

## RESEARCH REPORT

## Social gradients in binge drinking and abstaining: trends in a cohort of British adults

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**Objective:** To investigate (1) social gradients in non-drinking and binge drinking, and (2) changes in social gradients in drinking with increasing age.

**Methods:** British men and women born during the same week in March 1958 were prospectively followed up to adulthood. The frequency and amount of alcohol use were recorded at age 23, 33 and 42 years. Abstainers “never” drank, binge drinkers consumed  $\geq 10$  units (men) and  $\geq 7$  units (women) per occasion. Educational qualifications and occupation were reported at age 23 and 33 years. Logistic and repeated-measures models were used to investigate associations between social position and drinking status at single and multiple ages in adulthood.

**Results:** Less educated men and women had greater odds of being non-drinkers at each age in adulthood, with similar gradients at ages 23–42 years. At 23 years of age, men without qualifications had 2.94 times greater odds of non-drinking than men with higher qualifications. Less educated men had greater odds of binge drinking, and gradients did not change at ages 23–42 years. At age 23 years, less educated women had lower odds of binge drinking (odds ratio (OR) 0.67 for women with no qualifications) than women with higher qualifications. By age 42 years, the gradient reversed, and less educated women had higher odds of binge drinking (OR 2.68).

**Conclusions:** Stable gradients in non-drinking and trends in gradients in binge drinking may reinforce alcohol-related health inequalities over time.

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Binge drinking is a current policy concern in the UK and also in other countries.<sup>1,2</sup> Binge drinking and abstaining from alcohol are both associated with poorer health outcomes.<sup>2,3</sup> Social gradients of varying magnitudes are documented for different levels of alcohol use in the UK. Non-drinking is more concentrated in deprived groups and moderate consumption is more prevalent in affluent classes; however, studies on gradients in heavier drinking are inconsistent.<sup>4,5</sup> Little research exists on social gradients in binge (or heavy episodic) drinking. The existing British national cross-sectional data indicate weak or inconsistent social gradients in binge drinking.<sup>6,7</sup> At present, data on trends over time in non-drinking or binge drinking are sparse. Therefore, using prospective national data, we investigated (1) social gradients in non-drinking and in binge drinking during adulthood and (2) trends through adulthood of social gradients in non-drinking and binge drinking.

## METHODS

Data were obtained from a nationally representative British birth cohort comprising all births during the same week in March 1958.<sup>8</sup> Survivors were followed up to childhood and adulthood. We used data from adult surveys: the response rate was 76.1% (12 537/16 482) at age 23 years; 70.2% (11 407/16 240) at age 33 years; and 70.3% (11 419/16 240) at age 42 years.<sup>8</sup>

The frequency and amount of alcohol consumed were recorded in self-completed questionnaires at ages 23, 33 and 42 years.<sup>9</sup> Categories differed slightly between surveys, but comparable groups were as follows: drinking on most days, drinking  $\geq 2$  times a month, drinking infrequently or on special occasions, and not drinking. Units of alcohol (equivalent to 8 g or 10 ml ethanol)<sup>10</sup> were calculated using all information on beer, wine, spirits and “martini, vermouth or similar” at each age; plus alcopops at age 42 years, included to keep pace with the changing alcohol use. Binge drinkers were identified by

dividing the number of units of alcohol consumed in the past week by the usual frequency, with limits of  $\geq 10$  units (men) and  $\geq 7$  units (women) per occasion. The highest qualification achieved by age 33 years was recorded and coded as higher education, A level, O level, <O level or no qualifications. The current or most recent occupation at age 33 years (or at age 23 years if missing at 33 years) was categorised by the Registrar General's classification.<sup>11</sup> To illustrate, in the analysis of binge drinkers or non-drinkers at age 42 years, occupation data at age 23 years were used for 1592 of 10 637 participants. Ethics committee approval for the survey at age 42 years was obtained from the North Thames Multi-centre Research Ethics Committee. The analysis sample was the maximum with education (or social position) and alcohol use, and hence varies for each survey. Regarding sample attrition for the survey at 42 years: 21% of women with missing data on alcohol use had higher qualifications compared to 27% of women with data. Equivalent proportions for men were 23% and 30%, respectively.

## Analysis

Analyses were conducted separately for two outcomes: non-drinkers (compared with drinkers) and binge drinkers (compared with non-binge drinkers plus non-drinkers). Cross-tabulations were used to check that the prevalence of non-drinking and that of binge drinking were linearly associated with education level and with occupational class. Education level and occupational class were then used as continuous variables. Logistic regression was used to estimate the odds of drinking outcome at each adult survey associated with qualification level. The change over time in the association between education level and drinking outcome was tested using binomial repeated measures multilevel models (in MlwiN), testing the interaction between educational level and time point. Sex differences in the association between education level and drinking outcome were tested with interactions

between education level, time point and sex. Analyses were repeated using occupation at age 33.

## RESULTS

### Social gradients in non-drinking

Table 1 shows that more women than men do not drink; the prevalence of non-drinking is similar throughout adulthood in both men (3.7% by age 42 years) and women (6.3% by age 42 years). At each age, less educated men and women had increased odds for being non-drinkers; at age 23 years, men with no qualifications had 2.94 (ie, 1.31<sup>4</sup>) times greater odds for non-drinking than men with higher qualifications. In both sexes, the magnitude of the education gradient in non-drinking at age 23 years did not differ significantly from that at ages 33 or 42 years. A similar pattern of results was seen regarding the occupational class, with higher levels of non-drinking in manual social groups and no change in the social gradient between ages 23 and 42 years (table 2).

### Social gradients in binge drinking

The prevalence of binge drinking declines to 31% at 42 years from a peak at age 23 years in men and to 14% at age 42 years in women (table 1). Less educated men had raised odds for binge drinking at each age; at 23 years, men with no qualifications had 1.63 times greater odds than those with higher qualifications. The education gradient in binge drinking in men did not change significantly from age 23 to 42 years. By contrast, less educated women were less likely to binge drink at age 23 years but were more likely to binge drink at older ages. At age 23 years, the odds were 0.69 times lower for women with no qualifications than for those with higher qualifications; by age 42 years, the odds were 2.68 times greater. Conversely, more educated women were more likely to binge drink at age 23 years and then to stop binge drinking by 42 years. The change in educational gradient for binge drinking from age 23 to 42 years was significant; the interactions of qualifications with the 33-year time point and also qualifications with 42-year time point (both  $p < 0.05$ ) indicated that the association between qualifications and binge drinking differed at ages 33

and 42 years compared with that at 23 years. The trend in educational gradients in binge drinking over time differed by sex; there were significant interactions between sex, qualifications and survey at age 33 years and also sex, qualifications and survey at 42 years were both  $p < 0.05$ . Similar results were seen regarding the occupational class; we found no change over time in the social gradient in binge drinking among men, but the social gradient reverses over time among women (table 2).

## DISCUSSION

In a contemporary cohort of British adults, the least educated men reported non-drinking or binge drinking more often than more educated men, whereas the more educated women were binge drinkers in their 20s, but this trend reversed as women entered their 30s. By mid-life, binge drinking and non-drinking were disproportionately concentrated in people with less education or unskilled manual occupations in this primarily Caucasian population. A corollary to our findings is that prevalence of the intermediate group, who were neither non-drinkers nor binge drinkers, was greater in the highly educated men and women and in those with skilled occupations. This pattern was consistent across ages, except for women at age 23 years. The direction of the gradient in binge drinking in men and by later ages in women fits with other data on the British population, although not all studies report significant gradients in binge drinking.<sup>5-7</sup> Inconsistencies in the literature about gradients in binge drinking may be explained partly by our findings of changes in the gradients with increasing age, at least among women. There are also differences between studies regarding the drinking measures used.<sup>12</sup> We defined non-drinkers as those who reported "never" drinking at separate surveys. The group is not the same as long-term abstainers:<sup>13</sup> only 5% ( $n = 419$ ) adults from the sample were "never" drinkers at age 42 years, and of these 72% ( $n = 301$ ) had reported drinking at ages 23 or 33 years, indicating that very few "never" drinkers are likely to have never consumed alcohol. For binge drinkers, definitions of binge drinking are debated, with variations over time and between countries,<sup>14</sup> but we used the British recommendations from the period covered by our

**Table 1** Association between alcohol use and adult education level (odds ratio (95% confidence interval)) across three adult time points

	n*	Non-drinkers		Binge drinkers	
		Prevalence (%)	OR (95% CI)†	Prevalence (%)	OR (95% CI)‡
<b>Men</b>					
23 years	4600	3.1	1.31 (1.16 to 1.49)	36.2	1.13 (1.07 to 1.18)
33 years	5446	3.0	1.19 (1.06 to 1.34)	27.8	1.17 (1.12 to 1.23)
42 years	4602	3.7	1.17 (1.04 to 1.32)	30.8	1.18 (1.13 to 1.24)
Test for trend					
23 v 33 years§			$p = 0.08$		$p = 0.239$
23 v 42 years§			$p = 0.09$		$p = 0.162$
<b>Women</b>					
23 years	4944	5.5	1.23 (1.12 to 1.36)	17.8	0.91 (0.86 to 0.96)
33 years	5684	6.0	1.20 (1.10 to 1.31)	12.8	1.11 (1.04 to 1.18)
42 years	4989	6.3	1.28 (1.16 to 1.40)	13.7	1.28 (1.20 to 1.36)
Test for trend					
23 v 33 years§			$p = 0.595$		$p < 0.001$
23 v 42 years§			$p = 0.661$		$p < 0.001$

\*Sample includes participants with qualifications at age 33 years ( $n = 11141$ ) and data on alcohol at any one of the three time points. Sample is largest at age 33 years, when data on qualifications were recorded.

†Non-drinkers v drinkers, OR per unit change in qualifications at 33 years, grouped into five categories. Higher qualifications (>A level) are baseline.

‡Binge drinkers v other drinkers and non-drinkers, OR per unit change in qualifications at 33 years, grouped into five categories. Higher qualifications (>A level) is baseline.

§The change in educational gradient for binge drinking from 23 to 42 years was tested using the interactions of qualifications with the 33-year time point and also qualifications with the 42-year time point in a repeated-measures model.

**Table 2** Association between alcohol consumption and adult social class at age 33 years (OR (95% CI)) across three adult time points

	n*	Non-drinkers		Binge drinkers	
		Prevalence (%)	OR (95% CI)†	Prevalence (%)	OR (95% CI)‡
<b>Men</b>					
23 years	6094	3.3	1.19 (1.05 to 1.34)	37.2	1.18 (1.13 to 1.24)
33 years	5466	3.0	1.21 (1.05 to 1.38)	28.0	1.23 (1.16 to 1.29)
42 years	5174	4.0	1.18 (1.04 to 1.33)	31.3	1.25 (1.19 to 1.32)
Test for trend					
23 v 33 years§			p=0.880		p=0.291
23 v 42 years§			p=0.940		p=0.119
<b>Women</b>					
23 years	6186	6.0	1.22 (1.12 to 1.34)	17.6	0.91 (0.86 to 0.97)
33 years	5668	5.8	1.16 (1.06 to 1.28)	12.9	1.09 (1.02 to 1.16)
42 years	5463	6.3	1.25 (1.14 to 1.38)	13.9	1.21 (1.13 to 1.29)
Test for trend					
23 v 33 years§			p=0.449		p<0.001
23 v 42 years§			p=0.698		p<0.001

\*Sample includes participants with social class at age 33 years (or at 23 years if data at 33 years missing; n = 12 229) and data on alcohol consumption at any one of the three time points.

†Non-drinkers v drinkers, OR per unit change in occupational class at 33 years, grouped into four categories.

Professional and managerial (RG I&II) categories are baseline.

‡Binge drinkers v other drinkers and non-drinkers, OR per unit change in occupational class at 33 years, grouped into four categories. Professional and managerial (RG I&II) are baseline.

§The change in social gradient for drinking from age 23 to 42 years was tested using the interactions of social class with 33-year time point and also social class with the 42-year time point in a repeated-measures model.

study. Our measure of binge drinking is an index of drinks consumed per occasion rather than an estimate of the maximum number of drinks per drinking occasion. It is a conservative measure with sex-specific cut-offs. As in other large surveys, we use self-reported alcohol use, which may limit the accuracy of quantities consumed.<sup>9</sup> However, studies report that asking beverage-specific questions improves recall during the reference period.<sup>15</sup>

It is not clear why the trends in social gradients in binge drinking should differ by sex, reversing with age for women, whereas social gradients in non-drinking were stable in men and women. As in other populations, alcohol use is normative in this cohort, with the majority drinking at each time point, and the social pattern of not drinking in this study was consistent with cross-sectional British data.<sup>4</sup> Age, cohort or period effects may influence trends in both prevalence and social gradients in drinking over time. With respect to gradients in binge drinking, an age effect might be a consequence of different trajectories of work and domestic circumstances, creating opportunities for binge drinking in different social groups at different ages—for example, among women, the less educated are more likely to have children earlier than more educated women,<sup>16</sup> and also have different types of employment with differing drinking cultures. A period effect could result from increased availability of alcohol related to declining real price,<sup>17</sup> with binge drinking becoming more accessible and possibly affecting social groups differently through varying behavioural norms. Age and period effects might produce cohort effects that play out in changing social trends in drinking.

However, we cannot unravel which mechanisms are operating from our study alone, and hence cannot extrapolate on binge drinking to younger cohorts currently experiencing different influences on their patterns of drinking. The initial peak of alcohol use in the most educated women differs from characteristic social gradients in health behaviours, whereby healthier behaviours are taken up by the most educated in society, as seen with smoking in this cohort.<sup>18</sup> Social gradients in health behaviours, including alcohol consumption, differ across locations and times, and are influenced by cultural and

economic contexts. In this cohort, the social gradient in binge drinking in men established by age 23 years is maintained over time, whereas the gradient in women is reversed by mid-life, bringing the social pattern of binge drinking in women to more closely resemble the pattern for men. Whether these patterns will be found in other populations, which include ethnic minorities, and whether they will stabilise in the 1958 cohort with increasing age remains to be seen. Meanwhile, for both

### What is already known

- There are social gradients in non-drinking in the UK but limited evidence is available about social inequalities in binge drinking, or about trends in social gradients in binge drinking or non-drinking.

### What this paper adds

- Social inequalities in non-drinking were stable over two decades, with higher levels of non-drinking in groups with the lowest educational levels.
- For binge drinking, the most educated men were consistently less likely to binge drink throughout adult life. The most educated women were more likely to binge drink in their 20s, but by their 40s they were least likely to be binge drinkers.

### Policy implications

- Policies to reduce inequalities in health outcomes linked to drinking behaviour should take account of the tendency for inequalities in non-drinking and binge drinking to persist for long periods during adult life.

men and women, the social patterns in abstaining and in binge drinking may have consequences on future health inequalities in this population.

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