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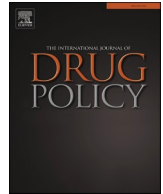
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## Research Paper

## Trends in alcohol expenditure among risky drinkers: A population study in England, 2014–2023

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## ABSTRACT

**Background:** This study aimed to estimate time trends in alcohol expenditure among risky drinkers in England over the past decade, to understand whether these trends are driven by changes in prices paid or volumes purchased, and to explore differences between population subgroups.

**Methods:** Nationally-representative monthly cross-sectional survey. Participants were 44,382 adults ( $\geq 18$ y) drinking at risky levels (AUDIT-C  $\geq 5$ ; 'risky drinkers'). Linear regression modelled trends between March-2014 and October-2023 in (i) mean weekly inflation-adjusted expenditure on alcohol, (ii) mean weekly alcohol consumption in units, and (iii) mean inflation-adjusted expenditure per unit of alcohol, overall and by age, gender, social grade, region, and smoking status.

**Results:** There was an uncertain decrease in mean weekly expenditure from £18.90 [95 %CI=£18.30-£19.50] in March-2014 to £17.90 [£17.60-£18.30] in May-2016, then an uncertain increase to £18.60 [£18.30-£18.90] between May-2016 and June-2018. This was followed by a further decline to £16.90 [£16.60-£17.30] by April-2021 and subsequent rise to £18.60 [£17.90-£19.40] by October-2023. Changes in weekly alcohol expenditure were more closely mirrored by changes in mean expenditure per unit of alcohol than by changes in mean weekly alcohol consumption in units. Notable subgroup differences included sharp rises in weekly alcohol expenditure since 2021 among younger ages (driven by a rise in expenditure per unit of alcohol) and current smokers (driven by a rise in weekly units of alcohol consumed).

**Conclusions:** In England, the average amount adult risky drinkers reported spending on alcohol each week has fluctuated since 2014, with a notable decrease around the start of the COVID-19 pandemic in 2020 and a subsequent rise since restrictions were lifted and since the cost-of-living crisis has led to high rates of inflation. Except for current smokers, this pattern appears to have been driven predominantly by changes in the price paid per unit rather than changes in consumption.

## Introduction

Alcohol use is a leading risk factor for morbidity and mortality (Griswold et al., 2018; Shield et al., 2020). In England, one in three adults drinks at risky levels (Buss et al., 2023) (operationalised as a score  $\geq 5$  on the Alcohol Use Disorders Identification Test—consumption [AUDIT-C] (Bush et al., 1998); henceforth referred to as 'risky drinkers'). Raising the price of alcohol, through taxation or other pricing policies, is regarded internationally as one of the most effective

strategies for reducing alcohol consumption and its related harms at the population level (Chisholm et al., 2018; Wagenaar et al., 2009, 2010; World Health Organization, 2011). A vast literature has demonstrated that higher alcohol prices and taxes are associated with lower levels of alcohol consumption, risky drinking, and heavy episodic drinking (Fogarty, 2006; Gallet, 2007; Guindon et al., 2022; Nelson, 2013; Wagenaar et al., 2009). This pattern of price responsiveness has been observed across all beverage types and for lighter and heavier drinkers (Wagenaar et al., 2009). Understanding how much risky drinkers are

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paying for alcohol, how this is changing over time, and what is driving these changes can inform pricing policies aimed at reducing alcohol harm in this at-risk population.

After concern for their health, cost ranks among drinkers' leading motives for reducing their alcohol consumption (Beard et al., 2017a). However, in the UK, alcohol has become increasingly affordable over the last 30 years (NHS Digital, 2022b). This is particularly true in the off-trade (shops) where price-based promotional deals and low costs per unit of alcohol are commonplace. Government policy on alcohol taxation since 2012 has contributed to this increase in affordability, with the cancellation of the alcohol duty escalator (which increased alcohol duties by 2 % above inflation each year) and subsequent real-terms cuts in duty rates (Angus & Henney, 2019). These increases in affordability have occurred alongside a long-term shift in alcohol consumption from pubs and bars towards greater at-home drinking (British Beer & Pub Association, 2022; Ponce Hardy & Giles, 2022), with lower prices as one of the main drivers (Foster & Ferguson, 2012). The initial phase of the COVID-19 pandemic created a temporary step-change in this trend, with drinking at home replacing on-trade drinking (in pubs, restaurants, bars and nightclubs) – a shift that may have become habitual for some drinkers over the longer term (Callinan & MacLean, 2020; Fitzgerald et al., 2022; Hardie et al., 2022). More recently, the 'cost-of-living crisis', driven by high rates of inflation, has put additional pressure on household budgets, although the prices of alcoholic products have risen more slowly than other food and drink categories (Office for National Statistics, 2023c).

Previous studies have examined trends in population alcohol consumption and aggregate prices paid for alcohol (Angus et al., 2016; de Vocht et al., 2016; NHS Digital, 2022b, 2022a; Ponce Hardy & Giles, 2022), however less is understood about trends in expenditure on alcohol. Examining how risky drinkers' expenditure on alcohol is changing over time, and whether changes are reflective of price per unit or changes in units consumed, is important for understanding shifts in consumer behaviour and policy effects in the context of the wider economic climate. In order for alcohol pricing policies to benefit public health, increases in (or stability of) alcohol expenditure should be accompanied by a reduction in total units of alcohol consumed (i.e., an increase in the price per unit consumed). If alcohol expenditure remains stable as units consumed increase, this may provide evidence for reductions in the price paid per unit and may suggest the need to increase prices and reduce the affordability of alcohol so as to reduce its public health burden. In examining changes in expenditure on alcohol, it is also important to consider differences across subgroups of the population. The amount people spend on alcohol varies according to individual patterns of consumption (including what they drink, how much they drink, and where they buy it from) and price sensitivity (Meier et al., 2010). These are variables known to differ markedly by sociodemographic characteristics (e.g., age, gender, socioeconomic position, and region) and use of other substances (e.g., smoking status) (Beard et al., 2017b; Holmes et al., 2014; Lewer et al., 2016; McKee et al., 2007; Meier et al., 2010, 2016, 2021; Shelton & Savell, 2011; Wilson et al., 2021). For example, heavy drinkers on low incomes consume more alcohol on average than those on higher incomes, but pay substantially less per unit of alcohol (Meier et al., 2016). This is because they purchase more in the off-trade and more beer, both of which are cheaper than alternatives (Meier et al., 2016).

This descriptive study aimed to estimate time trends in alcohol expenditure among risky drinkers in England over the past decade and explore differences between relevant population subgroups. Specific research questions were:

1. How has risky drinkers' mean weekly expenditure on alcohol changed between 2014 and 2023, before and after adjustment for inflation?
2. To what extent have changes in expenditure differed by age, gender, occupational social grade, region in England, and smoking status?

3. How far have changes in mean weekly expenditure (overall and within subgroups) been driven by changes in the amount spent per unit of alcohol as opposed to changes in the amount of alcohol consumed?

## Methods

### Pre-registration

The study protocol and analysis plan were pre-registered on Open Science Framework (<https://osf.io/x6j95/>).

### Design

Data were drawn from the Alcohol Toolkit Study, an ongoing monthly cross-sectional survey of a nationally-representative sample of adults in England (Beard et al., 2015). The study uses a hybrid of random probability and simple quota sampling to select a new sample of approximately 1700 adults each month. Full details of the sampling procedure are provided elsewhere (Beard et al., 2015; Kock et al., 2021).

Data were collected monthly through face-to-face computer-assisted interviews up to February 2020. However, social distancing restrictions under the COVID-19 pandemic meant that no data were collected in March 2020, and data from April 2020 onwards have been collected via telephone. The telephone-based data collection relies upon the same combination of random location and quota sampling, and weighting approach as the face-to-face interviews and comparisons of data collected using these two modalities indicate good comparability (Jackson et al., 2021, 2022; Kock et al., 2022).

For the present study, we used data collected from participants in the period from March 2014 (the first wave of data collected) to June 2023 (the last wave of data on alcohol expenditure collected before alcohol duty reforms were implemented in August 2023). Since April 2022, expenditure on alcohol was not assessed in certain waves (May/July/September/November/December 2022; July 2023) due to availability of competitive research funding; participants surveyed in these waves were therefore excluded. We restricted our sample to those who reported risky drinking levels (AUDIT-C  $\geq 5$ ; 'risky drinkers'), because those drinking at lower-risk levels or not at all were not asked about their expenditure on alcohol. We also excluded those aged under 18, who cannot legally buy alcohol in England.

All participants provided informed verbal consent and ethical approval was granted by the UCL Ethics Committee (ID 0498/001).

### Measures

Risky drinking was assessed with the extended AUDIT-C (Bush et al., 1998; Dutey-Magni et al., 2022), which asks the following three questions:

1. How often do you have a drink containing alcohol?
  - Never (score 0)
  - Monthly or less (score 1)
  - 2–4 times per month (score 2)
  - 2–3 times per week (score 3)
  - 4–5 times per week (score 4)
  - 6+ times per week (score 4)
2. How many units of alcohol do you drink on a typical day when you are drinking?
  - 1–2 (score 0)
  - 3–4 (score 1)
  - 5–6 (score 2)
  - 7–9 (score 3)
  - 10–12 (score 4)
  - 13–15 (score 4)
  - 16+ (score 4)

3. How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?
- Never (score 0)
  - Less than monthly (score 1)
  - Monthly (score 2)
  - Weekly (score 3)
  - Daily or almost daily (score 4)

Those who scored  $\geq 5$  were considered risky drinkers. Participants with a score  $< 5$  were excluded from the sample as they were not asked about their expenditure on alcohol.

Weekly expenditure on alcohol was assessed in risky drinkers with the question: 'On average about how much per week do you think you spend on alcohol for your own consumption?'. Participants were asked to only answer this if they were fairly confident that they knew. Responses were given to the nearest pound. Our primary outcome was total weekly expenditure. Our secondary outcome was expenditure per unit of alcohol (calculated as total weekly expenditure divided by weekly units of alcohol consumed). We log-transformed expenditure variables for analysis to normalise the skewed distributions and reported results as geometric means. Inflation adjustment was calculated using monthly Consumer Prices Index including owner occupiers' housing costs (CPIH) inflation published by the Office for National Statistics ([Office for National Statistics, 2023c](#)). This is the UK's leading measure of inflation ([Office for National Statistics, 2023b](#)).

Weekly units of alcohol consumed was calculated based on responses to questions 1 and 2 of the extended AUDIT-C ([Dutey-Magni et al., 2022](#)). Drinking occasions per week was coded as never=0, monthly or less=0.25, 2–4 times per month=0.75, 2–3 times per week=2.5, 4–5 times per week=4.5, 6+ times per week=6.5. Units consumed per drinking occasion was coded as 1–2 = 1.5, 3–4 = 3.5, 5–6 = 5.5, 7–9 = 8, 10–12=11, 13–15=14, 16+=16. Weekly units of alcohol consumed was calculated as drinking occasions per week x units consumed per drinking occasion.

Age was analysed as a continuous variable.

Gender was self-reported as man, woman, or in another way and summarised descriptively. Those who identified in another way were excluded from regression analyses that included gender due to low numbers ( $n = 112$ ).

Occupational social grade was categorised as ABC1 (includes managerial, professional, and upper supervisory occupations) and C2DE (includes manual routine, semi-routine, lower supervisory, and long-term unemployed).

Region in England was categorised as North (North West, North East, Yorkshire and the Humber), Midlands (West Midlands, East Midlands, East of England), and South (South West, South East, London).

Smoking status was categorised as current smoker, ex-smoker, and never-smoker.

### Statistical analysis

Analyses were conducted using R v4.2.1. The Alcohol Toolkit Study uses raking to weight the sample to match the population in England. This profile is determined each month by combining data from the UK Census, the Office for National Statistics mid-year estimates, and the annual National Readership Survey ([Fidler et al., 2011](#)). The following analyses used weighted data.

We excluded participants with missing data on alcohol expenditure. We compared the characteristics of those excluded on this basis with those retained in the analytic sample. Missing cases on other variables were excluded on a per-analysis basis. We followed the 'New Statistics' approach to reporting and interpretation of results ([Calin-Jageman & Cumming, 2019](#); [Cumming, 2014](#)), focusing on effect sizes and confidence intervals rather than dichotomous thinking about statistical significance (i.e., whether a result is significant or not significant, based on an arbitrary threshold). Where confidence intervals overlap, we report

changes as 'uncertain'.

### Time trends in expenditure, overall and within population subgroups

We reported descriptive data on weekly alcohol expenditure by survey year, with and without adjustment for inflation, among all risky drinkers and within each subgroup of interest.

We used linear regression to estimate monthly time trends in mean weekly alcohol expenditure, with and without adjustment for inflation, with log-expenditure as the outcome and time (survey wave, coded 1...n) modelled using restricted cubic splines with five knots (decided *a priori* and pre-registered, on the basis that this number would be sufficient to accurately model trends across years without overfitting). This allowed for flexible and non-linear changes in expenditure over time, while avoiding categorisation ([Howe et al., 2011](#)).

To explore moderation by age, gender, occupational social grade, region in England, and smoking status, we repeated the models including the interaction between the moderator of interest and time – thus allowing for time trends to differ across sub-groups. Each of the interactions was tested in a separate model. Age was modelled using restricted cubic splines with three knots (placed at the 5, 50, and 95 % percentiles), to allow for a non-linear relationship between age and expenditure.

### Level of consumption and expenditure per unit

To explore the extent to which changes in total alcohol expenditure were driven by changes in the number of units consumed vs. changes in expenditure per unit of alcohol, we repeated the models described above with (i) weekly alcohol consumption in units and (ii) log-expenditure per unit of alcohol as outcomes.

### Unplanned analyses

In addition to our pre-registered analyses, we carried out an exploratory analysis to examine the extent to which differences in trends by smoking status were consistently observed across social grades, given smoking status is strongly linked with socioeconomic disadvantage. ([Hiscock et al., 2012](#); [Office for National Statistics, 2023a](#)) We repeated the models testing interactions between time and smoking status for each outcome stratified by social grade (i.e., within ABC1 and C2DE separately).

## Results

A total of 182,654 (unweighted) adults aged  $\geq 18$  years were surveyed between March 2014 and June 2023, of whom 50,804 (27.8 %) reported risky drinking levels ('risky drinkers'). We excluded 2605 risky drinkers surveyed in waves in which alcohol expenditure was not assessed and a further 3817 participants who responded 'don't know' to the question on alcohol expenditure (7.9 % of those asked), leaving a final sample of 44,382 participants (weighted mean [SD] age = 44.5 [16.7] years, 35.7 % women, mean [SD] AUDIT-C score = 6.9 [1.8]; Table S1). Relative to the analysed sample, risky drinkers who were surveyed in eligible waves and were excluded based on missing data were more likely to be aged  $\geq 65$ , women, and from less advantaged social grades (Table S1).

Table 1 summarises changes in weekly expenditure on alcohol, weekly units of alcohol consumed, and expenditure per unit of alcohol from the start to the end of the study period. Time trends are shown in Figs. 1 and 2.

### Trends among all risky drinkers

#### Weekly expenditure on alcohol

Across the study period, risky drinkers' mean weekly inflation-adjusted expenditure on alcohol followed a curvilinear trend (Fig. 1A). There was an uncertain decrease in mean expenditure from £18.90 [95 %CI £18.30–£19.50] in March 2014 to £17.90 [£17.60–£18.30] in May

**Table 1**

Modelled estimates of changes in weekly expenditure on alcohol, weekly units of alcohol consumed, and expenditure per unit of alcohol among risky drinkers in England, March 2014 to October 2023.

	Weekly expenditure <sup>1</sup> on alcohol (£)			Weekly units of alcohol consumed			Expenditure <sup>1</sup> per unit of alcohol (£)		
	Mean <sup>2</sup> [95 %CI] <sup>3</sup>		% change <sup>4</sup>	Mean [95 %CI] <sup>3</sup>		% change <sup>4</sup>	Mean <sup>2</sup> [95 %CI] <sup>3</sup>		% change <sup>4</sup>
	March 2014	October 2023		March 2014	October 2023		March 2014	October 2023	
All adults	18.9 [18.3–19.5]	18.6 [17.9–19.4]	–1.2	15.2 [14.7–15.7]	16.2 [15.5–16.9]	+6.6	1.70 [1.64–1.75]	1.68 [1.62–1.75]	–0.7
Age (years) <sup>5</sup>									
18	18.6 [17.2–20.1]	22.4 [19.7–25.4]	+20.3	12.9 [11.8–14.1]	13.3 [11.3–15.2]	+2.3	2.16 [1.99–2.34]	2.72 [2.41–3.07]	+26.0
25	18.7 [17.7–19.7]	20.7 [19.0–22.6]	+10.8	13.3 [12.5–14.0]	13.9 [12.6–15.2]	+4.8	2.03 [1.93–2.15]	2.34 [2.16–2.55]	+15.3
35	18.8 [18.0–19.6]	18.8 [17.8–19.8]	–0.2	13.8 [13.2–14.5]	14.8 [13.9–15.7]	+7.3	1.86 [1.79–1.94]	1.92 [1.83–2.01]	+3.0
45	18.9 [18.0–19.9]	17.6 [16.7–18.6]	–6.9	14.8 [14.0–15.6]	15.9 [14.8–16.9]	+7.5	1.69 [1.61–1.77]	1.62 [1.54–1.70]	–4.2
55	19.1 [18.2–19.9]	17.4 [16.6–18.4]	–8.5	16.3 [15.6–17.1]	17.1 [16.1–18.0]	+4.7	1.51 [1.45–1.58]	1.43 [1.37–1.50]	–5.0
65	19.2 [18.3–20.1]	18.0 [17.2–18.9]	–6.0	18.4 [17.4–19.3]	18.4 [17.5–19.4]	+0.4	1.33 [1.27–1.39]	1.32 [1.27–1.38]	–0.9
Gender									
Men	21.7 [20.9–22.6]	21.3 [20.3–22.4]	–2.0	16.8 [16.1–17.5]	18.0 [17.1–19.0]	+7.2	1.77 [1.70–1.84]	1.75 [1.67–1.83]	–1.1
Women	14.3 [13.6–15.1]	14.5 [13.6–15.4]	+1.2	12.1 [11.4–12.8]	12.5 [11.7–13.3]	+3.6	1.56 [1.48–1.65]	1.57 [1.48–1.67]	+0.4
Occupational social grade									
ABC1 (more advantaged)	19.5 [18.8–20.3]	18.7 [17.9–19.5]	–4.2	15.2 [14.6–15.9]	15.1 [14.4–15.8]	–1.0	1.67 [1.61–1.74]	1.74 [1.67–1.80]	+3.8
C2DE (less advantaged)	17.9 [16.9–18.9]	18.6 [17.2–20.1]	+3.9	15.1 [14.2–16.1]	18.0 [16.6–19.4]	+19.1	1.73 [1.64–1.83]	1.61 [1.49–1.73]	–7.4
Region in England									
North	17.9 [17.1–18.8]	17.7 [16.5–19.0]	–1.3	15.2 [14.4–16.0]	17.2 [15.9–18.5]	+12.7	1.66 [1.58–1.74]	1.53 [1.43–1.64]	–7.8
Midlands	18.5 [17.4–19.7]	17.9 [16.6–19.4]	–3.1	14.2 [13.1–15.3]	15.6 [14.3–16.9]	+10.1	1.77 [1.65–1.89]	1.69 [1.57–1.81]	–4.5
South	20.2 [19.1–21.4]	19.8 [18.6–21.0]	–2.2	15.9 [15.0–16.8]	15.9 [14.9–16.9]	+0.2	1.69 [1.60–1.78]	1.79 [1.70–1.89]	+6.3
Smoking status									
Never smoker	18.4 [17.6–19.2]	16.6 [15.7–17.5]	–9.9	13.7 [13.0–14.3]	13.6 [12.8–14.4]	–0.4	1.76 [1.68–1.84]	1.72 [1.63–1.81]	–2.5
Ex-smoker	17.8 [16.7–19.0]	18.4 [17.2–19.5]	+3.0	15.6 [14.5–16.6]	16.6 [15.5–17.6]	+6.3	1.48 [1.39–1.58]	1.53 [1.44–1.62]	+3.2
Current smoker	20.9 [19.5–22.4]	24.7 [22.4–27.3]	+18.4	17.9 [16.6–19.2]	21.2 [19.3–23.2]	+18.7	1.76 [1.65–1.88]	1.84 [1.68–2.02]	+4.4

CI, confidence interval.

<sup>1</sup> Adjusted for inflation. Modelled estimates of mean weekly expenditure on alcohol and mean expenditure per unit of alcohol without adjustment for inflation are provided in Table S2. Unmodelled estimates of mean weekly expenditure on alcohol within each survey year, with and without inflation, are provided in Table S3 and Table S4, respectively.

<sup>2</sup> Geometric means are reported to account for the skewed distribution of expenditure.

<sup>3</sup> Data for March 2014 and October 2023 are weighted estimates of mean expenditure/consumption in these months (the first and last in the study period) from linear regression with survey month modelled non-linearly using restricted cubic splines (five knots).

<sup>4</sup> Percentage change between March 2014 and October 2023, calculated before rounding estimates.

<sup>5</sup> Note that the model used to derive these estimates included data from participants of all ages, not only those who were aged exactly 18, 25, 35, 45, 55, or 65 years.

2016, then an uncertain increase to £18.60 [£18.30–£18.90] between May 2016 and June 2018. This was followed by a further decline to £16.90 [£16.60–£17.30] by April 2021; visual inspection of unmodelled data points (Fig. 1A) suggested this was driven by a fall in expenditure from March 2020 onwards (the modelled trends smooth out abrupt changes so give the impression the decrease began sooner than this, but the unmodelled data points show a clear drop in expenditure from March 2020). There was then a subsequent rise to £18.60 [£17.90–£19.40] by October 2023. The net result was little overall change in mean expenditure on alcohol from the start to the end of the study period (Table 1).

#### Weekly units of alcohol consumed

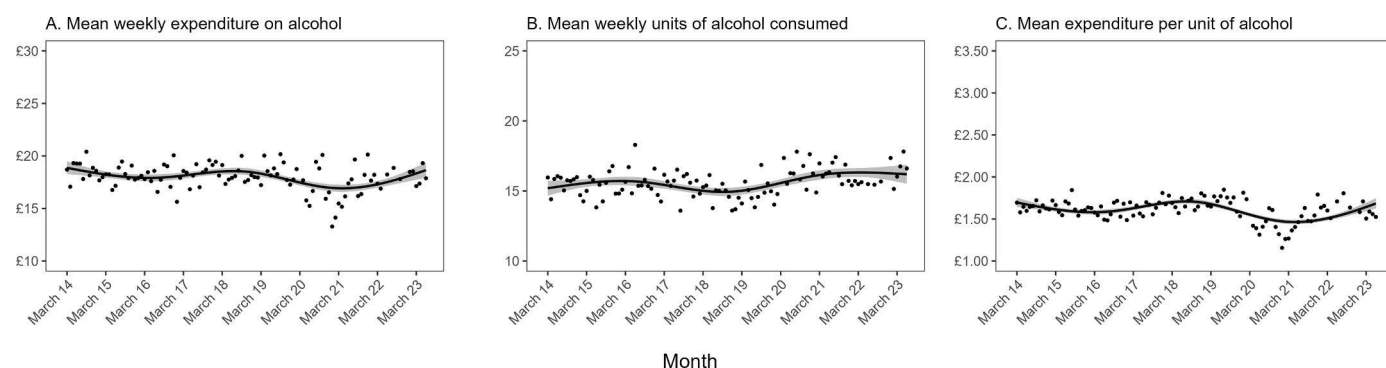
Changes in mean weekly units of alcohol consumed followed a different pattern, with a small uncertain increase from 15.2 [14.7–15.7] to 15.7 [15.4–16.0] between March 2014 and January 2016, falling

slightly to 14.9 [14.6–15.2] between January 2016 and October 2018, then increasing to 16.2 [15.8–16.5] by April 2022 and remaining stable (at 16.1–16.2 units/week) up to October 2023 (Fig. 1B). The net result was an uncertain one-unit increase in weekly alcohol consumption from the start to the end of the period, from 15.2 [14.7–15.7] to 16.2 [15.5–16.9] units per week (Table 1).

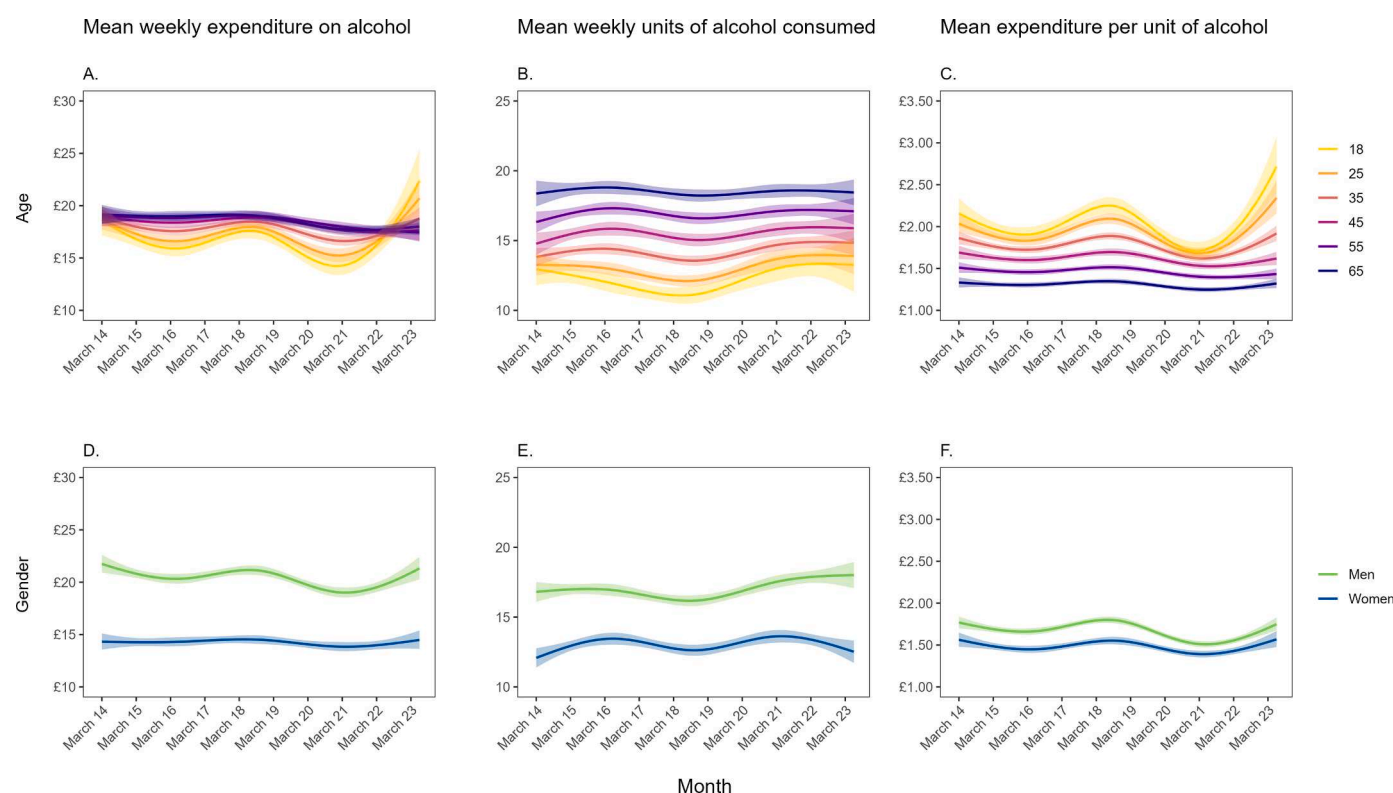
#### Expenditure per unit of alcohol

Changes in weekly alcohol expenditure were largely mirrored by changes in mean expenditure per unit of alcohol, which decreased from £1.70 [£1.64–£1.75] to £1.58 [£1.55–£1.61] between March 2014 and March 2016, increased to £1.71 [£1.68–£1.74] by July 2018, fell to £1.46 [£1.44–£1.49] by May 2021, then increased to £1.69 [£1.63–£1.75] by October 2023 (Fig. 1C). The net result was little overall change in mean expenditure per unit of alcohol from the start to the end of the study period (Table 1).





**Fig. 1.** Time trends in weekly expenditure on alcohol, weekly units of alcohol consumed, and expenditure per unit of alcohol. Panels show trends in weighted (A) geometric mean inflation-adjusted expenditure on alcohol, (B) mean weekly units of alcohol consumed, and (C) geometric mean inflation-adjusted expenditure per unit of alcohol, among all risky drinkers. Lines represent modelled weighted estimates over the study period. Shaded bands represent 95 % confidence intervals. Points represent unmodelled weighted data by month. Corresponding trends by age and gender are shown in Figure 2 and by social grade, region, and smoking status in Figure 3. Corresponding estimates of expenditure without inflation adjustment are shown in Figure S1.



**Fig. 2.** Time trends in weekly expenditure on alcohol, weekly units of alcohol consumed, and expenditure per unit of alcohol, by age and gender. Panels show trends in weighted geometric mean inflation-adjusted expenditure on alcohol, mean weekly units of alcohol consumed, and geometric mean inflation-adjusted expenditure per unit of alcohol, by age (panels A-C) and gender (D-F). Lines represent modelled weighted estimates over the study period. Shaded bands represent 95 % confidence intervals. Corresponding trends among all risky drinkers are shown in Figure 1 and by social grade, region, and smoking status in Figure 3. Corresponding estimates of expenditure without inflation adjustment are shown in Figure S2.

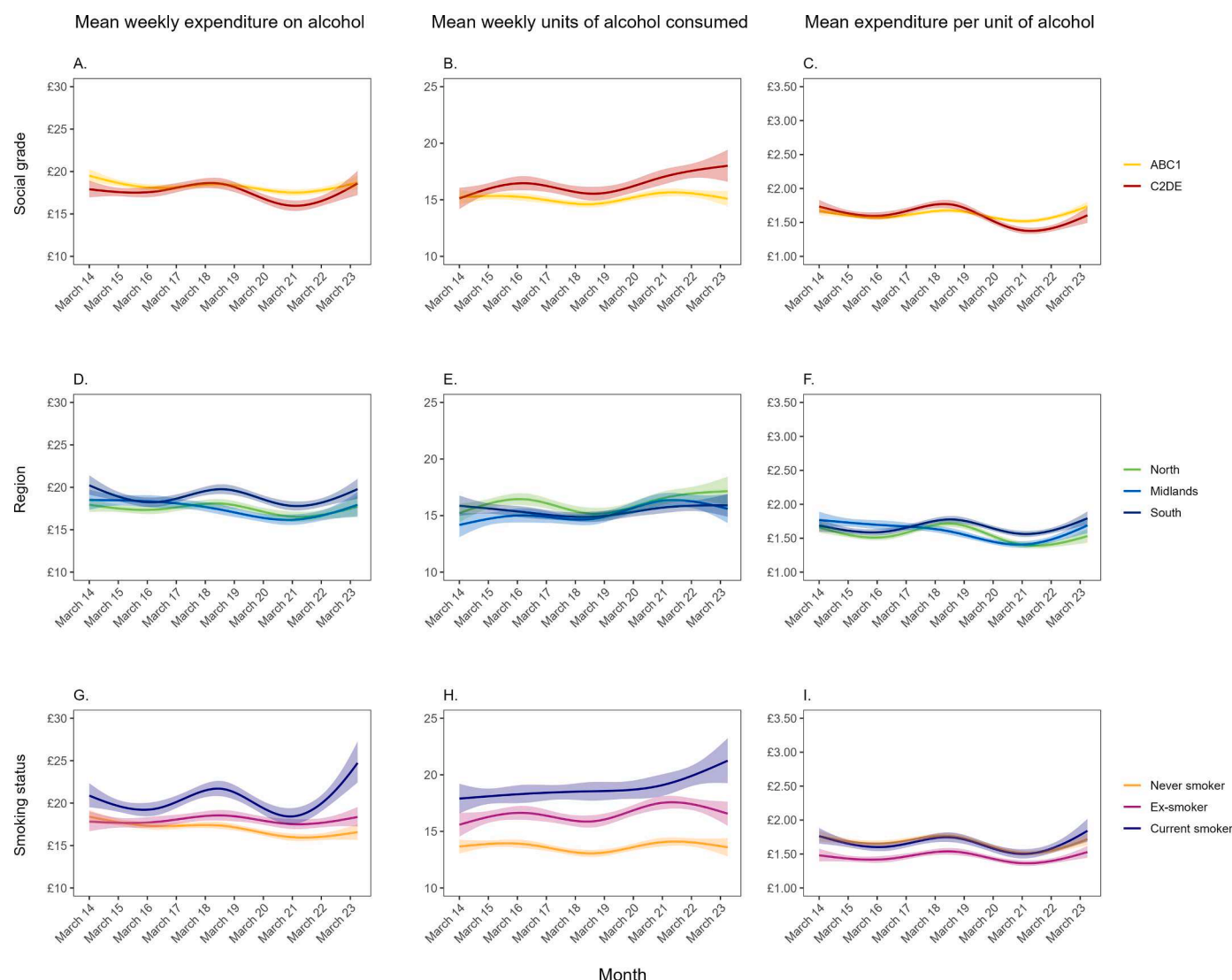
#### Trends within subgroups of risky drinkers

Trends in weekly expenditure on alcohol, weekly units of alcohol consumed, and expenditure per unit of alcohol differed across subgroups of risky drinkers (Table 1; Figs. 2 and 3).

#### Differences by age

Up to 2021, mean weekly expenditure on alcohol was generally lower at younger ages. However, it then rose sharply among younger adults between 2021 and 2023 while remaining more stable among older adults, causing the age gradient to reverse (Fig. 2A). As a result, by

2023, younger risky drinkers spent more on alcohol each week than their older counterparts (e.g., £22.40 [£19.70–£25.40] among 18-year-olds vs. £18.00 [£17.20–£18.90] among 65-year-olds in October 2023; Table 1). The mean level of consumption was consistently lower at younger than older ages across the period and was more stable over time at older ages (Fig. 2B). Mean expenditure per unit of alcohol was lower and relatively stable over time at older ages while it was higher at younger ages and rose sharply between 2021 and 2023, which may have driven the similar increase in overall expenditure given the comparative stability in consumption (Fig. 2C).



**Fig. 3.** Time trends in weekly expenditure on alcohol, weekly units of alcohol consumed, and expenditure per unit of alcohol, by social grade, region, and smoking status

Panels show trends in weighted geometric mean inflation-adjusted expenditure on alcohol, mean weekly units of alcohol consumed, and geometric mean inflation-adjusted expenditure per unit of alcohol, by occupational social grade (panels A-C; ABC1=more advantaged, C2DE=less advantaged), region in England (D-F), and smoking status (G-I). Lines represent modelled weighted estimates over the study period. Shaded bands represent 95 % confidence intervals. Corresponding trends among all risky drinkers are shown in Figure 1 and by age and gender are shown in Figure 2. Corresponding estimates of expenditure without inflation adjustment are shown in Figure S3.

#### Differences by gender

Across the period, mean weekly expenditure on alcohol, mean weekly units of alcohol consumed, and mean expenditure per unit of alcohol were consistently higher among men than women (Fig. 2D, 2E, and 2F, respectively). The decline in mean weekly expenditure during 2020 and subsequent rise since 2021 occurred predominantly among men, with relatively little change among women (Fig. 2D). There was a similar rise in the mean level of consumption among men and women during 2020, but while this has since declined among women the higher level has been sustained over time among men (Fig. 2E). Trends in expenditure per unit of alcohol were similar over time among men and women, with the only difference being a slightly greater decline among men during 2020 (Fig. 2F).

#### Differences by social grade

Mean weekly expenditure on alcohol and mean expenditure per unit of alcohol were similar across social grades for most of the period, with the exception of 2020 and 2021, when they were higher among those

from more (ABC1) versus less (C2DE) advantaged social grades (Fig. 3A and 3C, respectively) – meaning the decline during 2020 and subsequent rise since 2021 occurred predominantly among less advantaged drinkers. The mean weekly units of alcohol consumed was generally higher among those from less advantaged social grades and rose consistently in this group between 2020 and 2023 in contrast to a rise and subsequent decline among those from more advantaged social grades (Fig. 3B).

#### Differences by region

Across the period, mean weekly expenditure on alcohol was consistently slightly higher among those living in the South of England but time trends were broadly similar across regions (Fig. 3D). The mean level of consumption was similar across regions over time (Fig. 3E). Mean expenditure per unit of alcohol was higher in the South of England during 2020 and 2021 (Fig. 3F).

### Differences by smoking status

Mean weekly expenditure on alcohol and mean weekly units of alcohol consumed were consistently highest among current smokers and lowest among never smokers; both increased from 2021 among current smokers only (Fig. 3G and 3H, respectively). Mean expenditure per unit of alcohol was consistently higher among current and never smokers than ex-smokers and time trends were similar (Fig. 3I). Unplanned analyses stratified by social grade showed differences in trends in mean weekly expenditure on alcohol by smoking status were broadly similar across those from more and less advantaged social grades (Figure S4A and S4D). However, the reasons for the sharp increase in weekly expenditure among current smokers since 2021 appeared to differ, with a rise in consumption (Figure S4E) but little change in expenditure per unit of alcohol (Figure S4F) among smokers from less advantaged social grades, and a rise in expenditure per unit of alcohol (Figure S4C) but little change in consumption (Figure S4B) among those from more advantaged social grades.

## Discussion

### Summary of findings

In England between March 2014 and October 2023, the average amount adult risky drinkers reported spending on alcohol each week followed a fluctuating trend. It decreased slightly between March 2014 and May 2016, rebounding by June 2018, then fell significantly during 2020 before increasing again between April 2021 and October 2023. Changes in these drinkers' weekly expenditure on alcohol were more closely mirrored by changes in expenditure per unit of alcohol (i.e., the price people paid for alcohol) than by changes in weekly units of alcohol consumed (i.e., the amount people were drinking).

### Trends among all risky drinkers

The timing of the most pronounced changes in alcohol expenditure coincided with the introduction and relaxation of measures implemented to control the COVID-19 pandemic, which restricted people's access to on-trade alcohol. Lockdown restrictions legally came into force on 26 March 2020, requiring on-trade alcohol retailers to close (Institute for Government, 2022). However, the government designated off-trade retailers, including the supermarkets that sell most of the alcohol purchased in England, as essential businesses and permitted them to remain open. Restrictions were eased across most of England from 4 July 2020, allowing restaurants and pubs to reopen (Institute for Government, 2022) and the government launched the 'Eat Out to Help Out' scheme in August, which offered a 50 % discount on meals and soft drinks in restaurants and pubs (HM Treasury, 2020). A second national lockdown was then implemented between 5 November and 2 December 2020 and a third between 4 January and 12 April 2021 (Institute for Government, 2022).

The unmodelled data points (Fig. 1A) show that drinkers' average weekly expenditure on alcohol fell abruptly when lockdown restrictions were introduced in March 2020 and remained lower until restrictions were eased in July 2020, was higher between August and October 2020 when restaurants and pubs were open, then fell again from November 2020 when the country went back into lockdown and was particularly low in January 2021 when restrictions were tightened further. This suggests the fall in expenditure on alcohol we observed in 2020 was likely the result of a shift from more expensive on-trade drinking to cheaper off-trade drinking during lockdowns and the rise from 2021 may reflect a return to pre-pandemic habits. The ongoing cost-of-living crisis is also likely to have affected patterns of alcohol expenditure, although teasing out the relative contribution of falls in disposable income, large increases in the price of many goods and services, and alcohol prices rising at a slower rate than other food and drink categories (Office for National Statistics, 2023c) is challenging.

### Trends within subgroups of risky drinkers

The decline in alcohol expenditure during 2020 and subsequent rebound did not occur equally across subgroups of drinkers. The amount people were spending per unit of alcohol was much more stable over time among older adults, women, those from more advantaged social grades, and those living in the South of England. This could reflect these groups being more likely to purchase relatively more expensive off-trade products during COVID lockdowns instead of reducing their expenditure on alcohol, or that they were spending less on-trade products so less subject to the change. The sharp rise in alcohol expenditure among younger adults who drink at risky levels since 2021 suggests there may have been larger post-pandemic price increases in the on-trade than off-trade (Office for National Statistics, 2024), as younger adults are more likely than older adults to drink on-trade (Ally et al., 2016), and/or greater switching from off- to on-trade at younger ages. Older people may have been more cautious about going back to pubs and bars immediately after the lockdowns as the risk of adverse outcomes from COVID was higher at older ages. Our data suggest that until recently, these heavier drinking younger adults spent less on alcohol despite being more likely to drink on-trade because their level of consumption was lower – but a substantial rise in the amount young adults spend per unit of alcohol since 2021 has caused the pattern to reverse, such that young adults now spend more on alcohol than older adults even at lower levels of consumption.

In contrast to other population groups, the sharp rise in expenditure among current smokers since 2021 appeared to reflect an increase in the amount they were drinking rather than the amount they were spending per unit of alcohol. This pattern was specific to smokers from less advantaged social grades. This is in line with wider evidence that those at greatest risk of various mental, physical, and social problems (who typically have higher smoking rates) increased their alcohol consumption during the pandemic (Roberts et al., 2021). This has both financial and health-related implications. Expenditure on tobacco and alcohol can exacerbate poverty in low-income households (Nyakutsikwa et al., 2021). Data from 2012 to 17 indicated households in the lowest income quintile that purchased both tobacco and alcohol were spending around 13 % of their total household budget on these commodities (Wilson et al., 2021). The cost-of-living crisis has put household budgets under additional strain and an increase in expenditure on alcohol among smokers is likely to exacerbate this. In terms of health impacts, the risks of smoking and excessive alcohol use in combination can be greater than the additive effect of each exposure (Burton et al., 2024). There has been a striking increase in alcohol-related deaths since the pandemic (Office for National Statistics, 2022, 2023d) and it is possible that an increase in alcohol consumption among heavy drinkers with particularly poor health due to smoking may have been a contributing factor.

### Strengths and limitations

Strengths of this study include the large sample and granular monthly data collection over an extended period. There were also several limitations.

While the changes in expenditure we observed had face validity (e.g., a decline during lockdown and subsequent rise when on-trade reopened), expenditure on alcohol was self-reported and was therefore subject to various biases. Inaccuracy may be introduced by rounding or recall bias and average weekly expenditure may be difficult for people to assess if they buy in bulk, if they buy alcohol for others, if they do not buy alcohol themselves (e.g., if someone else in the household does), or if their drinking pattern is irregular. The question asked people to only report their expenditure if they were fairly confident that they could provide an accurate estimate, which may have reduced some of this bias in reporting. However, a downside of this approach is that it resulted in more missing data (7.9 % of eligible participants responded 'don't know'). While the sample was designed to be representative, there were



some differences in the sociodemographic profile of participants who were excluded on the basis of missing expenditure data. Given ‘don’t know’ responses are qualitatively different to non-response, multiple imputation was not considered appropriate.

The assessment of weekly units of alcohol consumed was also limited. It was estimated based on the mid-point of responses to two questions of the AUDIT-C which ask people how often they drink and how many units they typically drink on each day that they drink. We coded the highest response option for typical number of units consumed (16+) as 16 units, which likely underestimates consumption among the heaviest drinkers. While the AUDIT-C effectively captures alcohol risk, the measure lacks granularity and references typical monthly consumption over a six-month period without accounting for fluctuations across that period. Further, the expenditure item did not measure weekly expenditure over the same six-month period, so our estimate of expenditure per unit is necessarily approximate. Nonetheless, these limitations of the measures should not affect time trends given they were consistent across the period.

Another limitation was that our models did not account for seasonal variation in expenditure on alcohol. Although the data did not appear to show a strong seasonal pattern (Fig. 1), estimates of overall changes in expenditure from the start to the end of this period may be affected by these data having been collected in different calendar months. Data on alcohol expenditure were not collected in every month in 2022, meaning there were some missing data at the individual level. However, the use of splines effectively interpolated at the aggregate level using information before and after the missing time points to model the trends across the period. In addition, data collection changed from face-to-face to telephone interviews at the start of the pandemic (April 2020). It is possible that this could have contributed to immediate changes in our outcomes at the start of the pandemic, if people responded differently when asked about their alcohol expenditure and consumption via the telephone vs. in person, but it would not have affected the changes we observed between April 2020 and October 2023 since there was no further change in methodology during this period.

Finally, we were unable to examine changes in the source of alcohol purchasing over the period. While source of purchase of alcohol is currently assessed in the Alcohol Toolkit Study, this variable was only introduced in October 2020 (i.e., since the COVID-19 pandemic). Additionally, it asks participants to select all the places they have purchased alcohol within the past 6 months, rather than the *main* source of purchase which is likely to be more closely related to average expenditure. Further research (e.g., qualitative) could offer more insight into how far changes in where people were buying their alcohol from in recent years accounted for the changes in expenditure we observed.

## Conclusions

The average amount adult risky drinkers in England reported spending on alcohol each week has fluctuated since March 2014, with a notable decrease around the start of the COVID-19 pandemic in 2020 and a subsequent rise since restrictions on-trade premises and social distancing were lifted and since the cost-of-living crisis has led to high rates of inflation. With the exception of current smokers, this pattern appears to have been driven predominantly by changes in the price paid per unit of alcohol rather than changes in consumption.

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## CRediT authorship contribution statement

**Sarah Jackson:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Melissa Oldham:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Colin Angus:** Writing – review & editing, Visualization, Methodology, Investigation, Conceptualization. **Claire Garnett:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Luke Wilson:** Writing – review & editing, Methodology. **John Holmes:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Jamie Brown:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization.

## Declaration of competing interest

JB has received unrestricted research funding from Pfizer and J&J, who manufacture smoking cessation medications. All authors declare no financial links with alcohol companies or their representatives.

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.drugpo.2024.104615](https://doi.org/10.1016/j.drugpo.2024.104615).

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