

**Predictors of Self-Reported Alcohol Use and Attitudes toward Alcohol  
among 11 Year Old British Children with and without Intellectual  
Disability**

## Abstract

### Background

Reducing harmful levels of alcohol consumption among children is an important public health concern internationally and in many high income countries. Little is known about levels and predictors of alcohol use among children with intellectual disability.

### Method

Secondary analysis of child self-report data at age 11 years collected in the UK's Millennium Cohort Study.

### Results

Children with intellectual disability were significantly more likely to: **have used alcohol in the last four weeks**; to have had five or more alcoholic drinks on one occasion; **to have had five or more alcoholic drinks or been intoxicated on one occasion**; to have more positive attitudes about the psychological and social benefits of drinking; to have less negative attitudes about the social and physical costs of drinking. Potentially harmful levels of drinking (intoxication or 5+ alcoholic drinks on one occasion) among children with intellectual disability were associated with child smoking, having friends who use alcohol, reporting that drinking makes it easier to make friends and reporting that drinking reduces worrying. Children with intellectual disability accounted for 9% of all children with potentially harmful levels of drinking.

### Conclusion

Public health interventions to reduce potentially harmful drinking among children in general must recognise that children with intellectual disability are a potentially high risk group and ensure that interventions are appropriately adjusted to take account of their particular needs and situation. Future research in this area is needed to untangle the causal pathways between attitudes toward

alcohol and alcohol use among children with intellectual disability and the extent to which levels of alcohol use and predictors of alcohol use may be moderated by severity of intellectual disability.

## Introduction

Reducing harmful levels of alcohol consumption, including among children, is a long standing public health concern internationally and in many high income countries (Chief Medical Officer for England 2009, US Department Health & Human Services 2007, Public Health England 2014, World Health Organization 2010, World Health Organization 2014). In the United Kingdom (UK), for example, a range of initiatives had led to a decline in alcohol use among 11-15 year old children, from 64 per cent in 1990 to 39 per cent in 2013 (Fuller and Hawkins 2014). However, in 2013 six per cent of 11-year-olds in the UK reported that they had drunk alcohol (Fuller and Hawkins 2014).

Drinking at a young age, and particularly heavy or regular drinking, can result in physical or mental health problems, impair brain development, and put children at risk of alcohol-related accident or injury. More broadly it is also associated with missing or falling behind at school, violent and antisocial behaviour, unsafe sexual behaviour and alcohol dependency in later life (Hingson *et al.* 2009, US Department Health & Human Services 2007, Viner and Taylor 2007, Chou and Pickering 1992, Tapert *et al.* 2004-2005, Newbury-Birch *et al.* 2009, Chief Medical Officer for England 2009, Agrawal *et al.* 2006). Early onset drinking has been associated with single parent family status, parental drinking frequency, parental smoking, lower parental monitoring, a more disadvantaged home environment, having more friends who drink, child conduct disorder, smoking, male gender and white ethnicity (Donovan and Molina 2011, King and Chassin 2007, Hawkins *et al.* 1997, Hayatbakhsh *et al.* 2008, Rose *et al.* 2001, McGue *et al.* 2001, Lynskey and Fergusson 1995, Donovan 2004).

Very little is known about the prevalence of or risk factors associated with alcohol use among people with intellectual disability (Emerson and Hatton 2014, Steinberg 2009, Chapman and Wu 2012, McGillicuddy 2006, McGillicuddy 1999, Kerr *et al.* 2013, Minihan 2005). The available evidence suggests that while there appears to be a lower prevalence of alcohol use among **adults** with intellectual disability who are known to intellectual disability services, there is some evidence to

indicate a potentially elevated risk for alcohol abuse among those **adults** who do drink (Chapman and Wu 2012, Didden *et al.* 2009) (Westermeyer *et al.* 1996). In **contrast, in a recent large English community-based survey of parents of young children, rates of alcohol abuse were reported to be twice as high among parents with intellectual disabilities; 14% compared with 7% among parents without intellectual disabilities (Emerson and Brigham 2013). The difference between this and the previously mentioned studies could reflect the likely differences in severity of intellectual disability between those adults known to intellectual disability services and those who become parents.**

We are aware of only one study which has examined alcohol use among a population-based sample of adolescents with intellectual disability. In this study, based on secondary analysis of the 1999 British ONS Child and Adolescent Mental Health Survey, the prevalence of lifetime drinking was lower among 11-15 year old adolescents with intellectual disability **when compared to adolescents without intellectual disability (41% vs. 50%)** as was drinking at least once per month (12% vs. 22%) (Emerson and Turnbull 2005).

**Given the dearth of information on levels and predictors of alcohol consumption among children with intellectual disability and the acknowledged importance of reducing harmful levels of alcohol consumption among children (often by increasing their knowledge of and changing their attitudes toward alcohol use), the aims of the present study were to: (1) estimate the prevalence of alcohol use and attitudes toward alcohol among young British adolescents with and without intellectual disability; (2) to determine the extent to which any between-group differences could be attributable to between-group differences in family socio-economic position (cf., Emerson and Hatton 2014); and (3) to identify risk factors associated with alcohol use among adolescents with intellectual disability.**

## **Method**

The UK's Millennium Cohort Study (MCS) is the fourth in the series of British birth cohort studies. It aims to follow throughout their lives a cohort of over 18,000 children born in the UK between 2000

and 2002. MCS data are managed by the Centre for Longitudinal Studies at the University of London and are available to researchers registered with the UK Data Service. Full details of the design of MCS are available in a series of reports and technical papers (Plewis 2003, Plewis and Ketende 2006, Hansen 2014, Gallop *et al.* 2013, Platt 2014, Johnson 2009, Johnson 2012), key aspects of which are summarised below.

## Sampling

Participant families were randomly selected from Child Benefit Records, a non means-tested welfare benefit available to all UK children at the time the cohort was established. Sampling was geographically clustered to include all four countries of the UK (England, Wales, Scotland, Northern Ireland), and disproportionately stratified to over-sample children from ethnic minority groups and disadvantaged communities (Plewis 2007). Children and families were drawn from 398 randomly selected electoral wards in the UK. The first survey (MCS1) took place when children were nine months old and included a total of 18,552 families. *At the second survey (MCS2), undertaken when the children were three years of age, an additional 692 families joined the study. These 'new families', were, in principle, eligible at the first survey through living in one of the sampled wards and having a child of the relevant age, but had not been identified through the Child Benefit records in time to enable them to be included in the initial survey. Thereafter children in all the 19,244 families (original and 'new') formed the basis of the fieldwork sample for subsequent surveys.* Children were followed up at ages three (MCS2; 15,590 families, 81% response rate), five (MCS3; 15,246 families, 79% response rate), seven (MCS4; 13,857 families, 78% response rate) and eleven (MCS5; 13,287 families, 69% response rate). For each family, information was collected on the target child falling within the designated birth date window. For multiple births (e.g., twins, triplets) information was collected on all children. To avoid the statistical problems associated with the clustering of multiple births within households, the present analyses are restricted to the first named

target child in multiple birth households. All analyses used sampling weights provided with MCS data to adjust for the initial sampling design and biases in recruitment and retention at specific ages.

## Identification of children with intellectual disability

Child cognitive ability was assessed at age three using the Bracken School Readiness Assessment (Bracken 2002) and Naming Subscale of the British Ability Scales (BAS)(Elliott *et al.* 1997), selected subscales of the BAS at ages five and seven, and the National Foundation for Educational Research's Progress in Maths test at age seven. At age eleven children were given three cognitive tests; verbal similarities (BAS), the Spatial Working Memory task and the Cambridge Gambling task, both from the Cambridge Neuropsychological Test Automated Battery. Of the age eleven tests, only verbal similarities is closely related to traditional measures of IQ.

Following the approach previously used to estimate IQ from MCS data we extracted the first component ('g') from a principal component analysis of all available age-standardised subscale/test scores associated with validated IQ/general cognitive ability tests (cf., Jones and Schoon 2008, Totsika *et al.* 2014). For ages five and seven the first component accounted for 63% of score variance at age seven and 55% of score variance at age five. Following ICD-10 convention (World Health Organization 1996), we identified children as having intellectual disability if they scored two or more standard deviations below the mean on the first principal component at age seven (n=419 [3.3%] of 12,820 children for whom test results were available).

If cognitive test scores were missing at age seven, we identified children as having intellectual disability if they scored two or more standard deviations below the mean on the first principal component at age five (n=146 [6.5%] of 2,250 children). If cognitive test scores were missing at age five and at age seven, we identified children as having intellectual disability if they scored two or more standard deviations below the mean on the Bracken School Readiness Assessment at age three (n=49 [4.4%] of 1105 children). If Bracken scores were not available, we identified children as having intellectual disability if they scored two or more standard deviations below the mean on the BAS

Naming Subscale at age three (n=54 [7.6%] of 711 children). This process allowed us to classify intellectual disability on the basis of cognitive test scores for 99.1% of children participating at age seven.

For 125 children no cognitive test results were available at any age. Interviewers did not administer the assessments if the child 'has a learning disability/serious behavioural problem (e.g., severe ADHD, autism) which prevents them from carrying out the assessments', 'is unable to respond in the required manner for each assessment, e.g., reading, writing, manipulating objects', 'is not able to speak or understand English (or Welsh if applicable)' or if consent and co-operation were not forthcoming. For these children we identified intellectual disability on the basis of parental report at age seven. A child was identified as having intellectual disabilities if both of the following two criteria were met: (1) the child was reported to be receiving special education due to their 'learning difficulty' (the term used in educational services in the UK to refer to intellectual disability); (2) the child was reported to have 'great difficulty' in all three areas of reading, writing and maths. This led to the identification of another 11 children as having intellectual disability (8.8% of children for who no test scores were available).

Finally, we used the normalised verbal similarities standard score at age eleven to attempt to address potential errors in classification based on the age 7, 5 and 3 variables. Specifically, all children who had been identified as having intellectual disability who scored at or above the population mean on verbal similarities at age eleven were reclassified as not having intellectual disability (n=62, 7.6% of children previously classified as having intellectual disability). Similarly, all children identified as not having intellectual disability but who scored three or more standard deviations below the population mean on verbal similarities at age eleven were reclassified as having intellectual disability (n=76, 0.4% of children previously classified as not having intellectual disability).



The **overall classificatory** procedure led to the identification of 647 of the 18,495 (3.5%) children participating at Wave 1 where the child's mother was the primary informant as having intellectual disability. As expected, boys were significantly more likely than girls to be identified as having intellectual disability (4.3% vs 2.6%; OR=1.67, 95% CI 1.42-1.96) (**Emerson 2012**). At Wave 5 (age 11), 460 (3.6%) of the 12,780 children who participated were identified as having intellectual disability. **Of these, 64% were male, 76% white and 7% were also identified as having autism.**

## **Alcohol Use**

**Information on alcohol use was contained in a general child self-completion module.** The completion rate for **the whole module** was 87% (n=402) among children with intellectual disability and 97% (12,159) among children without intellectual disability. Of the 58 children with intellectual disability who did not complete this module, for 20 parental consent was not given and for 9 child consent was not obtained. No information is available on the reasons for non completion among the 29 children where consent had been obtained. **Among children for whom consent was given there was no statistically significant association between completion and child gender, child ethnicity, single parent status, maternal education, income poverty, material hardship or area deprivation.**

The self-completion module was paper based with options for audio support or presentation by the interviewer. Among children with intellectual disability, 78% completed the paper version (98% of children without intellectual disability), 11% used audio support and for 11% the questions were read by the interviewer. The level of support provided by the interviewer was recorded as 'none' (38% of children with intellectual disability, 55% of children without intellectual disability), 'help with some questions' (42% of children with intellectual disability, 40% of children without intellectual disability) and 'help with many questions' (20% of children with intellectual disability, 5% of children without intellectual disability). Information on alcohol use was provided by 369 children with intellectual disability (92% of those who completed at last part of the self-completion module) and

11,828 children without intellectual disability (97% of those who completed at last part of the self-completion module).

### *Alcohol Use*

We extracted data from five questions children were asked about alcohol use: (A1) *'Have you ever had an alcoholic drink? That is more than a few sips?'* (response options; yes/no); (A2) *'How many times have you had an alcoholic drink in the last 12 months?'* (response options; never, 1-2 times, 3-5 times, 6-9 times, 10-19 times, 20-39 times, 40 or more times); (A3) *'How many times have you had an alcoholic drink in the last 4 weeks?'* (response options; never, 1-2 times, 3-5 times, 6-9 times, 10-19 times, 20-39 times, 40 or more times); (A4) *'Have you ever drunk enough to feel drunk?'* (response options; yes/no); (A5) *'How many times have you had five or more alcoholic drinks at a time? A drink is half a pint of lager, beer or cider, one alcopop, a small glass of wine, or a measure of spirits.'* (response options; never, once, twice, 3 to 5 times, 6 to 9 times, 10 or more times). Due to small numbers: the '3-5 times, 6-9 times, 10-19 times, 20-39 times, 40 or more times' categories in A2 and A3 were combined for analysis; and the '3 to 5 times, 6 to 9 times, 10 or more times' categories in A5 were combined for analysis. **In order to create an indicator of potentially harmful early age drinking we created a new variable based on EITHER reporting having been intoxicated OR having had five or more drinks on one occasion.**

### *Attitudes towards Alcohol*

Children were asked ten questions about their beliefs about alcohol use; seven related to the psychological and social impact of drinking, three to the risks associated with different levels of drinking. Response options for the former were 'Strongly Agree, Agree, Disagree, Strongly Disagree'. Response options for the latter were 'No risk, Slight risk, Some risk, Great risk'. The questions were: (AA1) *'Drinking beer, wine, or spirits is a way to make friends with other people'*; (AA2) *'Drinking alcohol makes people worry less'*; (AA3) *'It is easier to open up and talk about one's feelings after a few drinks of alcohol'*; (AA4) *'Drinking alcohol gets in the way of school work'*; (AA5) *'Drinking alcohol*

*makes people happier with themselves*'; (AA6) *'Drinking alcohol makes it hard to get along with friends*'; (AA7) *'If I drank alcohol without my parents' permission I would be caught and punished*'; (AA8) *'How much do you think people risk harming themselves if they try one or two alcoholic drinks?'*; (AA9) *'How much do you think people risk harming themselves if they drink one or two alcoholic drinks nearly every day?'*; (AA10) *'How much do you think people risk harming themselves if they drink four or five alcoholic drinks almost every day?'*. Due to small numbers in cells: the 'Strongly Agree/ Agree' and 'Disagree/Strongly Disagree' categories were combined for analysis of AA1-AA7; the 'Slight risk/Some risk/Great risk' categories were combined for analysis of AA8-AA10.

## **Predictor Variables**

The following potential predictor variables were extracted from MCS data collected in Waves 1-4 (unless stated). **Selection of potential predictors was based on: (1) evidence of their association with early onset alcohol use among children in general (see Introduction); and (2) availability with the data set.**

### ***Child Gender***

Child gender was based on parental report.

### ***Child Ethnicity***

Child ethnicity was based on parental report and coded using the six category UK Census scheme: White; Mixed Ethnicity; Indian; Pakistani or Bangladeshi; Black or Black British; Other.

### ***Child Conduct Difficulties***

The Strengths and Difficulties Questionnaire (Goodman 2001) was completed by parents at Waves 2-4. The data were used to identify whether children at each wave met the UK criteria for 'borderline' or 'abnormal' conduct difficulties. A binary variable was created indicating whether the child had shown conduct difficulties at two or more waves.

### *Child Exposure to Bullying*

The Strengths and Difficulties Questionnaire (Goodman 2001) was completed by parents at **ages three, five and seven**. One item '*Picked on or bullied by other children*' was used to identify exposure to bullying at ages three, five and seven. A single binary variable (ever bullied) was derived from these data.

### *Parental Smoking & Alcohol Use*

Information was collected on whether the child's **parents** were current smokers. Following inspection of the distribution of these data, a binary measure of **parental** smoking was derived based on **either parent reporting** being a current smoker at two or more of the four waves of data collection. Information was also collected in from the main informant and, if present, their partner on their frequency of alcohol consumption. Following inspection of the distribution of these data, a binary measure of parental alcohol use was derived (one parent drinking at least weekly in at least one wave vs. not).

### *Peer Alcohol Use*

At Wave 5 children were asked one question about peer alcohol use (*'How many of your friends drink alcohol?'*). Response options for this question was; none of them, some of them, most of them, all of them. Due to small numbers in the 'most of them/all of them' categories the two categories were combined for analysis.

### *Maternal Educational Attainment*

Highest level of educational attainment across waves 1-5 was coded according to National Vocational Qualifications (NVQ) categories.

- No qualifications or NVQ Level 1: Competence that involves the application of knowledge in the performance of a range of varied work activities, most of which are routine and predictable (equivalent to one General Certificate of Secondary Education at grade D-G).

- NVQ Level 2: Competence that involves the application of knowledge in a significant range of varied work activities, performed in a variety of contexts. Collaboration with others, perhaps through membership of a work group or team, is often a requirement (equivalent to one GCSE at grade A\*-C).
- NVQ Levels 3-5: NVQ Level 3 requires competence that involves the application of knowledge in a broad range of varied work activities performed in a wide variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy and control or guidance of others is often required (equivalent to 1-5 Advance Level certificates at grades A\*-C).
- Overseas qualifications only.

### *Single Parent Family*

Following inspection of the distribution of data on household composition, a single binary measure of single parent family was derived based on being a single parent family at any of the four waves of data collection.

### *Domestic Violence*

Primary respondents were asked at Wave 1-5 *'People often use force in a relationship - grabbing, pushing, shaking, hitting, kicking etc. Has your [^husband/wife/partner] ever used force on you for any reason?'* A binary measure of domestic violence was derived to indicate whether force had been reported at any wave.

### *Parental Monitoring*

At Wave 5, the main parental informant was asked two questions related to parental monitoring: (1) *'How often, if at all, does [^Cohort child's name] spend time with [^his/her] friends, but without adults or older children, doing things like playing in the park, going to the shops or just 'hanging out' at the weekend?'* (response options: most weekends, at least once a month, less often than once a month, never); (2) *How often, if at all, does [^Cohort child's name] spend time with [^his/her] friends,*

*but without adults or older children, doing things like playing in the park, going to the shops or just 'hanging out' in the afternoon after school?' (response options: most days, at least once a week, once a month, less often than once a month, never). Following inspection of the data distributions a single binary parental monitoring variable was derived with 'low parental monitoring' being defined as spending unsupervised time with friends at weekends at least once a month and during weekdays at least one day a week.*

### ***Household Income Poverty***

Information on household income adjusted for household composition using the modified OECD equivalisation scale (Office for National Statistics 2014) and used to define household income poverty (equivalised household income falling 60% below the population median) (Pantazis *et al.* 2006). Following inspection of the distribution of these data a single binary measure of household income poverty was derived based on a household being in income poverty at any of the first four waves of data collection.

### ***Material Hardship***

Experiencing material hardship was defined in wave one as not owning three or more material assets from a list of eight (e.g., refrigerator, microwave). In subsequent waves material hardship was defined as not being able to afford two or more of a list of goods/activities that have been identified as basic necessities for UK families (e.g., a warm weatherproof coat for each child) (Pantazis *et al.* 2006). Overall material hardship was defined as experiencing material hardship in two or more of the four waves of data collection.

### ***Area Deprivation***

At each wave postcode data were linked to country-specific area-based measures of multiple deprivation (Noble *et al.* 2008). These were recoded into a binary measure of living in an area characterised by high levels of local area deprivation based on living in an area in the lowest quintile of neighbourhoods in a given country at all in the first four waves of data collection (vs. not).

## Approach to Analysis

As noted above, the three aims of the present study were to: (1) estimate the prevalence of alcohol use and attitudes toward alcohol among 11 year old British children with and without intellectual disability; (2) to determine whether any between-group differences could be attributable to between-group differences in family socio-economic position; and (3) to identify risk factors associated with alcohol use among children with intellectual disability.

Given the risk of recency and acquiescence bias among people with intellectual disability (Perry 2004), in the first stage of analysis we attempted to identify child respondents whose responses to self-completion questions about alcohol were of questionable reliability. To do this we examined responses to the six questions about the psychological and social benefits and costs of alcohol use (questions AA1-AA6, see above). Of these questions four were positively worded (e.g., *'Drinking .... is a way to make friends with other people'*) and two were negatively worded (e.g., *'Drinking ..... makes it hard to get along with friends'*). We defined questionable response reliability as either 'strongly agreeing' or 'strongly disagreeing' with all six items. This identified 508 children as showing questionable response reliability. Of these 464 had not been identified as having intellectual disability (3.6% of the initial non-intellectual disability subsample) and 44 had been identified as having intellectual disability (11.8% of the initial intellectual disability subsample). These respondents were excluded from all subsequent analyses giving effective subsample sizes of 325 children with intellectual disability and 11,364 children without intellectual disability.

In the **second** stage of analysis we used simple bivariate descriptive statistics to estimate the prevalence of alcohol use and attitudes toward alcohol among children with and without intellectual disability (**Aim 1**). In the **third** stage of the analysis we used multivariate logistic regression to estimate the risk (odds) of children with intellectual disability using alcohol and having less healthy attitudes toward alcohol use adjusted to take account of between-group differences in four

commonly used indicators of socio-economic position (income poverty, material hardship, maternal education, area deprivation, cf., Galobardes *et al.* 2006) (Aim 2).

In the final stage of analysis we determined the strength and statistical significance of the bivariate association between predictor variables and alcohol use at age 11 for children with and without intellectual disability. We then used multivariate logistic regression to determine the unique strength and statistical significance of the association between predictor variables that were significantly associated with alcohol use at age 11 among children with intellectual disability (Aim 3).

All analyses used appropriate wave-specific weights to take account of biases in the sampling frame (e.g., oversampling of households in Scotland, Wales and Northern Ireland), initial recruitment and participant attrition over time. We report categories of effect sizes for odds ratios following the recommendations of Olivier and Bell (small  $0.82 \leq$  or  $\geq 1.22$ , medium  $0.54 \leq$  or  $\geq 1.86$ , large  $0.33 \leq$  or  $\geq 3.00$ ) (Olivier and Bell 2013). Missing data in the predictor variables was handled through multiple imputation routines in SPSS version 22 to create five parallel data sets. The results of analyses pooled across the five are reported below.

## Results

### Estimated Prevalence of Alcohol Use

The estimated prevalence of alcohol use is presented in Table 2 for 11 year old British children with and without intellectual disability along with risk estimates (unadjusted and adjusted for four indicators of socio-economic position; income poverty, material hardship, maternal education, area deprivation). In the unadjusted comparisons children with intellectual disability were significantly more likely to report, when compared with their non-intellectually disabled peers: having had five or more alcoholic drinks on one occasion (large effect size); having either been intoxicated or having had five or more alcoholic drinks on one occasion (moderate effect size) and having used alcohol in the previous four weeks. In the adjusted comparisons, the greater prevalence among children with



intellectual disability of **having either been intoxicated or having had five or more alcoholic drinks on one occasion was no longer statistically significant and the effect size reduced to small**. The odds of having had five or more alcoholic drinks on one occasion were slightly attenuated, but the effect sizes remained moderate to large. Children with intellectual disability accounted for 9% of all children with potentially harmful levels of drinking (having either been intoxicated or having had five or more alcoholic drinks on one occasion).

[Insert Table 2]

### **Attitudes toward Alcohol**

Attitudes toward alcohol use among 11 year old British children with and without intellectual disability are presented in Table 3. In the unadjusted comparisons there were statistically significant differences between children with and without intellectual disability on five of the seven items related to the psychological and social impact of drinking, and on all three items related to the harm associated with different levels of drinking. Children with intellectual disability were more likely to agree with the positive benefits of drinking. **They were also** less likely to agree with the social and physical costs of drinking. Of particular note is that between group differences were of large effect sizes for the three items related to the harm associated with different levels of drinking, with the magnitude of effect increasing in dose dependent fashion with increasing levels of drinking.

Adjusting risk estimates to take account of between-group differences in family socio-economic position slightly reduced the risk estimates, but had no impact on the categorisation of effect sizes.

[Insert Table 3]

### **Predictors of Alcohol Use**

The strength of association and statistical significance of bivariate associations between predictor variables and having ever used alcohol and having ever been intoxicated or having ever had five or more drinks on one occasion are presented in Tables 4 and 5 for children with and without

intellectual disability. Among children with intellectual disability having ever had an alcoholic drink was significantly associated with eight variables (in order of effect size): **having ever smoked; having a mother with overseas educational qualifications; low parental monitoring; white ethnicity; reporting that drinking is a good way to make friends; parental smoking; conduct difficulties; and reporting that no risk is associated with daily drinking.** There were also medium (but statistically insignificant) effect sizes associated with lower maternal educational qualifications (NVQ Level 1).

[Insert Tables 4 and 5]

Having ever been intoxicated or having five or more drinks on one occasion was significantly associated with **four** variables (in order of effect size): **having friends who drink; having ever smoked; reporting that drinking reduces worrying; and reporting that drinking is a good way to make friends.** There were also medium or large (but statistically insignificant) effect sizes associated with: **conduct difficulties; having been bullied; parental smoking; low and overseas only maternal educational attainment; domestic violence; single parent family; material hardship; reporting that drinking makes it easier to open up; reporting that drinking increases happiness.**

Table 6 presents the results of multivariate logistic regression undertaken to estimate the unique association between statistically significant predictor variables and having ever used alcohol and having ever been intoxicated or having ever had five or more drinks on one occasion among children with intellectual disability. Child smoking and low parental monitoring were significantly associated with having ever used alcohol (both large effect sizes). Other predictors with moderate or large effect sizes were reporting that drinking makes it easier to make friends and white ethnicity. Child smoking and having friends who drink were significantly associated with having ever been intoxicated or having ever had five or more drinks on one occasion (both large effect sizes). Other predictors with moderate or large effect sizes were reporting that drinking reduces worry.

[Insert Table 6]

Given the strong association between alcohol use and smoking, the analytic procedures outlined above were repeated to identify socio-environmental factors associated uniquely with children with intellectual disability having ever smoked. Three variables were entered into the final stage of analysis with increased odds of having ever smoked being associated with: material hardship (OR=3.74 [1.01-13.86],  $p<0.05$ ); maternal smoking (OR=2.38 [1.14-5.00],  $p<0.05$ ); and white ethnicity (OR=2.61 [0.87-7.88], n.s.).

## Discussion

Our results indicated that within a contemporary nationally representative sample of 11 year old children in the UK, children with intellectual disability were significantly more likely to: **have used alcohol in the last four weeks**; to have had five or more alcoholic drinks on one occasion; **to have had five or more alcoholic drinks or been intoxicated on one occasion**; to have more positive attitudes about the psychological and social benefits of drinking; to have less negative attitudes about the social and physical costs of drinking. Potentially harmful levels of drinking (intoxication or having had five or more alcoholic drinks on one occasion) among children with intellectual disability were associated with child smoking and having friends who use alcohol.

**The only similar previous study of which we are aware reported that the prevalence of lifetime drinking was marginally lower among 11-15 year old adolescents with intellectual disability when compared to adolescents without intellectual disability and drinking at least once per month was markedly lower (Emerson and Turnbull 2005). It is not possible to determine whether the differences between this and the present study, especially with regard to more frequent drinking, are due to cohort effects (cf., Fuller and Hawkins 2014) or differences in age range, question format or other methodological issues.**

These results are of importance on three counts. First, they indicate that, in the UK, children with intellectual disability are at increased risk of early experimentation with alcohol and, in particular,

experimentation with potentially harmful levels of drinking. As noted in the introduction, drinking at a young age, and particularly heavy or regular drinking, can result in physical or mental health problems, impair brain development, put children at risk of alcohol-related accident or injury and is associated with missing or falling behind at school, violent and antisocial behaviour, unsafe sexual behaviour and alcohol dependency in later life (Hingson et al. 2009, US Department Health & Human Services 2007, Viner and Taylor 2007, Chou and Pickering 1992, Tapert et al. 2004-2005, Newbury-Birch et al. 2009, Chief Medical Officer for England 2009, Agrawal et al. 2006). Public health interventions to reduce potentially harmful drinking among children in general need recognise that children with intellectual disability are a potentially high risk group (accounting for just under one in ten of UK children with potentially harmful levels of drinking at an early age) and ensure that interventions are appropriately adjusted to take account of the particular needs and situation of children with intellectual disability (Public Health England in press). Second, they add significantly to the dearth of literature on alcohol use among children with intellectual disability. Third, by being based on a contemporary nationally representative sample of 11 year old children the data avoid the problem of unrepresentativeness, which is endemic within much health-related research in this area (Emerson and Hatton 2014).

However, as in all studies, there are limitations that need to be taken into account when considering the salience of these findings. First, while having access to a large, longitudinal dataset is an asset, datasets (such as the MCS) that are designed for multiple purposes commonly utilise abbreviated forms of measures such as the abbreviated scales of cognitive functioning (rather than complete IQ tests) used in the MCS. *As such, it is likely that our approach to classifying intellectual disability contains a degree of error. Unfortunately it is not possible to quantify the extent of this error.* Second, while the overall sample was relatively large, it was of insufficient size to examine the extent to which our results generalized to children with severe intellectual disability. It is important, to keep in mind, therefore, that our results regarding intellectual disability primarily relate to children with mild or moderate intellectual disability.

Third, there are clear limitations associated with sole reliance on self-report data, especially when applied to factors that may be subject to significant social desirability biases (e.g., being intoxicated) or when collected from respondents with impaired intellectual and communicative abilities (Perry 2004, Finlay and Lyons 2001, Heal and Sigelman 1995). While our screening to exclude acquiescence and recency bias is likely to have reduced error in self reporting by participants with intellectual disability, it is likely that some error will remain. However, it is important to note that the vast majority of the small amount of research on response bias among people with intellectual disabilities has been undertaken with adults with intellectual disability who are recipients of specialised intellectual disability services. Indeed, of the studies reviewed by Heal and Sigelman (1995), only two examined response bias in adolescents with intellectual disability; one based on a sample of 52 adolescents drawn from residents of a state institution, the other based on a sample of 57 adolescents who either attended a special school for the ‘trainable retarded’ or attended special education classes. The extent to which this body of knowledge on the prevalence of response bias can be generalised to contemporary population-based samples is unclear. For example, a relatively recent analysis of the validity of the self-completion form of the Strengths and Difficulties Questionnaire by a population-based sample of 98 British adolescents with intellectual disability reported minimal evidence of response bias (Emerson 2005).

Fourth, the use of a large number of predictor variables increases the probability of Type 1 error (falsely rejecting a true null hypothesis). However, given the exploratory nature of the study, the highly limited nature of the existing literature and our focus on reporting effect sizes (rather than null hypothesis significance testing), we considered it appropriate to accept this limitation rather than address it by significantly limiting either the number of variables explored or modifying alpha values. Finally, the cross-sectional nature of the data does not allow for any conclusions to be drawn regarding causal relationships among the variables. While in some instances potential causal relationships may be ruled out on the basis of plausibility (e.g., alcohol use cannot have an impact on child ethnicity), in other instances the direction of any casual relationship is extremely unclear (e.g.,

between attitudes toward alcohol and alcohol use). Future research in this area is needed to **test the generalisability of the present results and** untangle the causal pathways between attitudes toward alcohol and alcohol use among children with intellectual disability and the extent to which levels of alcohol use and predictors of alcohol use may be moderated by severity of intellectual disability.

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Table 1: Summary of Measures

<i>Background predictor variables</i>	<i>Attitudes toward alcohol use</i>	<i>Self-reported alcohol use</i>
Gender	Alcohol and peer relations: (1) drinking is a way to make friends with other people; (2) it is easier to open up and talk about one's feelings after a few drinks; (3) drinking makes it hard to get along with friends	Ever had an alcoholic drink
Ethnicity	Alcohol and psychological wellbeing : (1) drinking makes people worry less; (2) drinking makes people happier with themselves	Ever been intoxicated
Conduct difficulties	Alcohol and education: drinking gets in the way of school work	Number of times had an alcoholic drink in the last: (1) 12 months (2) 4 weeks
Indicators of socio-economic position: (1) maternal educational attainment; (2) income poverty; (3) material hardship; (4) area deprivation	Risk of detection (If I drank without my parents' permission I would be caught and punished)	Number of times had 5+ alcoholic drinks on one occasion
	Risk of harm if people: (1) try one or two alcoholic drinks; (2) drink one or two alcoholic drinks nearly every day; (3) drink four or five alcoholic drinks almost every day	Ever been intoxicated or had 5+ alcoholic drinks on one occasion
Single parent family		
Low parental monitoring		
Mother smokes		
More frequent parental drinking		
Domestic violence		
Bullied		
Friends drink		
Has smoked cigarette		

Table 2: Estimated prevalence of alcohol use and smoking among 11 year old British children with and without intellectual disability				
Indicator	Prevalence		OR (with 95% CI) and p value	
	Intellectual disability	No intellectual disability	Unadjusted	Adjusted
Ever had an alcoholic drink	15.8%	13.2%	1.24 (0.91-1.68)	1.18 (0.86-1.61)
Ever been intoxicated	1.2%	1.0%	1.21 (0.44-3.29)	0.69 (0.22-2.16)
Number of times had an alcoholic drink in the last 12 months				
Never	91.0%	89.5%	1.0 (ref)	1.0 (ref)
Once or twice	5.6%	7.9%	0.71 (0.44-1.15)	0.70 (0.43-1.15)
Three or more times	3.4%	2.6%	1.26 (0.66-2.28)	1.20 (0.62-2.32)
Number of times had an alcoholic drink in the last 4 weeks				
Never	94.7%	97.1%	1.0 (ref)	1.0 (ref)
Once or twice	4.6%	2.5%	1.81* (1.06-3.10)	<b>1.97*</b> <b>(1.14-3.43)</b>
Three or more times	0.6%	0.4%	<b>1.99</b> <b>(0.55-7.14)</b>	1.45 (0.34-6.11)
Number of times had 5+ alcoholic drinks on one occasion				
Never	96.6%	99.2%	1.0 (ref)	1.0 (ref)
Once	1.9%	0.6%	<b>3.16**</b> <b>(1.36-7.36)</b>	<b>2.60*</b> <b>(1.07-6.35)</b>
Two or more times	1.6%	0.2%	<b>6.60***</b> <b>(2.55-17.12)</b>	<b>4.93**</b> <b>(1.76-13.90)</b>
Ever been intoxicated or had 5+ alcoholic drinks on one occasion	2.8%	1.2%	<b>2.26*</b> <b>(1.15-4.48)</b>	1.49 (0.72-3.10)
Notes: OR – odds ratio, p – probability, CI – confidence interval * p<0.05, ** p<0.01, *** p<0.001 ORs in bold indicate medium or large effect size				

Table 3: Attitudes toward alcohol use among 11 year old British children with and without intellectual disability				
	ID	No ID	OR (with 95% CI) and p value	
	% agree or strongly agree		Unadjusted	Adjusted
(AA1) <i>'Drinking beer, wine, or spirits is a way to make friends with other people'</i>	16.1%	6.5%	<b>2.75***</b> <b>2.03-3.73</b>	<b>2.44***</b> <b>(1.78-3.35)</b>
(AA2) <i>'Drinking alcohol makes people worry less'</i>	35.2%	27.5%	1.43* 1.14-1.80	1.32* (1.04-1.68)
(AA3) <i>'It is easier to open up and talk about one's feelings after a few drinks of alcohol'</i>	32.7%	30.4%	1.11 0.88-1.40)	1.12 (0.87-1.43)
(AA4) <i>'Drinking alcohol gets in the way of school work'</i>	<b>68.8%</b>	<b>81.8%</b>	<b>0.49***</b> <b>(0.39-0.62)</b>	0.56*** (0.44-0.72)
(AA5) <i>'Drinking alcohol makes people happier with themselves'</i>	25.8%	26.2%	0.98 (0.76-1.25)	1.05 (0.81-1.36)
(AA6) <i>'Drinking alcohol makes it hard to get along with friends'</i>	52.1%	69.4%	<b>0.48***</b> <b>(0.39-0.60)</b>	<b>0.45***</b> <b>(0.36-0.57)</b>
(AA7) <i>'If I drank alcohol without my parents' permission I would be caught and punished'</i>	82.2%	91.2%	<b>0.44***</b> <b>(0.33-0.59)</b>	<b>0.44***</b> <b>(0.32-0.60)</b>
	% reporting 'no risk'			
(AA8) <i>'How much do you think people risk harming themselves if they try one or two alcoholic drinks?'</i>	25.9%	6.0%	<b>5.42***</b> <b>(4.17-7.06)</b>	<b>4.78***</b> <b>(3.62-6.30)</b>
(AA9) <i>'How much do you think people risk harming themselves if they drink one or two alcoholic drinks nearly every day?'</i>	21.1%	2.9%	<b>9.06***</b> <b>(6.79-12.08)</b>	<b>6.30***</b> <b>(4.55-8.72)</b>
(AA10) <i>'How much do you think people risk harming themselves if they drink four or five alcoholic drinks almost every day?'</i>	18.2%	1.9%	<b>11.48***</b> <b>(8.41-15.66)</b>	<b>7.48***</b> <b>(5.33-10.52)</b>
Notes: OR – odds ratio, p – probability, CI – confidence interval, ID – intellectual disability * p<0.05, ** p<0.01, *** p<0.001 ORs in bold indicate medium or large effect size				

Table 4: Bivariate Association between Predictor Variables and Ever Having an Alcoholic Drink among 11 Year of British Children with and without Intellectual Disability

	ID (OR with 95% CI & p)	No ID (OR with 95% CI & p)
Has smoked cigarette	<b>8.87*** (3.74-21.03)</b>	<b>6.32*** (5.03-7.94)</b>
Female gender	0.74 (0.39-1.40)	0.71*** (0.64-0.80)
White ethnicity	<b>3.21* (1.16-8.91)</b>	<b>3.23*** (2.55-4.09)</b>
Conduct difficulties	<b>2.15* (1.03-4.51)</b>	1.38*** (1.19-1.60)
Bullied	1.47 (0.26-8.37)	1.11 (0.78-1.58)
Parent smokes	<b>2.22* (1.12-4.42)</b>	1.64*** (1.47-1.83)
More frequent parental drinking	1.53 (0.78-2.98)	1.55*** (1.34-1.78)
Maternal educational attainment		
NVQ Level 3-5	1.0 (ref)	1.0 (ref)
NVQ Level 2	1.31 (0.42-4.15)	1.17* (1.03-1.33)
NVQ Level 1 or none	<b>2.08 (0.73-5.90)</b>	1.29*** (1.12-1.48)
Overseas qualifications only	<b>5.56* (1.28-24.11)</b>	0.94 (0.67-1.32)
Domestic violence	1.10 (0.70-1.73)	1.10* (1.01-1.21)
Low parental monitoring	<b>4.59*** (2.15-9.77)</b>	1.46*** (1.31-1.63)
Single parent family	0.98 (0.54-1.81)	1.33*** (1.19-1.49)
Income poverty (2+ waves)	0.95 (0.31-2.96)	1.16* (1.03-1.32)
Material hardship (2+ waves)	1.23 (0.44-3.44)	1.15 (1.00-1.33)
Area deprivation	1.19 (0.53-2.68)	0.90 (0.73-1.10)
Friends drink	None	1.0 (ref)
	Some	1.79 (0.062-5.19)
	Most/all	<b>2.25 (0.53-9.66)</b>
(AA1) way to make friends	<b>3.07** (1.51-6.24)</b>	<b>1.93*** (1.61-2.32)</b>
(AA2) worry less	1.54 (0.83-2.87)	1.66*** (1.48-1.86)
(AA3) easier to open up	1.44 (0.77-2.71)	1.71*** (1.53-1.91)
(AA4) gets in the way of school work	0.77 (0.41-1.47)	0.69*** (0.60-0.78)
(AA5) happier with themselves	1.55 (0.80-3.00)	1.64*** (1.46-1.84)
(AA6) hard to get along with friends	0.70 (0.38-1.28)	<b>0.54*** (0.48-0.60)</b>
(AA7) caught and punished	0.58 (0.28-1.19)	0.64*** (0.54-0.76)
(AA8) no risk - one or two drinks	0.81 (0.38-1.71)	1.60*** (1.31-1.95)
(AA9) no risk - one or two every day	<b>2.12* (1.07-4.19)</b>	<b>1.89*** (1.45-2.46)</b>
(AA10) no risk - four or five every day	1.81 (0.89-3.69)	0.92 (0.61-1.38)
Notes: OR – odds ratio, p – probability, CI – confidence interval		
* p<0.05, ** p<0.01, *** p<0.001		
ORs in bold indicate medium or large effect size		

Table 5: Bivariate Association between Predictor Variables and Ever Having been Intoxicated or Ever Having Five or More Alcoholic Drinks on One Occasion among 11 Year of British Children with and without Intellectual Disability

	ID (OR with 95% CI & p)	No ID (OR with 95% CI & p)
Has smoked cigarette	<b>14.62** (3.41-62.74)</b>	<b>16.40*** (11.22-23.97)</b>
Female gender	1.76 (0.43-7.21)	0.57** (0.40-0.80)
White ethnicity	<b>0.38 (0.09-1.58)</b>	<b>2.25* (1.16-4.39)</b>
Conduct difficulties	<b>2.28 (0.09-58.87)</b>	<b>2.85*** (2.03-4.00)</b>
Bullied	<b>4.72 (0.93-23.95)</b>	<b>2.43 (0.84-6.99)</b>
Parent smokes	<b>0.51 (0.12-4.36)</b>	<b>1.86*** (1.33-2.60)</b>
More frequent parental drinking	1.02 (0.24-4.36)	0.83 (0.69-1.00)
Maternal educational attainment		
NVQ Level 3-5	1.0 (ref)	1.0 (ref)
NVQ Level 2	<b>5.05 (0.27-95.9)</b>	<b>2.43*** (1.52-3.88)</b>
NVQ Level 1 or none	1.56 (0.07-33.07)	<b>3.80*** (2.41-5.99)</b>
Overseas qualifications only	<b>20.13 (0.90-447.69)</b>	<b>1.96 (0.77-5.00)</b>
Domestic violence	<b>0.53 (0.06-4.93)</b>	1.10 (0.84-1.45)
Low parental monitoring	1.06 (0.26-4.34)	<b>2.34*** (1.64-3.33)</b>
Single parent family	<b>3.53 (0.63-19.81)</b>	<b>3.15*** (2.25-4.40)</b>
Income poverty (2+ waves)	1.04 (0.12-8.69)	<b>2.41*** (1.41-4.11)</b>
Material hardship (2+ waves)	<b>0.42 (0.01-14.43)</b>	<b>2.64*** (1.83-3.82)</b>
Area deprivation	1.40 (0.11-17.55)	1.61 (0.99-2.60)
Friends drink		
None	1.0 (ref)	1.0 (ref)
Some	<b>25.84*** (3.16-211.20)</b>	<b>9.10*** (6.37-13.00)</b>
Most/all	<b>49.65*** (5.68-433.88)</b>	<b>7.09*** (2.82-17.85)</b>
(AA1) way to make friends	<b>5.04* (1.21-20.98)</b>	<b>4.57*** (3.09-6.75)</b>
(AA2) worry less	<b>5.94* (1.18-29.54)</b>	<b>2.52*** (1.81-3.51)</b>
(AA3) easier to open up	<b>0.15 (0.01-2.34)</b>	<b>2.72*** (1.95-3.78)</b>
(AA4) gets in the way of school work	0.89 (0.20-4.01)	<b>0.45*** (0.31-0.63)</b>
(AA5) happier with themselves	<b>2.34 (0.57-9.68)</b>	<b>2.41*** (1.75-3.39)</b>
(AA6) hard to get along with friends	0.55 (0.13-2.33)	<b>0.47*** (0.34-0.65)</b>
(AA7) caught and punished	1.74 (0.19-16.11)	<b>0.33*** (0.22-0.49)</b>
(AA8) no risk - one or two drinks	<b>0.17 (0.01-2.92)</b>	<b>3.61*** (2.35-5.54)</b>
(AA9) no risk - one or two every day	1.33 (0.27-6.62)	<b>4.76*** (2.85-7.95)</b>
(AA10) no risk - four or five every day	1.18 (0.21-6.66)	<b>4.36*** (2.33-8.16)</b>
Notes: OR – odds ratio, p – probability, CI – confidence interval		
* p<0.05, ** p<0.01, *** p<0.001		
ORs in bold indicate medium or large effect size		



Table 6: Unique Associations (OR with 95% CI & p) Between Predictor Variables and Alcohol Use Among Children with Intellectual Disability

	Ever Had an Alcoholic Drink	Ever Having been Intoxicated or Ever Having Five or More Alcoholic Drinks on One Occasion
Has smoked cigarette	<b>4.93** (1.89-12.83)</b>	<b>7.29* (1.25-42.40)</b>
White ethnicity	<b>2.34 (0.63-7.92)</b>	
Conduct difficulties	1.57 (0.59-4.21)	
Parent smokes	1.15 (0.48-2.74)	
Low parental monitoring	<b>3.48** (1.48-8.19)</b>	
Friends drink		<b>21.17* (2.00-224.58)</b>
(AA1) way to make friends	<b>2.21 (0.93-5.22)</b>	1.17 (0.22-6.26)
(AA2) worry less		<b>5.98 (0.93-38.61)</b>
(AA10) no risk – 1/2 every day	1.59 (0.71-3.57)	
Notes: OR – odds ratio, p – probability, CI – confidence interval * p<0.05, ** p<0.01, *** p<0.001 ORs in bold indicate medium or large effect size		