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Early life socio-economic position and later alcohol use: birth cohort study

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ABSTRACT

Aims To investigate associations between socio-economic position in early life and later alcohol use and problem use among male and female adolescents. **Design** Birth cohort study. **Setting** South West England. **Participants** A total of 2711 girls and 2379 boys with one or more measures of alcohol use or problem use at age 15 years. **Measurements** Exposure measures were highest parental social class, maternal education and household disposable income (all maternal self-report before school-age); outcome measures were heavy typical drinking, frequent drinking, regular binge drinking, alcohol-related psychosocial problems and alcohol-related behavioural problems. **Findings** Alcohol use and related problems were relatively common amongst adolescent girls and boys. Boys were slightly more likely to report frequent drinking and girls were slightly more likely to drink heavily and to experience alcohol-related psychosocial problems. Higher maternal education appeared protective in relation to alcohol-related problems, particularly among boys. Higher household income was associated with greater risk of alcohol use and problem use, most apparently among girls. **Conclusions** Children from higher-income households in England appear to be at greater risk of some types of adolescent alcohol problems, and these risks appear different in girls compared to boys. Childhood social advantage may not generally be associated with healthier behaviour in adolescence.

Keywords Alcohol problems, alcohol use, ALSPAC, gender interaction, gender, health inequalities, missing data, social status.

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INTRODUCTION

Alcohol is the most common psychoactive substance used and abused by adolescents world-wide [1–3]. Alcohol use is associated with substantial harms at both the individual and community level [4]. The use of alcohol in childhood and adolescence has been associated with both proximal (e.g. antisocial behaviour, poor academic performance, unintentional injuries) and distal (mental and physical health problems) adverse consequences [5–7]. Adolescent problem alcohol use may also cluster with other adolescent health risk behaviours [7,8].

Problem substance use in adolescence and adulthood shows a relatively consistent general association with childhood disadvantage [9]. A previous systematic review found little consistent evidence to support an association between childhood disadvantage and later use or problem use of alcohol [10]. Although some evidence suggested heavier alcohol use among adolescents from more disadvantaged backgrounds [11], other studies found that less disadvantaged childhood circumstances were associated with greater risk of alcohol use in later life [12,13]. Associations between childhood socio-economic position (SEP) and alcohol use might differ from those between SEP and more problematic use [10].

Childhood social position may influence adolescent substance use through a number of mechanisms. Children from more disadvantaged backgrounds are more likely to have been exposed to a number of early adversities, including parental substance abuse and psychological problems and family dissolution [14]. These exposures may also associate with later problem substance use

[8,15]. In particular, childhood externalizing disorders such as conduct problems have been shown to predict later problem substance use [16–18]. Externalizing disorders are also more common among disadvantaged children. However, childhood social advantage may also increase the risk of adolescent substance use, particularly in the case of relatively accessible substances [2,19,20]. Socially advantaged children may be more likely to have the means to purchase alcohol and may be more likely to live in homes where alcohol is available [10]. The particular measure of SEP may also matter regarding the nature of these associations. For example, an inverse relationship between parental education and alcohol use is often assumed, but evidence is weak [10,12,13,21,22]. Evidence on associations between alcohol use and other childhood socio-economic indicators, such as household income or social class, is even more controversial and may suggest a complex picture [10].

Young people tend to consume alcohol for its pleasurable and inebriating effects [2,23,24]. Occurrences of heavy episodic drinking sessions (binge drinking) or drinking to intoxication are common among adolescent drinkers world-wide [2,3,25]. In Britain, too, more positive expectations about alcohol use have been linked to more problem use [2]. Hibell *et al.* [2] reported that boys aged 15–16 in the United Kingdom consumed on average 6.9 cl of pure alcohol on the latest occasion, and girls of the same age consumed 5.7 cl, exceeding the current recommendations for adults [6]. Although some evidence suggests convergence of male and female drinking patterns [2,25,26], other evidence points to important gender differences [1,2,26,27]. For example, boys in the United States have their first drink earlier than girls, drink more frequently and are more likely to binge drink [1].

In mid-adolescence, girls have been reported to mature earlier and to be exposed to higher contextual influences than boys, which may impact upon substance-related behaviour [15,28–30]. Within and across strata of SEP they may also observe different cultural norms to that of boys [29–31]. Therefore, the association between parental SEP and offspring alcohol use could vary by gender. However, evidence is mixed. Most studies reported SEP–adolescent alcohol associations that appeared consistent across genders [10–12,22,32]. One study tested explicitly for gender differences in the association of alcohol consumption with indicators of paternal/maternal education/occupation and found none [32]. Other studies reported a gender-specific effect of dimensions or constructs of SEP on adolescent alcohol use, with contrasting evidence in their reciprocal direction [19,27]. For example, Richter *et al.* [19] reported that, across a number of countries, with the exception of one, family affluence was related positively to drunkenness in boys, but not in girls.

A recent systematic review of evidence on these questions [10] noted contradictory findings and further highlighted a general lack of prospective studies where measurement of SEP clearly preceded measurement of alcohol, where different dimensions of SEP were considered, where the distinction was made between problematic and non-problematic alcohol use and where possible gender differences were examined. This review also noted a general lack of evidence related to alcohol use patterns in contemporary adolescents. We used data from the Avon Longitudinal Study of Parents and Children (a contemporary birth cohort study in South West England) to address these questions. We investigated associations between different dimensions of early childhood SEP and multiple measures of later alcohol use and problem use and whether these associations differed in boys and girls.

METHODS

The Avon Longitudinal Study of Parents and Children (ALSPAC) recruited 14 541 pregnant women from the former Avon area (southwest UK) in the early 1990s. The mothers and their offspring have been followed-up to date to investigate aspects of their general health and wellbeing, including offspring substance use and detailed socio-demographic data (http://www.bristol.ac.uk/alspac/) [20,33,34]. Informed written consent and assent were obtained from the adult participants and the young people. The ALSPAC Ethics and Law Committee and the Local Research Ethics Committee approved the study.

Participants

The original birth cohort comprised 13 973 live infants at 1 year of known sex [34]. Those with known addresses and still participating were invited to a clinical assessment at age 15 years (n = 10 040, 71.9%); 5246 (52.3%) eligible subjects attended the clinic. Adolescents with a lower SEP (according to multiple indicators) were less likely to participate ($P < 0.001$). Girls (2771, 52.8%) were more likely than boys (2475, 47.2%) to participate ($P < 0.001$) and they were slightly older ($P = 0.001$). A total of 5090 subjects (2711 girls, 2379 boys, response rate: 50.7%) reported some alcohol consumption at age 15. Given the complexity and longevity of the overall ALSPAC project, the attrition rate and its implications have been described comprehensively elsewhere [20,34].

SEP

All SEP indicators were obtained from self-administered questionnaires to the mother. Based on the Registrar General's classification of occupations [35], parental social class was defined as the highest rank between parents (mainly the father's occupation) and grouped into four

categories: V (unskilled) or IV (semi-skilled manual), III (skilled manual or non-manual), II (managerial and technical) and I (professional), and used as an indicator of social capital [14]. The highest maternal educational attainment was categorized as 'less than O-level', 'O-level', 'A-level' and 'university degree' as a measure of human capital. Both social class and education were collected in pregnancy. A measure of household disposable income was averaged over two observations at ages 3 and 4 years of the index child and split into quintiles to denote material capital [14]. The measure had been rescaled preliminarily to account for family size and composition, estimated housing benefits and was expressed in 1995 prices for comparability across families [20]. Father's education and maternal social class, as reported by the mother, were also considered for inclusion. Due to relatively higher proportions of missing data, good correlations with the variables included and either consistent or weaker findings in preliminary investigations, they were excluded from further analyses. All SEP indicators included were correlated moderately, as reported previously [20].

Alcohol measures

Adolescents reported detailed information on their alcohol consumption via a computer at age 15 years. We first derived a variable for early alcohol onset ($\leq$11 years) to measure pre-adolescence alcohol use, as both an intermediate outcome and a marker of later problem use [15,16,36]; the earliest available information from six surveys from age 10 to 16 years was used in hierarchical order to minimize recall bias and maximize the sample for the analyses. For the main outcome variables we focused on data from the clinic at 15 years, as this was after the peak incidence of alcohol initiation; data were adequate to derive multiple phenotypes of alcohol use and response rate was relatively high. The following binary variables for alcohol use were defined: heavy typical drinking (more than four drinks per occasion in the previous 6 months), which constitutes sufficient level for intoxication in this age group for both genders [37]; frequent drinking ($\geq$20 times in the previous 6 months), which is akin to weekly drinking compared to other studies [2,19,25]; and regular binge drinking (consuming more than five drinks in any 24-hour period in the previous 2 years on $\geq$20 occasions), which adapts a common definition for binge drinking [15,21]. If participants reported any binge drinking in the past 2 years, but failed to report on the number of times they did so, they would be classified as 'no' ($n = 537$). Two additional indicators defined alcohol problem use. Alcohol psychosocial problems experienced in the previous 2 years on more than three occasions (to exclude chance occurrences) included any of the following eight items (yes/no): 'set a limit, drank more'; 'felt should stop/cut back on drinking'; 'spent a great deal of day drinking'; 'not done things because of drinking'; 'continued to drink despite causing problems'; 'unable to keep up with other activities'; 'parents/friends complained'; and 'had a "blackout" because of drinking'. Alcohol behavioural problems, defined similarly, included any of four dichotomous items: 'used alcohol in dangerous situations'; 'been accidentally physically hurt while drinking'; 'had a problem with the police' and 'got into fights because of drinking'. These latter measures are also comparable with other constructs and with criteria for alcohol dependence or harmful use in adults [2,3,38,39].

Additional exposures

- Maternal smoking in early childhood: maximum number of cigarettes per day smoked between the child's birth and 4 years (none, $\leq$20, >20), as reported across five surveys.
- Maternal drinking in early childhood: at the same surveys above, mothers were classified as 'non-drinking' (0), 'drinking less than daily' (1) or 'drinking daily' (2). A total score was derived and categorized subsequently as 0–1, 2–4, 5, 6+ to minimize misclassification for non-response and due to small numbers in extreme cells.
- Paternal smoking in pregnancy: father's smoking was based on both maternal and own reports across two surveys in pregnancy. If they reported any form of tobacco use or smoking on more than one occasion per day at either survey they were classified as smokers.
- Father's absence: measure derived from multiple self-reports asked of the mother about the biological father's presence/absence in the household between birth and age 10 of the child. The father was classified ultimately as either 'ever absent' or 'present' between birth and 5 years, as a period of particular susceptibility [40].
- Conduct problems: both asked of the mother and the teacher at child's age 11. The highest score reported based on the Strengths and Difficulties Questionnaire [41] was then ordered as 0, 1, 2, 3, 4, 5+ due to small counts in extreme cells.
- Alcohol onset: as defined previously; this was included as an exposure of alcohol use at 15.

All these childhood exposures were considered as they have been reported previously to predict alcohol use in adolescence and to be associated with SEP.

Statistical analysis

Patterns of drinking are reported by gender. Multivariable logistic regressions were fitted to each alcohol measure at age 15 and included all three indicators of SEP, child's gender and actual age at reporting as

explanatory variables. Age was included, as girls were slightly older than boys due to differential response patterns. All SEP indicators entered the analysis as linear terms, as there was no strong evidence of any non-linear relationship. In a second step, interaction terms between each SEP indicator and child's gender were then tested for each outcome. If a likelihood ratio test had a $P < 0.05$, an interaction term was included and retained in further analyses. Because early SEP may influence early alcohol onset, which can then determine adolescent alcohol use at 15 and possibly conceal other parenting variables associations [16,17,36], each model was adjusted further for all remaining exposures (step 3) and separately for alcohol onset (step 4). Alcohol onset was also analysed as an outcome to aid interpretation of the results.

Missing data

To assess the potential for selection bias we also ran sensitivity analyses after multiple imputations of missing data on the original cohort ($n = 13\,973$). Covariates and outcomes were imputed iteratively by chained equations [42–44], which assume that data are missing at random, given the observed characteristics of the individuals included in the imputation model. We entered 67 variables overall into the model, which included the measures of interest and auxiliary data to predict both their missingness and the missing values [44]. Conditional imputations were stratified by gender to allow for any interaction with other variables [44]. One hundred imputations of 10 cycles each were run through the command *ice* in Stata version 11.2 [42]. Parameter estimates were then summarized according to Rubin's rules through the command *mim* [42]. This method has been described and applied similarly elsewhere [20,44]. We restricted the analysis of the associations of interest only to subjects with one or more measures of alcohol available ($n = 7921$), including early alcohol onset, as outcome imputations across cycles out with this sample were unstable [44].

RESULTS

Patterns of alcohol use

A greater proportion of boys reported early-onset drinking than girls (Table 1). Boys and girls had similar patterns of alcohol use at age 15 (Table 1). However, a greater proportion of girls reported heavy typical drinking, whereas boys were more likely to report frequent drinking. Approximately 10% of boys and girls reported binge drinking regularly. A higher proportion of girls (nearly 28 versus 24% in boys) reported alcohol-related psychosocial problems. The prevalence of alcohol-related behavioural problems was similar to that of binge drinking and similar in boys and girls.

Table 1 Early drinking onset (≤age 11) and measures of alcohol use and problem use at age 15 by gender.

	Boys		*Girls*		
Alcohol measure	*n*[a]	*%*	*n*[a]	*%*	*P*
Early drinking[b]	3757	17.4	4042	15.2	0.009
Heavy typical drinking	2289	19.7	2611	22.6	0.012
Frequent drinking	2359	20.6	2691	18.1	0.024
Regular binge drinking	2371	10.6	2696	10.1	0.50
Alcohol psychosocial problems	2336	23.8	2678	27.8	0.001
Alcohol behavioural problems	2349	10.0	2695	9.1	0.27

[a]*n* represents the total number of respondents for each measure; *n* may vary due to missing data. From these numbers, row percentages are calculated by gender. [b]The total observations for this measure are noticeably larger than for other measures, as early drinking onset is derived from multiple surveys of age 10 to 16. *P*-values are reported by Pearson's χ^2 statistics.

Early drinking onset and SEP

Higher maternal education was associated negatively with early drinking onset (Table 2). Risk of early drinking onset did not appear to be related independently to either disposable income or occupational class.

Alcohol use and SEP

Heavy typical drinking and regular binge drinking were both associated negatively with maternal education (Table 3). However, these associations were attenuated substantially in adjusted models. In contrast, there was evidence for both frequent drinking and regular binge drinking being associated positively with family disposable income, particularly after adjustment for other exposures and after multiple imputation. No interaction of gender with SEP was detected. Associations of gender with measures of alcohol use were generally consistent with those seen in Table 1.

Alcohol-related problems, SEP and gender

There was some evidence of an interaction between gender and dimensions of SEP for measures of alcohol-related problems in adolescence (Table 4 and Fig. 1). Among girls, increasing household income was associated with increasing risk of alcohol-related psychosocial problems, whereas an opposite and weaker association was apparent among boys (Fig. 1a). For example, when stratifying the marginal effects by levels of income and gender, girls coming from the top quintile of household

Table 2 Multivariable logistic regressions between early drinking onset (≤age 11) and mutually adjusted SEP indicators.

	Early drinking onset					
	(a) *(n = 6170)*		*(b)* *(n = 5512)*		*(c)* *(n = 7921)*	
SEP indicator[a]	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*
Social class	1.00 (0.90–1.11)	0.997	1.06 (0.94–1.18)	0.353	1.04 (0.94–1.16)	0.412
Maternal education	0.91 (0.84–0.99)	0.029	0.91 (0.83–1.00)	0.046	0.90 (0.83–0.98)	0.012
Disposable income	1.01 (0.95–1.06)	0.820	1.01 (0.95–1.08)	0.677	1.04 (0.98–1.10)	0.178
Girl	0.88 (0.77–1.01)	0.062	0.94 (0.81–1.09)	0.399	0.88 (0.78–1.00)	0.044

[a]Each socio-economic position (SEP) indicator is represented by a linear term. The reference category is the least advantaged socio-economic position and the odds ratio represents the independent linear effect of a unit increase in the levels of each indicator. (a) also adjusted by gender [odds ratios (ORs) shown]; (b) model (a), also adjusted for multiple exposures; (c) model (b), after multiple imputation by chained equations of missing data. *n* represents the number of subjects in each analysis; *n*s may vary due to missing data. 95% CI: 95% confidence interval. *P*-values are reported by the Wald test for each term in the model.

income had their average odds of alcohol psychosocial problems 1.7 [odds ratio (OR) 1.68, 95% confidence interval (CI): 1.33–2.13] times higher than boys with comparable familial income. Conversely, among boys there was an average reduction of 0.029 (95% CI: 0.009–0.050) in the odds of alcohol-related behavioural problems for each additional level of maternal education, with no association apparent in girls (Fig. 1b). Fully adjusted and sensitivity analyses after multiple imputation showed similar patterns, although a few associations, particularly with social class and maternal education, were attenuated.

DISCUSSION

In a large population-based sample of contemporary adolescents in South West England, both alcohol use and problem use were relatively common. There was also evidence that multiple dimensions of childhood SEP had different associations with alcohol use and problem use in adolescence. These associations also differed by gender. Particularly among boys, higher maternal education was associated with lower risk of alcohol-related behavioural problems, whereas among girls higher household income was associated with greater risk of alcohol-related psychosocial problems. Attenuation of some effects after adjustment for established childhood risk factors for problem alcohol use suggested possible mediation through these factors which would need further investigation. Alternative mechanisms are discussed below.

Findings in the context of previous evidence

Our findings challenge the view that childhood social advantage is associated generally with healthier behaviour in adolescence. This adds to evidence both from ALSPAC [20] and elsewhere that aspects of childhood SEP, particularly higher household income, may be associated positively with certain types of unhealthy behaviour [2,12,19,22]. An association between higher parental education and healthier behaviour in adolescent offspring has been reported previously, although in relation to alcohol use this evidence is mixed [10,12,13,20–22]. Moreover, most previous studies investigated limited domains of both SEP and alcohol use. There has been little prior investigation of differential SEP effects on alcohol use by gender. Some studies have suggested a greater vulnerability to alcohol-related problems among adolescent girls due to earlier maturation and the greater influence of contexts and peers [15,27–30]. We are not aware of previous evidence that this phenomenon may differ by SEP. However, there is some evidence that higher social strata may have a more liberal attitude towards drinking, particularly in girls [17,29,30].

Possible mechanisms

Our study was not intended to investigate mechanisms, and any discussion of this based on our findings is necessarily speculative. Increased risk of alcohol use and related psychosocial problems with greater household income may reflect greater availability in such households or greater 'purchasing power' among children from such households. There may also be cultural norms to explain different alcohol behaviours across the socio-economic spectrum. The positive association of alcohol problem use with income in girls could be explained partly by their susceptibility to ethanol [37] and heavier drinkers coming from more affluent families. The current findings might also be a reflection of the 'emotional climate' that may operate within families in different social strata. For example, one longitudinal study reported that parental disapproval of alcohol use was particularly protective in boys and also, to a lesser extent,

Table 3 Multivariable logistic regressions between measures of alcohol use at age 15 and mutually adjusted SEP indicators.

	Heavy typical drinking							
	(a) *(n = 4039)*		*(b)* *(n = 3708)*		*(c)* *(n = 3708)*		*(d)* *(n = 7921)*	
SEP Indicator[a]	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*
Social class	0.90 (0.80–1.01)	0.083	0.91 (0.80–1.04)	0.170	0.89 (0.78–1.02)	0.084	0.95 (0.85–1.07)	0.408
Maternal education	0.91 (0.83–1.00)	0.053	0.96 (0.87–1.06)	0.454	0.98 (0.88–1.09)	0.684	0.94 (0.86–1.02)	0.113
Disposable income	0.99 (0.93–1.05)	0.704	1.01 (0.94–1.08)	0.886	1.01 (0.94–1.08)	0.870	1.01 (0.95–1.07)	0.732
Girl	1.20 (1.03–1.40)	0.023	1.20 (1.02–1.42)	0.027	1.22 (1.03–1.44)	0.020	1.13 (0.98–1.30)	0.099
	Frequent drinking							
	(n = 4151)		*(n = 3807)*		*(n = 3807)*		*(n = 7921)*	
Social class	0.97 (0.86–1.10)	0.636	0.97 (0.85–1.10)	0.622	0.93 (0.82–1.07)	0.328	1.03 (0.91–1.16)	0.654
Maternal education	0.97 (0.88–1.07)	0.531	0.98 (0.88–1.08)	0.654	1.00 (0.90–1.11)	0.991	0.99 (0.90–1.09)	0.820
Disposable income	1.08 (1.01–1.16)	0.019	1.09 (1.02–1.17)	0.015	1.10 (1.02–1.19)	0.010	1.08 (1.02–1.15)	0.015
Girl	0.84 (0.72–0.98)	0.027	0.82 (0.70–0.97)	0.021	0.82 (0.69–0.98)	0.025	0.81 (0.71–0.94)	0.004
	Regular binge drinking							
	(n = 4162)		*(n = 3817)*		*(n = 3817)*		*(n = 7921)*	
Social class	0.99 (0.84–1.15)	0.852	1.02 (0.86–1.21)	0.826	0.99 (0.83–1.18)	0.944	1.04 (0.89–1.20)	0.636
Maternal education	0.86 (0.76–0.97)	0.016	0.92 (0.80–1.05)	0.203	0.93 (0.81–1.07)	0.336	0.91 (0.81–1.02)	0.100
Disposable income	1.06 (0.97–1.15)	0.198	1.11 (1.01–1.22)	0.027	1.12 (1.02–1.23)	0.022	1.11 (1.02–1.20)	0.019
Girl	0.93 (0.76–1.14)	0.503	0.94 (0.76–1.17)	0.583	0.94 (0.75–1.18)	0.596	0.88 (0.73–1.06)	0.193

[a] Each socio-economic position (SEP) indicator is represented by a linear term. The reference category is the least advantaged socio-economic position and the odds ratio (OR) represents the independent linear effect of a unit increase in the levels of each indicator. (a) Also adjusted by gender (ORs shown) and age at reporting; (b) model (a), also adjusted for multiple exposures; (c) model (b), also adjusted by early drinking onset; (d) model (c), after multiple imputation by chained equations of missing data. n represents the number of subjects in each analysis; ns may vary due to missing data. 95% CI: 95% confidence interval. *P*-values are reported by the Wald test for each term in the model.

Table 4 Multivariable logistic regressions between alcohol-related problems at age 15 and mutually adjusted SEP indicators.

	Alcohol psychosocial problems									
	(a) *(n = 4120)*		*(b)* *(n = 4120)*		*(c)* *(n = 3780)*		*(d)* *(n = 3780)*		*(e)* *(n = 7921)*	
SEP indicator[a]	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*	*OR (95% CI)*	*P*
Social class	0.84 (0.75–0.93)	0.002	0.84 (0.75–0.94)	0.002	0.86 (0.77–0.97)	0.017	0.84 (0.74–0.95)	0.005	0.87 (0.78–0.97)	0.010
Maternal education	0.86 (0.79–0.94)	0.001	0.86 (0.79–0.94)	0.001	0.89 (0.81–0.98)	0.021	0.90 (0.82–1.00)	0.044	0.88 (0.81–0.96)	0.003
Disposable income	1.07 (1.01–1.13)	0.030	0.96 (0.88–1.04)	0.296	0.98 (0.90–1.07)	0.667	0.97 (0.89–1.07)	0.582	1.00 (0.93–1.09)	0.931
Girl × disposable income	–	–	1.22 (1.10–1.36)	<0.001	1.23 (1.10–1.38)	<0.001	1.26 (1.12–1.41)	<0.001	1.20 (1.10–1.32)	<0.001
Girl	1.18 (1.02–1.36)	0.023	0.75 (0.57–0.99)	0.042	0.74 (0.55–1.01)	0.055	0.71 (0.52–0.97)	0.033	0.78 (0.61–0.99)	0.040
	Alcohol behavioural problems									
	(n = 4144)		*(n = 4144)*		*(n = 3802)*		*(n = 3802)*		*(n = 7921)*	
Social class	0.84 (0.71–0.98)	0.031	0.83 (0.71–0.98)	0.029	0.86 (0.72–1.02)	0.090	0.82 (0.69–0.99)	0.035	0.90 (0.77–1.05)	0.177
Maternal education	0.87 (0.77–0.99)	0.039	0.78 (0.66–0.92)	0.004	0.87 (0.72–1.05)	0.135	0.88 (0.73–1.07)	0.190	0.84 (0.71–0.99)	0.034
Girl × maternal education	–	–	1.26 (1.01–1.57)	0.042	1.26 (1.00–1.59)	0.053	1.29 (1.02–1.64)	0.037	1.26 (1.03–1.55)	0.028
Disposable income	0.98 (0.90–1.07)	0.671	0.98 (0.90–1.07)	0.666	1.02 (0.93–1.12)	0.660	1.02 (0.93–1.13)	0.658	1.05 (0.97–1.15)	0.218
Girl	0.82 (0.66–1.01)	0.057	0.60 (0.41–0.86)	0.006	0.61 (0.41–0.92)	0.017	0.58 (0.38–0.89)	0.011	0.62 (0.45–0.87)	0.005

[a] Each socio-economic position (SEP) indicator is represented by a linear term, including the interaction term of gender with selected SEP indicators. The reference category is the least advantaged socio-economic position and the odds ratio (OR) represents the independent linear effect of a unit increase in the levels of each indicator. When an interaction with gender is present the main effect of SEP is the main effect in boys. (a) Also adjusted by gender (ORs shown) and age at reporting; (b) model (a), including relevant interaction terms; (c) model (b), also adjusted for multiple exposures; (d) model (c), also adjusted by early drinking onset; (e) model (d), after multiple imputation by chained equations of missing data. n represents the number of subjects in each analysis; ns may vary due to missing data. 95% CI: 95% confidence interval. P-values are reported by the Wald test for each term in the model.

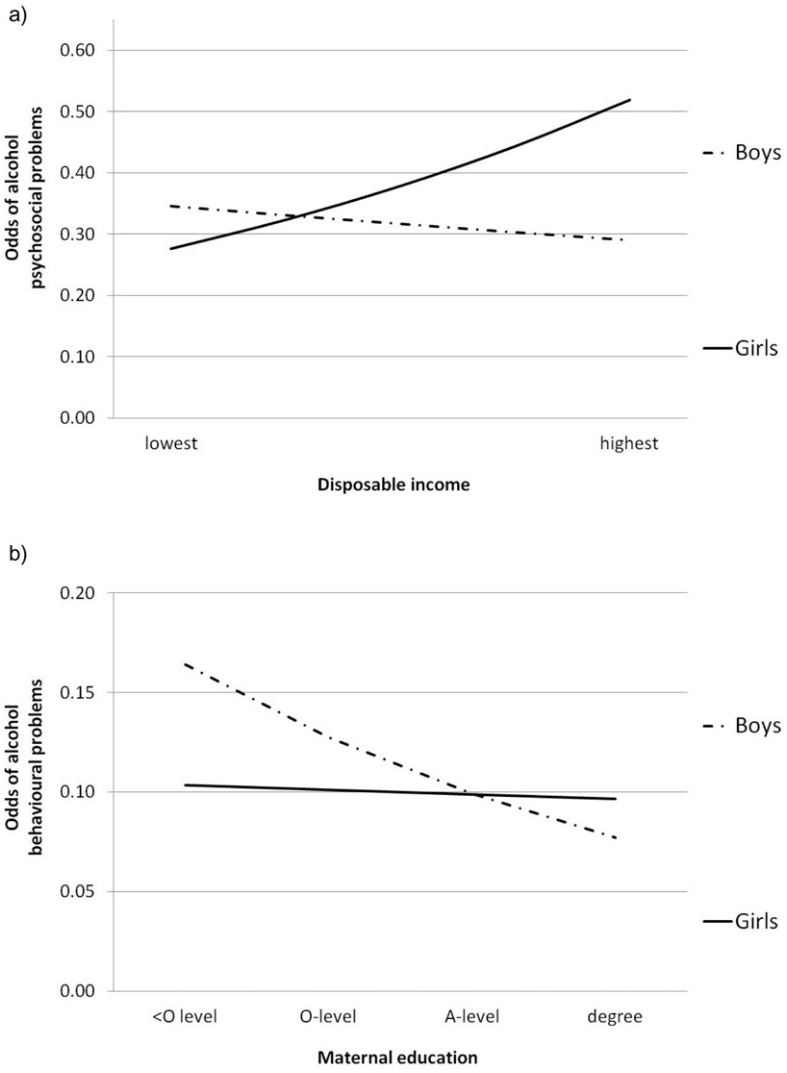

Figure 1 Visual representation of the interaction of gender with indicators of socio-economic position for alcohol-related problems at age 15 years.
(a) *y*-Axis: odds of alcohol psychosocial problems; *x*-axis: level of disposable income from lowest (left-hand side) to highest (right-hand side). (b) *y*-Axis: odds of alcohol behavioural problems; *x*-axis: maternal educational qualifications. Plain line: girls; dashed-dotted line: boys

in girls [27]. It is also possible that parental disapproval of alcohol misuse is associated with higher parental education or higher social classes. Weaker inverse relationships between a higher maternal education and alcohol problem use in girls compared to boys could also reflect a reduction in maternal closeness at this time [27].

Strengths and limitations

This study has several strengths. Our general population-based sample of contemporary adolescents was large enough for us to examine effects by gender. Our prospective design minimized the risk of recall bias. We had information on different dimensions of social position and were able to derive multiple measures of alcohol use and problem use. We also had information on key childhood exposures likely to confound or mediate an association between SEP and problem alcohol use. The measurement of our main exposures and covariates clearly preceded that of our alcohol use outcomes, thus minimizing the possibility of reverse causation or recall bias. Our study also had limitations. Alcohol problems were self-reported, thus may have been subject to reporting bias. Despite inclusion of the main socially patterned exposures influencing adolescent alcohol problem use, it is still possible that our associations reflect mechanisms we were not able to consider, such as peer-related factors and parenting practices. Like most prospective studies, ALSPAC experienced attrition which was higher among disadvantaged children. We addressed this issue through sensitivity analyses after multiple imputation of missing data which suggested that attrition had not introduced any substantial bias; nevertheless, we cannot exclude the possibility of such bias. Our main alcohol-related outcome measures were collected at age 15 and based where possible on standard criteria. While this is appropriate in the context of the particular issue of adolescent drinking, it is possible that problem alcohol use phenotypes are still emerging at this age, and that at later ages different patterns of association may be observed. Our findings derive

from a UK sample and may not generalize to other settings and drinking cultures.

Policy implications

Despite sparse evidence of effective strategies to curb adolescent drinking [30,45,46], interventions towards targeted groups or individuals have yielded more promising findings [45–48]. Our results may have some implications, particularly for parent-orientated and gender-specific prevention strategies. The increased affordability of alcohol among wealthier families and its availability may enhance opportunities for unhealthy drinking among their offspring (particularly girls). Improving communication with the family and favouring ties, particularly mother–daughter bonds, may help to prevent health-damaging behaviours among adolescents [27,49]. Policies to tackle irresponsible drinking among adolescents should focus not only on those from more deprived backgrounds, but include interventions for the more affluent.

CONCLUSION

Children from higher-income households were at greater risk of some types of adolescent alcohol problems, and these risks appeared different in girls compared to boys. Policy around reducing problematic alcohol use among adolescents should reflect awareness of these issues, and not be predicated on the notion that alcohol problems are predominantly a feature of social disadvantage.

Declarations of interest

None.

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