



Alcohol and the affluence paradox: A secondary analysis exploring the health disparities surrounding adolescent alcohol use and alcohol related harm in adulthood.

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The Institute of Child Care Research

Alcohol and the affluence paradox:

A secondary analysis exploring the health disparities surrounding adolescent alcohol use and alcohol related harm in adulthood

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Introduction

Several research studies have shown social differences in alcohol consumption and social inequalities in harm related to alcohol use and abuse (1-4). However relationships between the position in the socioeconomic spectrum, alcohol use and alcohol-related health problems are not clear-cut. Studies have provided evidence that groups at different ends of the socioeconomic spectrum display different patterns of drinking behaviour: as a rule, those in higher socioeconomic groups tend to drink more *frequently*, while persons at the lower end of the socio-economic spectrum tend to drink less frequently but more *heavily* (5,6).

The link between poor health outcomes and deprivation has been well documented with poor health, risky health behaviours and higher mortality all having positive associations with social class (7,8). Many health disparities increase with low incomes (for example, obesity and smoking) but the one exception is binge drinking – i.e. drinking more than 4 drinks for women and 5 drinks for men in one sitting – which is more common in higher SES groups (9).

Functional use of risk health behaviours

Some studies that have sought to address the mechanisms that lead to social differences in drinking patterns suggest that individuals in more deprived groups may (i) be more vulnerable and susceptible to harmful patterns of alcohol use, or (ii) experience more stressful events and may therefore resort to harmful drinking patterns as a strategy to cope with stress. Vulnerability may include personal characteristics (e.g. personality traits) as well as family and social resources (e.g. parental support) and may mediate the relationship between stressors and drinking habits differently across the socioeconomic spectrum (10). Other health behaviours, for example smoking, may have a functional use among individuals as a way of coping with the strains deriving from deprivation and managing stress. Evidence also points out that social class differences may reflect educational differences in the knowledge of risks associated with smoking (11).

Parenting

Parents also affect their children's alcohol trajectories in complex and sometimes contradictory ways including how they drink, how they monitor the children's drinking, and how they interact with their child. In a study among students from a wide range of countries, binge drinking was associated with having well educated parents and family wealth (12). Drinking styles of parents affect their children's relationship with alcohol through different channels (e.g. through modelling or by providing opportunities to get hold of alcohol). Several studies have also showed that poor parental monitoring is associated with increased risk of alcohol use (13,14). Levels of parental monitoring may also interact with family socio-economic status and with area deprivation. For example, a study conducted in the US suggested that parental monitoring may buffer against the negative effects of low neighbourhood SES (15). The latter study also supported the claim that parental drinking may exert important effects on adolescent drinking: high neighbourhood SES was associated with increased parental drinking, which in turn was associated with increased adolescent alcohol use. Overall, the results reviewed indicate that parental practises may mediate and act as a buffer against the negative effects of deprivation.

Neighbourhood context

Neighbourhood levels of disrupted family processes have significant, contextual effects on all the indicators of substance use and association with substance-using peers mediating a part of these contextual effects (16). Furthermore, neighbourhood deprivation is associated with higher levels of problem behaviour in adolescents such as delinquency, aggression and externalising behaviour (17,18). However, inconclusive results have been found regarding the association between neighbourhood deprivation and adolescent alcohol use (19). A longitudinal study on a small sample suggested that this inconclusive pattern may be explained by pre-existing risk factors such as parental drinking (20). In the latter study lower neighbourhood SES predicted higher rates of alcohol use among the children of alcoholics. Parental alcoholism thus represented a pre-existing risk factor whose effect on adolescent alcohol risk was magnified by neighbourhood deprivation. However, the study also found that among children of non-alcoholics, living in more affluent neighbourhoods was associated with a greater increase in alcohol use and consequences. The authors hypothesised that parents in more affluent neighbourhoods may be more permissive or absent more often from the home.

A number of studies have also investigated the relationship between the availability of places to purchase alcohol in neighbourhoods which has shown that density of alcohol outlets may be greater in poorer areas in US city level studies (21,22). New Zealand shows a similar pattern (7,23). Respondents who indicated greater fear of their neighbourhood environment had significantly greater levels of drug use than those with lower perceived fear (24). Overall, neighbourhood deprivation is an important variable to control for when investigating alcohol use trajectories in adolescence as it may explain some of the variation in alcohol use and consequences.

Measuring adolescent socio-economic status

Some commentators have argued that existing evidence on the association between socio-economic inequality and health risk behaviour in adolescence is generally less consistent and manifest compared to other periods in the life course (25). According to these authors, risk behaviour that has its onset in adolescence may be strongly influenced by socialisation agents such as school and youth culture that exert “equalising” effects across the socio-economic spectrum (26). However, a major problem in studying socio-economic inequalities in adolescent health is related to the lack of measures of socio-economic status in adolescence that are both conceptually and methodologically sound. On the one hand, it is disputed parental socio-economic status should be used to assess the positioning of adolescents, and if so, what aspects of the SES construct should be considered in determining the status of adolescents? On the other hand, accurate information on the family socio-economic status is difficult to collect reliably from adolescents. These conceptual and methodological difficulties associated with measuring adolescent SES have led to the development of the Family Affluence Scale, or FAS (27). The FAS was constructed considering the concept of material conditions in the family as central to determining the adolescents’ position. The items selected were meant to reflect family consumption and expenditure. The FAS has been used to demonstrate social gradients in alcohol use and intoxication in adolescence (28), and other health risk behaviours. The FAS was developed to measure affluence among young people living in Scotland in the 1990s, following on from Townsend’s (29) 1987 work on deprivation. The relevance of this scale for young people living in Northern Ireland in the 2000’s deserves some attention. For example, one item asks whether or not the young person has a bedroom to themselves, which could be a measure of deprivation as in a house where there are not enough bedrooms to sleep all children and adults separately: the assumption is that there is a greater likelihood that other resources besides housing space may be divided between a greater number of family members. However, the Northern Ireland Housing Executive, in conjunction with a number of housing

associations is responsible for the administration of social housing in Northern Ireland. Around 15% of the housing stock in Northern Ireland is occupied by social renters in NIHE or housing association properties (Department for Social Development, 2010). Allocation of social housing is based on rating procedures, which take into account level of need, affordability, receipt of means tested benefits, and overcrowding. As such, having a bedroom to oneself may not serve as an accurate indicator of relative affluence, as people in poverty may be allocated a house with a number of bedrooms appropriate to the size of the household. Alongside the measures included in the FAS, in the study presented here we collected data on a number of other indicators of affluence and deprivation, such as parental unemployment and eligibility for free school meals. Statistical modelling can assess how well each of these items serves as an indicator of affluence or deprivation. An overall measure of affluence that can benefit from the weight of evidence indicating relative affluence from a number of variables was constructed, while minimising any bias or error that any single item or measure may be prone to.

Aims and objectives

The aims of this study are to investigate socio-economic differences in pathways from onset to establishment of drinking patterns in adolescence, assess the consequences of these pathways in terms of alcohol related harm, and to consider the causal mechanisms that may contribute to socio-economic differences in drinking pathways and outcomes.

In order to meet the aims set, the study was based around five tasks:

- A.) Create a robust measure of relative affluence based on the BYDS indicators;
- B.) Assess the extent of systematic differences in drinking patterns across the socioeconomic spectrum;
- C.) Assess the extent to which drinking patterns carry a risk for alcohol problems in late adolescence;
- D.) Assess if the factors identified in C. differentially affect risk of negative outcomes among affluent and deprived groups;
- E.) Assess the extent to which factors such as living arrangements, area deprivation or family processes explain the differential risk with alcohol exposure.

Task A.) We considered different alternatives for creating robust measures of relative affluence. As well as the Family Affluence Scale (FAS), which has proved to be a reliable and valid measure, we considered combining multiple indicators of affluence to create a single construct that overcomes the weaknesses of any single measure, and provides a means to assess individuals' socioeconomic position more accurately and reliably than is possible with any single measure. A latent variable approach was taken to further overcome measurement error problems.

Task B.) The aim was to identify drinking trajectories for the adolescents, and to quantify variations in drinking patterns. We used a finite mixture latent variable approach to identify different typologies of drinking behaviour unfolding over the years. This approach allows identifying common drinking trajectories in the sample, their prevalence and the shapes of these trajectories.

Task C.) The study included a validated tool to assess hazardous and harmful patterns of alcohol use and alcohol-related harm such as the Alcohol Use Disorders Identification Test (AUDIT). We used regression modelling to assess the extent to which the previously mentioned alcohol use measures are related to poor outcomes in later adolescent years, and assess the magnitude of this association.

Furthermore, we considered the role of other drinking-related covariates such as age of onset of alcohol use, as well as use of other substances.

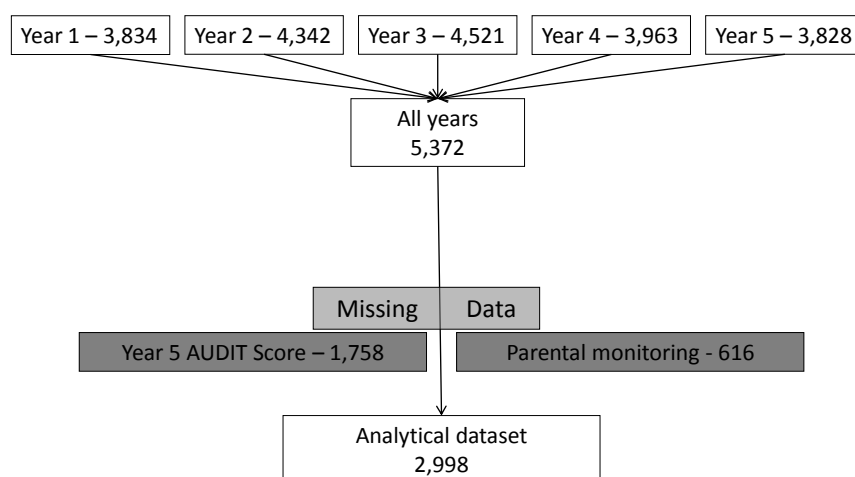
Task D). Our plan of analysis involved creating interaction terms in regression models to formally assess if any risk factor for a poor outcome varies in the magnitude of risk for people at different positions in the socioeconomic spectrum. In doing so we aimed to provide robust statistical evidence as to whether or not deprivation modifies the effect of early experiences on alcohol-related harm. In this part of the analysis, we will formally test whether affluent groups have a lower risk of harm than deprived groups, under comparable conditions of exposure to alcohol, and demonstrate the magnitude of the risk reduction should there be an effect.

Task E.) We also planned to assess what other factors may explain hazardous patterns of alcohol use and alcohol-related harm. Parental monitoring was considered in the analyses because it is a known protective factor against deviant behaviour in general. Other demographic variables such as family composition and gender were also considered in light of their association with alcohol use. We also considered the deprivation of participants' neighbourhood by linking the participants' home postcode to the Northern Ireland Multiple Deprivation Measure in 2005 (30), a measure that takes into account different domains of deprivation at the area level such as income, employment, education and health.

Methods

This study used data from the Belfast Youth Development Study, a longitudinal study of substance use during adolescence. Between 2000 and 2007, children attending over 40 schools, colleges and special educational programmes were given questionnaires on a range of personal, social, health and substance use variables. Six data sweeps took place during this time, and another has recently finished now that the cohort are around 22 years old. Pupils were in their first year of secondary school (around age 12) at the start of the study (academic year 2000/2001), and were surveyed annually until 2006/2007 (around age 17) whether they were still attending school, were in a further education college, or no longer in education. Where possible, information was linked longitudinally for pupils. The response rate across the sweeps of the study was complex. In year 2, several new schools joined that had not been surveyed in year 1. Teachers at some schools were participating in industrial action during year 4 and hence pupils at these schools were not surveyed. Figure 1 shows the total numbers contacted at each sweep, how many of those participating in year 5 provided information in at least one of the previous years, and how many of these provided usable information for this analysis.

Figure 1: Response, linkage rates, and outcome measurement for the 5 years of data collection



After linkage and excluding missing data, there were 2,998 respondents for analysis.

Study Variables

This study draws on data from year 1 to year 5 of the study. The earlier years of the study (ages 12 to 16) provide data on affluence and covariates for analysis, and the outcome variable for analysis is evidence of problem drinking in year 5 (around age 16). Demographic, health, social, and area deprivation measures were taken from year 4 and supplemented with data from other years where available (e.g. Gender was taken from any year where it was missing in year 4). By age 15, over three quarters of the cohort have some experience of alcohol, and some had begun regular alcohol use and developed patterns of social drinking.

Demographic, health and social characteristics

Several variables were available to adjust for background variation in rates of alcohol problems, including respondents' gender. Information was also collected on who else lived in the house with the respondent. Respondents were classified as either living with the biological parents, in a reconstituted family (birth parent plus parent's partner/step-parent), in a single parent family, not living with parents (predominantly those living with siblings) or no reply/missing information. Proportions of respondents by gender, health characteristics and family structure are reported in Table 1.

Table 1: Frequency and mean audit score for demographic and health characteristics of 2,998 adolescents

Variable	Total number (% of group)	Mean AUDIT (sd)
<i>Gender</i>		
Female	1,640 (55)	7.64 (6.57)
Male	1,358 (45)	8.13 (7.02)
Year 4, lives with:		
Biological parents	2,270 (76)	7.29 (6.62)
Reconstituted family	240 (8)	10.30 (6.85)
Single parent family	440 (15)	9.49 (6.92)
No reply / missing info.	5 (0)	5.80 (5.36)
No parents / Siblings	43 (1)	8.40 (7.60)
Year 4 Mental Health		
Normal	2,745 (92)	7.59 (6.58)
Abnormal	251 (8)	10.89 (8.05)
Missing Info.	2 (0)	11.00 (2.83)
Parental Monitoring		
Lowest Monitoring	560 (19)	12.36 (7.22)
2	538 (18)	9.80 (6.68)
3	693 (23)	8.11 (6.37)
4	516 (17)	5.85 (5.41)
Highest Monitoring	691 (23)	3.97 (4.74)
Total	2,998	7.86 (6.78)

Mental Health

The Strengths and Difficulties Questionnaire (self-report version) formed part of the year 4 survey. The SDQ is a validated questionnaire which measures mental health problems among young people (31). Adolescents answered a set of questions regarding their behaviour and feelings in three categories (from 'not true' to 'certainly true'). Items in the questionnaire are intended to cluster in four sub-scales that reflect difficulties in different areas (e.g. peer problems). Scores to single items can be summed up to produce a total difficulties score. The questionnaire can also be used to categorise respondents. Following the guidelines of the questionnaire, the total SDQ measure was dichotomised, with respondents scoring above the cut-off being considered as having abnormal results (i.e. an abnormal problem score). In Table 1 we report the proportion of adolescents in the abnormal (above cut-off) and normal categories.

Parental Monitoring

Stattin and Kerr's (32) parental monitoring measure was also used in the analysis. The nine parental monitoring questions that formed part of the questionnaire in year 4 of the study included questions such as: Do your parents know what you do with your free time? Do your parents know who you have as friends during your free time? The response scale for each set of questions was 'almost never or never', 'not very often', 'sometimes', 'often' and 'almost always or always'. Scores from the parental monitoring questions were summed to create a parental monitoring scale. In the analyses we categorised respondents into five bands corresponding to the quintiles of the parental monitoring score observed. Proportions of respondents in each quintile are reported in Table 1.

Ever use of tobacco and other drugs

Information on a wide range of substances was obtained in every year of the study (from tobacco to cannabis, ecstasy, inhalants, cocaine, LSD, and others). Information across all years from year 1 to year 5 of the study was used to determine if respondents had ever used tobacco or other drugs, or if they never used them. Two binary measures were created, ever smoked, and ever used other drugs. These measures were used as covariates in the study. Frequency and proportions of respondents that reported lifetime use of tobacco and other drugs is reported in Table 2.

Table 2: Frequency and mean audit score for measures of substance use

Variable	Total number (% of group)	Mean AUDIT (sd)
Smokes		
No	732 (24)	2.65 (4.09)
Yes	2,266 (76)	9.55 (6.62)
Uses drugs		
No	1,229 (41)	3.66 (4.60)
Yes	1,769 (60)	10.79 (6.50)
Drinking Trajectory		
Non drinkers	201 (7)	0.18 (1.25)
Early non drinker - Late infrequent	262 (9)	3.15 (4.49)
Early infrequent – late infrequent	406 (14)	2.17 (2.37)
Early infrequent – late moderate	795 (27)	7.69 (5.63)
Early moderate – late moderate	617 (21)	9.05 (5.94)
Early moderate – late frequent	351 (12)	13.67 (5.39)
Early frequent – late frequent	366 (12)	14.59 (5.89)
Started drinking at		
Under 9	258 (9)	9.50 (7.13)
9 to 11	953 (32)	8.74 (6.67)
12 to 14	1,039 (35)	8.29 (6.60)
15 or older	184 (6)	4.66 (5.96)
No age given, no age from study	286 (10)	3.80 (5.64)
No age given, but inferred from study	254 (8)	8.79 (6.78)
Missing	24 (1)	Missing
Total	2,998	7.86 (6.78)

Frequency of alcohol use

From year 2 to year 5 of the study, adolescents were asked if they had drunk within the last 12 months. Those who reported alcohol use in the last year were also asked about their frequency of alcohol use (Only drank once; drank between 2 and 5 times; drink about once a month; drink about once a week; drink more than once a week; used to drink but don't now). The answers to these questions in year 2, 3, 4 and 5 of the study were used to create a categorical variable in each year: a score of 0 was given if the participant had not reported drinking in the last year (which included participants that reported they had never drunk alcohol); a score of 1 indicated report of last year use of alcohol but less frequently than monthly (e.g. between 2 and 5 times); a score of 2 indicated monthly use of alcohol; a score of 3 was assigned to participants that reported weekly (or more frequent) use of alcohol.

Age of onset of alcohol use

In the first year of the study, respondents were asked at what age they had first drunk alcohol (in subsequent years they were asked if they had ever drunk alcohol, or had drunk in the last year). Information across the years was used to create a variable giving age of first drinking, this was categorised as follows: 6 to 8 years, 9 to 11 years, 12 to 14 years and 15 years or older. There were three further categories relating to missing data; no history of drinking, no age of onset but reported having drunk alcohol during the study, or no information available. These ages are approximate, as in the first year this was based on a whole year age report, and in later years it was an approximate age based on year of school rather than calendar age at time of survey. For around 15% of the cohort it was not possible to determine an age of drinking onset.

Affluence measures

Each year of the survey contained several measures of wealth and affluence. This included items from the Family Affluence Scale (33). These items included having own bedroom, number of family holidays and number of cars. Have own bedroom was a binary variable (scored 1 for Yes and 0 for No). Every year participants were also asked the number of holidays with the family lasting five days or more they had in the last year. Answers to this question were scored in four categories (0=None; 1=One; 2=Two; 3=Three or more). Participants also reported the number of cars owned by their family. Answers to these questions were scored in three categories: 0 (No cars); 1 (One car); 2 (Two or more cars). These items were summed so that a score of zero represented lower affluence (shared bedroom, no family holidays in the last year, no cars owned by family), and a score of 6 represent greatest affluence.

Participants were also asked other questions that were used to assess the position of their family in the socioeconomic spectrum. Every year, two questions asked about employment status of each parent individually (if present). Respondents could indicate that the parent was working full or part time, was unemployed, a student, or unable to work because of poor health. These answers were combined to produce a measure of household parental employment status coded as a three category variable: (1) no parents working or one working part time; (2) one working full-time or two working part-time; (3) two working full-time or one working part-time and the other full-time. In each year adolescents were also asked to indicate if they received free school meals (coded as a two-category variable: Yes or No). Free school meal eligibility is dependent on parental receipt of means-tested benefits, and can serve as valid indicator of lower socio-economic status. Finally, participants were asked to indicate every year in which type of house they lived in. Answers were coded in a three category variable: (1) Terraced/Flat/Other; (2) Semi-Detached; (3) Detached. These three questions as well as the three Family Affluence Scale items were used to estimate the most likely social class participants belonged to using Latent Class Analysis (see results section).

Respondents were asked to provide their home postcode in the fourth year of the study. This information was used to link individual information to the Northern Ireland Multiple Deprivation Measure for 2005 (30). Each super output area in Northern Ireland (of which there are 890) was grouped into deciles of multiple deprivation and these were collapsed into quintiles for analysis.

Outcome measure

The outcome measure for the study was the total score of the Alcohol Use Disorders Identification Test (33) in year 5 of the study. This is a validated instrument for assessing severity of alcohol problems. In year 5, one of the items from the audit was missing from the questionnaire (feeling of guilt after drinking). The proportion of the cohort noted as having alcohol problems in year 5 will hence be a slight underestimate. The overall average AUDIT score for the final sample is reported in Table 2.

Results

Affluence

In order to estimate the position of respondents in the socioeconomic spectrum we used two approaches. Firstly, we considered participants' scores on the Family Affluence Scale in each year. These scores showed a considerable degree of stability across the years. Correlation coefficients between year 1 affluence score and scores for the other years were as follows; year 2 - 0.55; year 3 - 0.51; year 4 - 0.46; and year 5 - 0.46. This indicates that very few participants showed major changes in their circumstances across the years they were surveyed, for example, less than ten percent of people in the study with a FAS score of zero in any given year from 2 to 5 had a FAS score of 5 or 6 in year 1 (few people saw a dramatic decrease in affluence), and less than five people with a FAS of 6 in any of the follow up years had a FAS score of 1 or 2 in year 1 (almost nobody saw a dramatic increase in affluence). Given that there was so little variation across the study, we took the mean FAS score across the five years, and split this into a 6 category scale. The most deprived category included participants whose mean across the years was between 0 and 1, while the most affluent category included participants whose average FAS score across the years was between 5 and 6 (the other bands included participants whose scores were within the range 1-2, 2-3, 3-4). In Table 4 we report the percentages of respondents in each of these categories of affluence and their associated average score in the year 5 AUDIT.

The answers on the three items of the Family Affluence Scale and answers to the other questions regarding socioeconomic status (parental employment status; free school meals uptake; type of house) were considered as indicators in a Latent Class Analysis (LCA), an approach that was used to estimate the most likely socioeconomic status of the participants' family. LCA is a latent variable approach that assumes that the observed association between a number of observed categorical or nominal items can be explained by an unobserved (latent) variable that is also nominal. The assumption is thus that individuals belong to one and only one latent class (the classes are mutually exclusive) and individuals within one latent class have the same probability of endorsing the manifest items. The other LCA assumption states that conditional on latent class membership, the manifest items are mutually independent of each other. This is the assumption of local independence between manifest items, which means that the observed association between items is totally explained by their association with the latent variable. Overall LCA is an optimal method to estimate the most likely class or group a respondent belongs to (within a limited number of classes) based on the observed pattern of responses to different items. Being a measurement model, it also allows taking into account measurement error in the observed responses.

A number of LCA models of social class were estimated at different ages using the six indicators described (number of cars, number of family holidays, uptake of free school meals, parental employment, own bedroom). LCA provides a series of heuristic methods to estimate the optimal number of classes that can explain the variability in the data, with some heuristics favouring more parsimonious models (e.g. information criteria). We selected a 5-class model as the optimal model. Latent transition analysis was used to test respondents' likelihood of moving from one class to another across the years. These models were estimated between Year 2 and Year 3 and between Year 3 and Year 4 and revealed that the number of participants moving from one of the estimated classes to another in consecutive years was negligible: less than 3% of respondents moved from one class to another between year 2 and year 3, and a similar percentage moved from one class to another between year 3 and year 4. For this reason we considered the five latent social classes estimated from year 4 as our measure of affluence. We imputed social class based on year 3 responses for any respondents with missing information in year 4. Estimation was carried out with the "Cluster" option in Mplus 5 (Muthen & Muthen, 2007) which uses a "sandwich" estimator to take into account clustering of data. The five-class solution had good classification qualities: Entropy was equal to 67%, which indicates a clear delineation of the estimated classes (entropy ranges from 0, indicating worse delineation, to 1 indicating perfect delineation of classes).

In Table 3 we report the conditional probability of endorsing each item category for the six items considered (probabilities sum up to 1 within each class, therefore the probability of answering yes to a binary items is equal to 1 minus the probability of answering no). Conditional probabilities can be thought as being similar to factor loadings in factor analysis in so far they illustrate the most likely pattern of responses of individuals within each class.

Table 3: Conditional probability of item response endorsement by latent affluence class (from most deprived to most affluent)

	<i>Socioeconomic Class</i>				
	<i>Most Deprived</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>Most Affluent</i>
Type of house					
<i>Terraced</i>	0.689	0.513	1.000	0.261	0.031
<i>Semi-Det.</i>	0.271	0.393	0.000	0.536	0.194
<i>Detached</i>	0.040	0.094	0.000	0.202	0.775
Parental Employment					
<i>Up to one part-time</i>	0.753	0.437	0.000	0.056	0.026
<i>One full-time</i>	0.198	0.385	0.536	0.337	0.204
<i>Two full-time</i>	0.049	0.178	0.464	0.607	0.769
Number of holidays					
<i>None</i>	0.440	0.246	0.555	0.246	0.144
<i>One</i>	0.326	0.308	0.256	0.419	0.389
<i>two or more</i>	0.235	0.446	0.190	0.335	0.468
Free school Meals	0.708	0.775	0.000	0.008	0.000
Has own bedroom	0.628	0.686	0.444	0.768	0.897
Number of cars					
<i>None</i>	0.549	0.043	0.415	0.073	0.000
<i>One</i>	0.418	0.513	0.585	0.592	0.080
<i>Two or more</i>	0.033	0.444	0.000	0.335	0.920

Individuals in the most deprived class had a 69% probability of reporting living in a terraced house, 75% probability of reporting parents with no employment or only one working part time, had a higher probability of reporting no family holidays in the last year, a high probability of reporting uptake of free school meals, and had a higher probability (55%) of not having access to cars. It is worth noting that there was no perfect linearity in the probability of endorsing item responses across the five estimated classes (e.g. individuals in social class 2 had a higher probability of not having their own bedroom). In Table 4 we report the number of adolescents in each affluence latent class and their average AUDIT scores in year 5.

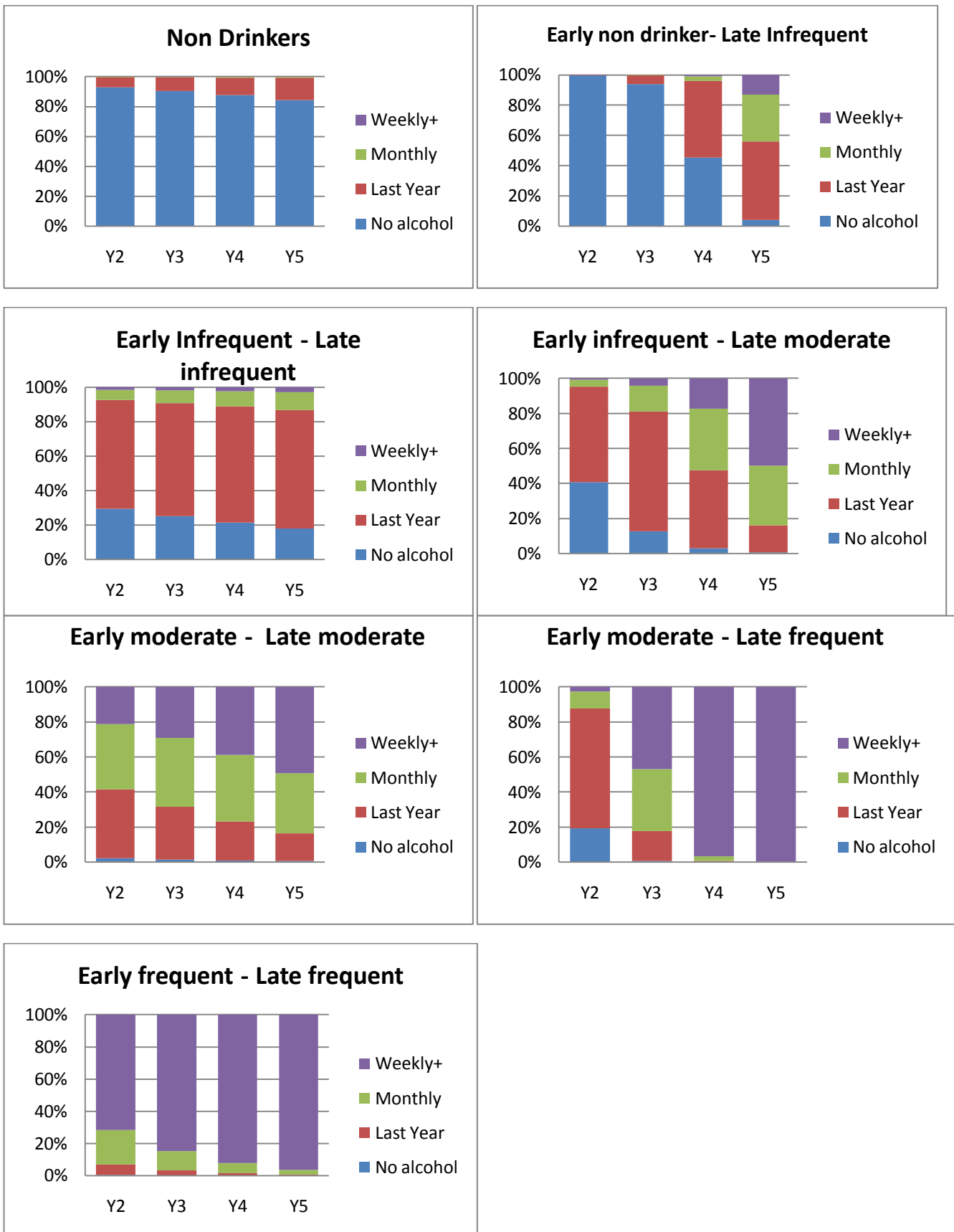
Table 4: Frequency and mean audit score (Year 5) for measures of affluence

Variable	Total number (% of group)	Mean AUDIT (sd)
Family Affluence Scale		
Most deprived	295 (10)	7.81 (6.45)
2	525 (18)	7.79 (6.57)
3	487 (16)	7.82 (6.93)
4	513 (17)	7.98 (6.89)
5	585 (20)	7.99 (6.99)
Most affluent	593 (20)	7.77 (6.71)
Affluence Latent Class Measure		
Most deprived	423 (14)	8.81 (6.90)
2	223 (8)	10.15 (7.36)
3	80 (3)	6.61 (6.16)
3	223 (8)	10.15 (7.36)
4	1,203 (40)	8.03 (6.75)
Most Affluent	1,059 (35)	6.89 (6.48)
Area Deprivation		
Least deprived	790 (27)	8.79 (6.90)
2	282 (9)	7.37 (6.27)
3	300 (10)	7.73 (6.79)
4	445 (15)	6.61 (6.39)
Most Deprived	620 (21)	6.68 (6.49)
Missing postcode information	561 (19)	9.18 (7.04)
Total	2,998	7.86 (6.78)

Drinking trajectories across the socioeconomic spectrum

Latent Class Growth Analysis (LCGA) was used to investigate individual differences in the trajectories of drinking frequency across the years (categorical measures collected from year 2 to year 5 of the study). Similarly to Latent Class Analysis, LCGA uses latent variable methods to characterise profiles of persons that share the same trajectories in the variable of interest. The assumption of this method is that there are a finite number of classes of individuals that explains the heterogeneity in the observed trajectories, classes are mutually exclusive and individuals within each class share the same characteristics (they have the same growth parameters).

Figure 2: Conditional probability of endorsing items of alcohol use frequency in each year by latent profiles of drinking trajectories.

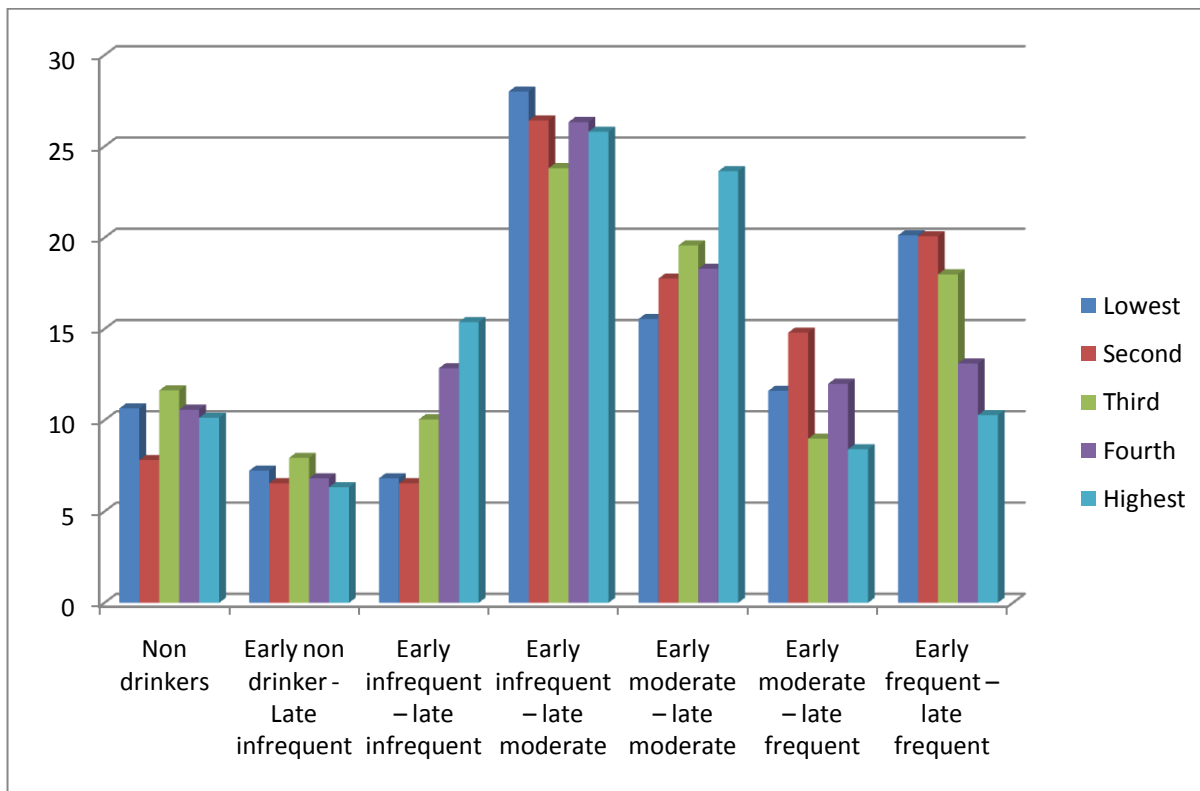


We compared models with different number of classes and with different parameters (a quadratic component was added to the estimated intercept and slope, but this did not reveal an improvement of fit). Estimation was carried out using the “Cluster” option in Mplus which uses a sandwich estimator to take into account clustering of participants (Muthen & Muthen, 2007): individuals were clustered within schools. The model was estimated on all participants that provided data irrespective of their providing a valid outcome in year 5 and this was done to avoid biases due to missing data. The model selected was a seven-class model. This model represented a better fit according to information criteria but retained the possibility of substantive interpretation. Figure 2 shows the probability of endorsing one of the drinking frequency answers across the four waves by class. Classes were given names to ease interpretation.

These classes could be described in this way: (1) Non drinkers: adolescents that throughout the four waves had a high probability of not reporting any drinking in the last year; (2) Early non drinkers – Late infrequent: participants that had a high probability of reporting no last year use in year 2 and 3 and that by year 4 and 5 reported some use in the last year; (3) Early Infrequent – Late infrequent: participants that reported infrequent use of alcohol throughout the years; (4) Early infrequent – Late moderate: participants that reported infrequent alcohol use in early adolescence and had a higher probability of reporting monthly to weekly use in the late teenage years; (5) Early moderate-Late moderate: participants that throughout the study had a high probability of reporting monthly use of alcohol, with increased probability of weekly use in late adolescence; (6) Early moderate-Late frequent: participants that increased their frequency of alcohol use in the last waves where they had a higher probability of reporting weekly alcohol use; (7) Early frequent-Late frequent: participants that throughout the study had a high probability of reporting weekly use of alcohol. Proportions of adolescents in each alcohol use trajectory profile and their associated AUDIT scores are reported in Table 2.

The latent class categories of socioeconomic status were used to assess social patterning in drinking trajectory patterns. Figure 2 shows the percentage of respondents within each social class falling into each drinking trajectory. Around 10% of respondents in the lowest social class were non-drinkers across the study period, there was a similar proportion across all social classes apart from the middle class, where only 7% were non drinkers. There was little social gradient for those who did not drink at younger ages and drank little at older ages (early non drinker – late infrequent).

Figure 3: Percentage within each social class by drinking trajectory



Around one quarter of all groups made up the early infrequent- late moderate category; this normative category reflects some experimental alcohol use at younger ages, and drinking monthly in the older teenage years. Slightly more of the poorest group made up this category than in other groups. The strongest differential by social class appeared for the ‘early infrequent-late infrequent’, and ‘early moderate-late moderate’ categories: a much greater proportion of respondents from the higher end of the socioeconomic spectrum fell into these less typical but moderate drinking patterns than did those in poorer groups. It was much less common for the most affluent respondents to form part of the most problematic drinking trajectory - weekly alcohol use continually from a young age. Only around 11% of the top two social classes fell into this heavy use category, compared to around 18% for people in lower to middle socioeconomic groups.

AUDIT and demographic characteristics

In order to investigate the relationship between demographic characteristics and alcohol-related health risk, we ran multi-level regression models using the AUDIT total score as the dependent variable and random intercept at the school level. Covariates included gender, family composition in year 4 of the study, mental health in year 4 (abnormal score in the SDQ; normal score; missing information); and quintiles of the parental monitoring scale. The outcome and the covariates met the necessary assumptions to run the analysis.

Between- and within- school variance

There was relatively little variation in AUDIT score between schools by comparison to the variation between individuals. Around 5.5% of the variation in AUDIT score could be explained as variation between schools before accounting for any respondent characteristics. After controlling for respondent characteristics, this fell to around 2.3% (see Table 5). The random effect parameters will not be reported in the following models; however the standard errors for estimates are corrected through using a multilevel approach.

Table 5: School level variance, pupil level variance and proportion of variance at the school level after controlling for respondent characteristics

Variables in Model	Between – school variance	Within school variance	Intra cluster correlation coefficient
Null Model	2.52	43.62	5.5%
+ personal characteristics	1.34	35.31	3.7%
+ substance use characteristics	0.51	21.63	2.3%
+ affluence measures	0.51	21.55	2.3%

Table 6 reports the adjusted and unadjusted coefficients for personal characteristics. In the tables, numbers in bold indicate parameters significant at $p < .05$. After controlling for all other covariates considered, there was still an effect of gender, with boys showing higher scores in the AUDIT than girls. Family composition was also significantly associated with alcohol-related risk, with adolescents from reconstituted families or from single parent families showing higher AUDIT scores compared to adolescents living with both biological parents. Abnormal scores in the SDQ were also associated with higher AUDIT scores.

Finally, in comparison to adolescents that reported lowest parental monitoring, increasing levels of parental monitoring had a protective effect in terms of alcohol outcomes. There was more than an 8 point difference between respondents in the lowest and highest quintiles of parental monitoring: to put this in context, someone with an AUDIT score of 12 would be towards the upper end of the ‘low risk of alcohol problems’ group, while someone with a score 8 points higher of 20 would be considered a ‘problematic’ alcohol user.

Table 6: Unadjusted and adjusted regression coefficients for demographic and health characteristics on Audit score

Variable	Unadjusted Coefficients	Adjusted coefficients
Gender		
Female	Reference	Reference
Male	0.62 (-0.06, 1.31)	0.30 (-0.30, 0.89)
Year 4, lives with:		
Biological parents	Reference	Reference
Reconstituted family	2.87 (1.99, 3.74)	1.78 (0.98, 2.58)
Single parent family	1.91 (1.23, 2.58)	1.51 (0.89, 2.12)
No reply / missing info.	-1.49 (-7.27, 4.28)	-1.29 (-6.54, 3.97)
No parents / Siblings	0.62 (-1.36, 2.61)	-1.54 (-3.36, 0.27)
Year 4 Mental Health		
Normal	Reference	Reference
Abnormal	3.12 (2.27, 3.98)	1.14 (0.35, 1.93)
Missing Info.	2.78 (-6.35, 11.91)	2.46 (-5.83, 10.75)
Parental Monitoring		
Lowest Monitoring	Reference	Reference
2	-2.62 (-3.33, -1.90)	-2.43 (-3.14, -1.72)
3	-4.12 (-4.79, -3.45)	-3.94 (-4.61, -3.26)
4	-6.39 (-7.11, -5.67)	-6.10 (-6.83, -5.37)
Highest Monitoring	-8.16 (-8.84, -7.49)	-7.83 (-8.51, -7.14)

Drinking trajectory patterns, onset of drinking and other drugs.

A second series of multi-level regressions was run considering the AUDIT scores in year 5 as the outcome. We considered firstly the unadjusted coefficients of lifetime tobacco use (a binary variable), lifetime use of other drugs (binary), age of onset of drinking and adolescents’ drinking trajectory patterns. We then considered the adjusted regression coefficients of these covariates controlling for the other covariates. Finally, we also adjusted for the demographic and health covariates considered in the previous section (gender, family composition, abnormal SDQ score, parental monitoring – see Table 7).

The results revealed that lifetime tobacco use and lifetime use of other drugs were significantly associated with higher AUDIT scores even after controlling for demographic, health variables and the other drinking variables. Age of onset of drinking was significantly associated with the AUDIT scores in the unadjusted model: adolescents that started drinking earlier had higher AUDIT scores compared to those that started between 12 and 14 years of age. However, once we adjusted for other substance use and for the pattern of drinking, age of onset of alcohol use was no longer significantly associated with AUDIT scores.

Typologies of drinking trajectories were significantly associated with AUDIT scores even after controlling for demographic, health, other substances use variables and age of onset of alcohol. There was a clear gradient whereby in comparison with the Early infrequent-Late moderate drinkers, the non-drinkers had significantly lower AUDIT scores and the Early frequent – Late frequent drinkers had higher scores.

Table 7: Regression coefficients of substance use measures on Audit score, controlling for health characteristics

Variable	Unadjusted Coefficients	Adjusted coefficients	+ demographic & health variables
Smokes			
No	Reference	Reference	Reference
Yes	6.73 (6.21, 7.25)	1.46 (0.95, 1.98)	1.30 (0.79, 1.80)
Uses drugs			
No	Reference	Reference	Reference
Yes	6.99 (6.56, 7.41)	2.71 (2.26, 3.17)	2.24 (1.78, 2.69)
Drinking Trajectory			
Non drinkers	-7.31 (-8.09, -6.53)	-4.82 (-5.75, -3.89)	-4.61 (-5.52, -3.69)
Early non drinker - Late infrequent	-4.64 (-5.34, -3.94)	-3.15 (-3.89, -2.4)	-2.86 (-3.59, -2.13)
Early infrequent – late infrequent	-5.37 (-5.98, -4.77)	-4.31 (-4.91, -3.71)	-4.09 (-4.68, -3.50)
Early infrequent – late moderate	Reference	Reference	Reference
Early moderate – late moderate	1.43 (0.90, 1.96)	0.70 (0.18, 1.22)	0.63 (0.12, 1.15)
Early moderate – late frequent	5.86 (5.23, 6.49)	4.84 (4.22, 5.46)	4.36 (3.75, 4.98)
Early frequent – late frequent	6.91 (6.29, 7.54)	5.62 (4.99, 6.25)	5.17 (4.55, 5.79)
Started drinking at			
Under 9	1.68 (0.79, 2.57)	0.29 (-0.38, 0.97)	0.13 (-0.54, 0.80)
9 to 11	1.13 (0.55, 1.72)	0.23 (-0.22, 0.67)	0.14 (-0.29, 0.58)
12 to 14	Reference	Reference	Reference
15 or older	-3.46 (-4.46, -2.46)	0.06 (-0.76, 0.88)	0.02 (-0.79, 0.82)
No age given, no age from study	-4.56 (-5.40, -3.71)	-0.48 (-1.21, 0.24)	-0.48 (-1.20, 0.23)
No age given, but do drink	-0.15 (-1.06, 0.77)	-0.33 (-1.02, 0.36)	-0.41 (-1.09, 0.27)
Missing	-7.61 (-10.18, -5.04)	-0.60 (-2.70, 1.51)	-0.47 (-2.54, 1.60)

AUDIT on affluence measures

We ran another series of multilevel regressions including two affluence covariates: the affluence latent class typologies (five classes, from most deprived to most affluent) and the area deprivation scores (five bands and a category for missing postcode information). The results of these series of regressions are displayed in Table 8. Unadjusted coefficients suggested an association between each of these affluence measures taken individually and the AUDIT score. In comparison to the most affluent latent class of participants, those in the most deprived and in class 3 had higher AUDIT scores. Considering the area deprivation categories, those that lived in most deprived areas had lower AUDIT scores.

When both these covariates were entered in the same regression model, there were still associations between these and the AUDIT scores. Compared to the most affluent latent class those in class 2 had higher AUDIT scores. Participants living in the most deprived areas displayed lower AUDIT scores compared to those in least deprived areas. When substance use and drinking patterns were controlled for in the model, neither area deprivation nor the latent classes of household were associated significantly with the AUDIT scores. A similar pattern emerged using the family affluence scale rather than the latent class measures.

Table 8: Regression coefficients of affluence measures on Audit score

Variable	Unadjusted Coefficients	Adjusted coefficients	+ demographic & health variables	+ substance use variables
Affluence Latent Class Measure				
Most deprived	1.31 (0.50, 2.13)	0.82 (-0.06, 1.69)	0.02 (-0.83, 0.86)	0.18 (-0.49, 0.85)
2	2.59 (1.59, 3.58)	2.18 (1.14, 3.21)	1.02 (0.06, 1.97)	0.56 (-0.20, 1.32)
3	-0.92 (-2.45, 0.62)	-1.35 (-2.92, 0.22)	-1.62 (-3.04, -0.19)	-0.83 (-1.97, 0.30)
4	0.81 (0.23, 1.38)	0.60 (0.00, 1.19)	0.12 (-0.43, 0.66)	0.20 (-0.24, 0.63)
Most Affluent	Reference	Reference	Reference	Reference
Area Deprivation				
Least deprived	Reference	Reference	Reference	Reference
2	-1.14 (-2.07, -0.20)	-0.96 (-1.90, -0.02)	-0.74 (-1.59, 0.11)	-0.22 (-0.89, 0.46)
3	-0.49 (-1.42, 0.45)	-0.23 (-1.19, 0.74)	0.11 (-0.76, 0.98)	0.47 (-0.22, 1.16)
4	-1.54 (-2.39, -0.68)	-1.16 (-2.07, -0.26)	-0.73 (-1.55, 0.09)	-0.18 (-0.83, 0.47)
Most Deprived	-1.50 (-2.30, -0.70)	-1.10 (-1.96, -0.23)	-0.93 (-1.71, -0.15)	-0.03 (-0.65, 0.59)
Missing postcode information	0.47 (-0.27, 1.21)	0.63 (-0.11, 1.38)	-0.10 (-0.78, 0.58)	-0.03 (-0.57, 0.51)

Interaction between affluence and drinking trajectory

In order to investigate if the association between AUDIT scores and drinking trajectory typologies was affected by affluence we ran a series of regressions where an interaction term was constructed multiplying the drinking trajectory typology by three bands of the Family Affluence Scale scores (Most deprived: scores 2 or lower; Middle: scores 2 to 4; Most affluent: scores above 4). FAS score was used in place of the latent classes as the FAS scale had a clearer ordering and there was more statistical power to assess evidence for an interaction across three groups rather than over five.

Table 9: Estimated AUDIT scores by drinking trajectory profiles and Family Affluence Bands

Variable	FAS two or lower n= 820	FAS two to four n=1,000	FAS above four n= 1,178
Drinking Trajectory			
Non drinkers	0.56 (-0.68, 1.81)	0.25 (-1.02, 1.52)	0.40 (-0.82, 1.61)
Early non drinker - Late infrequent	3.55 (2.47, 4.63)	2.51 (1.43, 3.59)	3.37 (2.24, 4.50)
Early infrequent – late infrequent	2.22 (1.18, 3.25)	2.22 (1.29, 3.14)	2.46 (1.65, 3.27)
Early infrequent – late moderate	7.92 (7.25, 8.60)	7.80 (7.11, 8.50)	7.56 (6.90, 8.22)
Early moderate – late moderate	9.40 (8.61, 10.19)	9.70 (8.91, 10.48)	8.63 (7.94, 9.32)
Early moderate – late frequent	13.04 (12.07, 14.01)	13.27 (12.24, 14.3)	14.40 (13.52, 15.28)
Early frequent – late frequent	12.99 (11.99, 13.99)	14.93 (14, 15.86)	15.58 (14.69, 16.48)

There was evidence of an interaction between affluence and drinking trajectory (Likelihood ratio test chi square 12 d.f. 29.66; $p = 0.003$). This persisted after controlling for all other variables ($p=0.02$). Table 9 shows the estimated audit scores within each drinking category grouped into three affluence groups (Lower FAS score indicates lower affluence). There were only a handful of non-drinkers in the FAS 2-4 and 4-6 categories; hence the inaccurate estimates for audit score. Inspection of the scores show that despite its significance, the differences in the AUDIT scores due to the interaction between affluence and typology of drinking trajectory were of small magnitude. The results showed that affluence had little effect on AUDIT scores for individuals in the less hazardous typologies of drinking behaviour, for example, all three affluence groups in the Early non drinker – Late infrequent category had a mean AUDIT between 2.5 and 3.5, while for the Early infrequent – Late infrequent’ group, AUDIT score was around 2.3. However, for those in more hazardous drinking trajectories (such as Early frequent – Late frequent) being in the most affluent band acted instead as a risk factor: adolescents in the more hazardous drinking category from more deprived backgrounds had AUDIT scores around 13, compared to around 14.9 or 15.5 for more affluent adolescents.

Discussion

We investigated how affluence and deprivation affect the development of drinking habits during adolescence and the extent to which alcohol use and deprivation differentially affect early symptoms of alcohol-related harm in a large sample of adolescents surveyed annually between age 12 and age 16. The results revealed some differences in alcohol use patterns across the socio-economic spectrum. Typologies of drinking trajectories were associated with alcohol-related problems at age 16, even after controlling for other demographic and health covariates: individuals that displayed more hazardous drinking patterns showed worse alcohol-related problems. Associations between affluence and alcohol-related health problems were observed, but after controlling for patterns of alcohol use, the association between affluence and alcohol-related health problems was no longer significant. However, a significant interaction was observed between patterns of alcohol use and affluence: being in the most affluent band acted as a risk factor for alcohol-related problems of individuals that displayed more hazardous alcohol use patterns. In what follows we discuss the results in relation to the study aims.

A.) Create a robust measure of relative affluence based on the BYDS indicators;

Firstly we created different bands of affluence by considering the average Family Affluence Scale across the five years of the study. The FAS scores were highly consistent across the years, indicating little variation in reported affluence across time. Secondly, we used a finite mixture model, Latent Class Analysis, to identify different socio-economic groups and adolescents' membership into these groups. Finite mixture models offer the advantage of allowing for measurement error (hence the indicators are not considered a perfect measure of the underlying construct). Preliminary analyses revealed a high degree of uniformity in socio-economic group membership across the years.

B.) Assess the extent of systematic differences in drinking patterns across the socioeconomic spectrum;

A finite mixture model, Latent Class Growth Analysis, was used to identify common patterns of alcohol use over time. Seven different typologies were identified. All profiles of drinkers showed some increase over time in the frequency of drinking, although the rate of this increase varied dramatically across alcohol use profiles. Overall, most adolescents in the final sample belonged to the Early infrequent-Late moderate or the Early moderate – Late moderate group. These groups started at different points, with the former group drinking experimentally in early adolescence and the latter drinking more regularly, but had similar end-points in the last year of the study in so far they were both likely to drink between monthly or weekly. A considerable percentage of adolescents were also included in the groups with the most hazardous drinking patterns: Early moderate – Late frequent and Early frequent – Late frequent. Adolescents in these groups were drinking weekly by late adolescence, although they started at different levels. Overall, these results revealed the pervasiveness of drinking by late adolescence in the cohort sample observed, a result that is consistent with available data collected by other studies in Northern Ireland (39).

The results revealed relevant differences in drinking patterns of adolescents from different socio-economic backgrounds. A greater proportion of respondents from the higher end of the socioeconomic spectrum displayed moderate drinking patterns than did those in poorer groups. Furthermore, it was much less common for the most affluent respondents to form part of the most hazardous drinking trajectory - weekly alcohol use continually from a young age, while a higher percentage of people in lower to middle socioeconomic groups were in this profile of alcohol use.

C.) Assess the extent to which drinking patterns carry a risk for alcohol problems in late adolescence.

The outcome variable considered was the total AUDIT score (34) collected in year 5 of the study when adolescents were approximately 16 years old. The AUDIT scores represent a valid measure of alcohol-related health problems such as harmful drinking, dependence and alcohol-related social problems. Multilevel models were used to test the association between covariates and the AUDIT scores while controlling for school effects. Overall, a small proportion of variation in the variable observed was explained by variation across schools (around 5.5%) and this fell to about 2% when other individual covariates were included in the models. Some consistent part of variation across schools was therefore related to substance use characteristics and affluence measures included in the model.

Age of onset of alcohol use was significantly associated with AUDIT scores, with younger age of onset carrying a higher risk for alcohol-related health problems. However, this association was reduced and was non-significant once we controlled for drinking patterns and lifetime use of tobacco and other drugs.

A clear gradient was observed in the association between alcohol use patterns and alcohol-related health problems: in comparison to a “normative” profile of early infrequent use followed by moderate use in late adolescence, AUDIT scores decreased in less hazardous profiles (e.g. non-users) and increased across more hazardous drinking trajectory profiles. The association between alcohol use trajectory profiles and alcohol-related health problems persisted after controlling for age of onset of alcohol, lifetime use of tobacco and other drugs, and persisted after controlling for demographic and health variables (gender, family composition, parental monitoring, abnormal problem behaviour). Health disparities across the different profiles of alcohol use over adolescence were not explained by other demographic and health variables. This result is consistent with results of other studies (35,36) but is also worth noting that in this study differences in alcohol-related health problems were already evident from late adolescence.

Lifetime use of tobacco and lifetime use of other drugs (ranging from cannabis to class-A drugs) were also associated with higher AUDIT scores, even after controlling for alcohol use profiles, demographic and health variables. This suggests that more serious alcohol-related health problems may be part of a constellation of health-risk behaviour (37,38).

D.) Assess whether the factors identified in C. differentially affect risk of negative outcomes among affluent and deprived groups;

Multilevel regression models revealed an association between socio-economic status and alcohol-related health problems before controlling for other covariates, but these associations were weakened once we controlled for deprivation categories of adolescents’ household, and faded to non-significance once we adjusted for demographic, health variables, drinking patterns and other substance use. Overall, demographic variables, abnormal problem behaviour, area deprivation, drinking patterns and other substance use explained the differential risk with alcohol exposure between adolescents from deprived and more affluent backgrounds.

After controlling for affluence latent class as well as demographic and health variables, there was still an association between area deprivation and AUDIT scores: being from more deprived areas was associated with lower AUDIT scores. However, once we adjusted for alcohol use profile, age of onset of alcohol use and lifetime use of tobacco or other drugs, the association between area deprivation and alcohol-related health problems was no longer significant. Alcohol-related health disparities across the social spectrum were not related to family affluence or deprivation of the area in which adolescents lived once adjusting for drinking patterns, a finding that resonates with other studies of social inequalities in adolescent health (25,26).

Finally, our goal was to investigate whether affluence differentially affected the risk of negative outcomes among profiles of alcohol use trajectory. We constructed an interaction term that was used in multilevel regression

models to assess if alcohol use trajectory profiles varied in the magnitude of risk for people at different positions in the socioeconomic spectrum. The results revealed a significant interaction, which indicated that individuals from more deprived backgrounds were at lower risk for poor alcohol outcomes if they were in more hazardous groups of alcohol use compared to adolescents from more affluent backgrounds. This interaction was also consistently observed when adjusting for other demographic, health and substance use variables. Although we must point out that the magnitude of differences in estimated AUDIT scores was small (over 2 points in the AUDIT scores in the most hazardous drinking trajectory profile), the results seem to indicate that being from a more affluent background was associated with increased health risk for adolescents that displayed more hazardous drinking patterns in adolescence.

E.) Assess the extent to which factors such as living arrangements, area deprivation or family processes explain the differential risk with alcohol exposure.

Multilevel regression models revealed that these factors had significant associations with alcohol-related health problems. Males displayed higher AUDIT scores compared to females. AUDIT scores were also higher for adolescents from reconstituted or single-parent families compared to adolescents living with both biological parents, and this was the case even after controlling for parental monitoring and abnormal problem behaviour scores. Parental monitoring had a protective effect on alcohol-related health even after controlling for gender, family composition and abnormal problem behaviour scores: adolescents that reported higher levels of parental monitoring reported lower levels of alcohol-related health problems. Finally there was a significant association between abnormal mental health and alcohol-related outcomes. However, these factors taken together did not explain the association between alcohol use patterns and alcohol-related health risk, nor did they explain the interaction between alcohol use patterns and family affluence in determining differential alcohol-related health risk.

Conclusions

This is one of the few studies that have examined the relationship between affluence, neighbourhood deprivation, drinking patterns and alcohol-related health problems longitudinally in adolescence. Consistent with other studies of adolescence we have not observed effects of socio-economic status on alcohol-related health problems once adjusting for alcohol use trajectory profiles and other covariates. These results seem to indicate that socio-economic differences in alcohol problems are not yet evident in late adolescence. Some commentators have suggested that this lack of a social gradient in alcohol-related risk may be explained by the *equalising* effects of socialisation agents in adolescence that act across the whole socio-economic spectrum: according to this hypothesis school ethos, peer behaviour, peer networks and youth cultures have a greater influence on drinking habits and on general health-risk behaviour than family or individual factors (25,26) and may mask or attenuate the effects of socio-economic status. According to this, it may be only after adolescence and when individuals are required to assume adult roles that social gradients start to emerge.

Our results however showed that adolescence alcohol-related health problems across the patterns of alcohol use profiles were affected differently by affluence. Being from a deprived background was associated with a reduction in alcohol problem risk for adolescents who demonstrated more hazardous drinking patterns. We can draw different hypotheses to explain these patterns of association. One explanation could be that drinking may be more normative among adolescents from more deprived backgrounds, therefore the motivation for drinking frequently in this socio-economic group may be more related to the need for socialising than the need to cope with stress. Another hypothesis may be that adolescents from more affluent backgrounds that drink more frequently may have greater access to alcohol (through peers, parents, or through access to larger disposable sums

of money) and therefore drink in greater quantity. In future studies we could investigate more closely the patterns of drinking and the drinking behaviour of peers to test these hypotheses.

The finding of no social gradient in adolescent problems in alcohol use has some policy implications. At younger ages, the cost to the state of harm caused by alcohol misuse among younger people occurs less often in the treatment of chronic medical conditions such as liver disease or alcoholism, but is more focused on costs incurred from dealing with accident and emergency medical treatment, violence, public disorder and antisocial behaviour. The most cost effective policies to deal with alcohol problems in young people are thus strategies that reduce these costs preventatively. The lack of social gradient would suggest that any public health intervention to reduce youth drinking problems would not benefit from targeting deprived communities, as the risk of drinking to excess does not vary greatly across social groups, and in fact, the more affluent heavy drinkers may be the individuals experiencing more problems with their drinking. It may be the case that a 'broad approach', such as alcohol education interventions with harm reduction messages rolled out across all schools would be the most beneficial in reducing the overall burden of alcohol misuse in adolescence.

One of the main conclusions of this study is that there appears to be little evidence of a social gradient in alcohol related problems in late adolescence, however affluence does influence drinking patterns, in a way that appears to place more affluent young people at higher risk of alcohol problems. However, it is known that in later adult years, a social gradient does appear, and this persists throughout the life course in that the poor are more prone to suffer a range of deleterious alcohol-related outcomes. The pertinent question then becomes at what point in the life trajectory does the gradient begin to emerge? The results here suggest some time after leaving school. As such, an important aim of future research would be to examine in detail the period of emerging adulthood and identify when the fork in the road between the rich and poor's alcohol related health appears.

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