Title:

Prevalence of simultaneous use of alcohol and prescription medication in older adults: Findings from a cross-sectional survey (Health Survey for England 2013).

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Title:

Prevalence of simultaneous use of alcohol and prescription medication in older adults: Findings from a cross-sectional survey (Health Survey for England 2013).

Objectives:

To investigate the concurrent use of 'at-risk' (AR) drinking (>10 units of alcohol per week) and prescription medications, while controlling for socio-demographic, and health related factors, amongst older adults (aged 65-89).

Design:

Cross-sectional survey.

Setting:

Data from Health Survey of England (HSE), 2013.

Interventions:

None.

Participants:

General population survey of 2169 adults aged 65-89 years.

Primary Outcome Measures:

AR drinking, (>10 units per week). Secondary outcome was AR drinking defined as more than 14 units of alcohol per week limit (the cut off used by the Department of Health for at-risk drinking).

Results:

Twenty seven percent (n=568) of the sample were AR drinkers. Factors associated with alcohol consumption were gender, age, social class, marital status, rurality of dwelling, deprivation index, self-reported general health, cigarette smoking, BMI, exercise level, health and well-being scores' and number of prescription drugs. Logistic regression analysis showed that males were more likely to be AR drinkers (OR 3.44, 95% CI 2.59 to 4.57, p<0.0001) than females. Each year increase in age, lowered the probability of AR drinking by a factor of 0.95 (95% CI 0.93 to 0.98, p<0.0001). Using prescription drugs reduced AR drinking by a factor of 0.92 (95% CI 0.85 to 0.93, p=0.033), after controlling for age, sex, and rurality of dwelling. No other predictors were significant. Similar results were obtained for AR drinking of >14 units per week.

Conclusion:

AR drinking is more likely in older men than women. The odds of AR drinking lessens, as individuals age, and using prescription drugs also reduces AR drinking.

Strengths and Limitations of Study:

- The research uses data from a gold-standard general population health survey.
- To our knowledge this is the first study that has shown there is a negative relationship between being prescribed medication and AR drinking in older adults (aged 65-89).
- HSE relies on self-report when assessing alcohol consumption.
- There is a high probability of under-reporting of alcohol consumption in the HSE.

Introduction:

In the UK, it is estimated that around 17% of the population are now over the age of 65. [1] The general trend is for alcohol consumption to decline with age. [2.] However, a recent paper [3] has stated that individuals within the age band 55-74, (now often referred to as baby boomers) is the only one where the percentage of individuals drinking above the daily limits have increased during the past five years. The sensible drinking limits in the UK have recently been reduced to 14 units per week for both men and women with a further recommendation of two alcohol free days. [4] Prior to this it was 14 units per week for women and 21 units for men. [5] During the past decade there has been a 20% increase in the number of people over 65 drinking above the daily limits at least one day per week. [6.] The Royal College of Psychiatrists (RCP) [7] recommended guidelines in the UK should be lowered to 1.5 units of alcohol per day (10.5 units per week), with at least 2 alcohol free days per week, for individuals over 65. A second edition of the report [8] suggested that the revised national guidelines [4] may still be too high for older people with physical or mental health problems who are taking medications.

According to the 2015 Health Survey of England (HSE), around half of the people over the age of 65 in the England regularly take prescription medication.[9] As the body ages, it becomes more susceptible to alcohol-drug interactions, and metabolises both alcohol and drugs less efficiently. Even a small amount of alcohol, (2-3 units) when taken in combination with some prescription drugs, can cause adverse effects. [10.] A systematic review has shown that prescription medication including psychotropic drugs are frequently used in combination with alcohol. [11] A US study found that the prescription of cardiovascular, central nervous system (CNS) and metabolic agents was commonplace in current drinkers over 65 years of age,[12] and similar work from Ireland found that heavy drinking was associated with the prescription of anticoagulants/anti-platelets, cardiovascular and CNS agents.[13] Non-steroidal anti-inflammatory drugs, which are commonly used by older adults, can cause stomach bleeding, gastric inflammation and kidney damage if taken in combination with alcohol.[14] Alcohol can also enhance the sedative effects of some medications, such as muscle relaxants and benzodiazepines, which can lead to falls and even death. [15.] Despite the increased likelihood of being prescribed multiple drugs the RCP [7,8] state that older people are often given confusing and conflicting advice on how much they can drink or no advice at all.

To date, there have been no studies in the UK which have looked at 'at-risk' (AR) drinking using the limits recommended by the RCP [7] and compared them to the new Department of Health guidelines.[4] This study uses data collected from the HSE [16] which is regarded as a gold-standard general population survey and data is quoted from it in NHS Statistics.[17.]

The aim of the study is to examine the concurrent use of AR drinking (>10 units of alcohol per week) and prescription medications, while controlling for socio-demographic, and health related factors, amongst older adults (aged 65-89).

Methods:

The Health Survey of England:

The study uses data collected from the HSE which has been conducted annually since 1991 on adults aged 16 years or more. The data used in the current study is from HSE 2013. The core modules that are repeated regularly are demographic characteristics, general health, longstanding illness, doctor-diagnosed hypertension, diabetes, smoking and alcohol consumption. Prescription medication was especially collected for the HSE 2013 and is not routinely collected.

Assessment of 'At-Risk' (AR) Drinking

The current study uses the cut-off points for AR drinking as those who drink more than 10 units of alcohol per week. The 10.5 (not including two alcohol-free days) unit limit is regarded as the cut-off for AR drinking in older adults in accordance with the recommendations of the RCP. [7] The nearest category to the RCP cut-off point used by the HSE is 10 units per week, which is used in the current study. The 14-units of alcohol per week, limit is the current Department of Health AR drinking guidelines[4] which is a cut-off also used by the HSE.

Data Collection:

The HSE sample was selected using a stratified random probability sample of private households in England. In 2013 8,795 adults aged 16 and over and 2,185 children ages 2-15 years were interviewed at households from the selected addresses and 6,183 adults and 1,455 children had a nurse visit when measurements such as blood samples were taken and data was recorded concerning prescription drug use. Thus, our sample (aged 65-89 years) consisted of 2169 (24.6%) participants who had the interview, and 1607 (25.9%) who received the nurse visit. Ethical approval for this wave of the study was provided by the Oxford A Research Ethics Committee (reference number: 12/SC/0317). [18]

Patient and Public Involvement (PPI):

The data is derived from a secondary dataset and there is no direct patient involvement in this study. Details of arrangements for PPI can be obtained through University College London. [16]

Socio Demographic Measures:

In this study, the variables age, gender, education level, employment status, ethnicity, religion, marital status, household type, rurality of dwelling, Index of Multiple Deprivation (IMD) [19], and social class were used. The IMD was calculated by assigning a number of indices of

deprivation/affluence to a specific locality. They are divided into quintiles and higher quintiles equate to greater deprivation. Social class categorisations were assigned with reference to the Office of Population Surveys [20] and occupations were coded according to Office of National Statistics guidance. [21]

Indicators of Physical and Mental Health:

Measures of height (cm), weight (kg), BMI, blood cholesterol levels, and blood pressure were collected. Diet was also assessed regarding the amount of fruit and vegetables consumed. Each adult was asked to rate their current general health on a scale of very good, good, fair, bad, and very bad. This was converted into a score of 1-5 (higher scores indicated better health). Level of physical activity was assessed by the International Physical Activity Questionnaire. [22] Individuals record the amount of time they spent carrying out physical activities such as walking. The Warwick and Edinburgh Mental Well-being Scale (WEMWBS) [23] was used which assesses mental health well-being across the general population and its validity and reliability is well established where higher scores indicate better mental health status. [24]

Cigarette and Alcohol Consumption:

Participants were asked how many cigarettes they typically smoked daily and to compile a drinking diary concerning the amount of alcohol consumed in the past 7 days. This was then subsequently converted into units of alcohol consumed per week. In the UK, a unit of alcohol is 8g of pure alcohol, the equivalent of half a pint of normal strength beer. [25]

Prescription Medications:

Participants were asked whether they had been prescribed any of the following medications in the past seven days; antidepressants, analgesia, anti-hypertensives, cardiovascular, anti-diabetic medications, proton-pump inhibitors, anti-platelet, lipid-lowering, anti-asthma/COPD, and anti-bacterial medications. The use of over the counter (OTC), medication purchased at a pharmacy, was not recorded in the survey.

Statistical Analysis:

SPSS V.23 was used for all statistical analyses. A two-sided p-value of less than 0.05 was considered statistically significant.

In stage 1 analysis (of all participants), Chi-Squared test, One-Way ANOVA, and Kruskal-Wallis test were used.

In stage 2 analysis, only the individuals who consumed any alcohol in the past 7 days were included. Logistic regression model was used, with the dependent variable as AR vs not-AR drinkers. A cut-off using 10 units of alcohol per week as cut-off was used as the primary outcome

measure for AR drinking, and a secondary outcome measure used a cut-off was 14 units of alcohol per week. All variables which were significant in the bivariate analysis in stage 1, were used as predictors in the logistic regression model of stage 2. The variable, total number of prescription drugs taken, included the 10 drugs: analgesics, anti-bacterial, anti-depressants, anti-diabetic, anti-hypertensives, anti-platelet, asthma/COPD, cardiovascular, lipid-lowering, and proton pump inhibitor. A further analysis using only 9 of these drugs (removing anti-depressants) was carried out, as it was the only psychotropic medication compared to the others. A comparison was also made, to assess the representativeness, of the subset of individuals who provided prescription drug use data, with all participants in the full sample.

Results:

Socio-demographic, cigarette, and alcohol consumption data for the study sample is shown in Table 1. There were 2169 (52.2% women) participants in the sample aged 65-89. Mean age in the sample was 73.7 years (SD 6.5). There was no difference in the mean age between men and women (p=0.402). Over ninety-two per cent of individuals were White British and the majority were married (59.8%), affluent (IMD quintiles 1 & 2: 47.5%) and lived in urban areas (75.2%). Most had retired (87.7%), but the most common social class categories (based on employment when working) were II and IIIN.

Over 90% of individuals were non-smokers. Nearly 40% (n=822) were either non-drinkers or typically drank less than 1 unit per week. In total 26.8% (n=568) individuals were drinking more than 10 units of alcohol per week and 20.5% (n=435) drinking more than 14 units per week. The most commonly prescribed drug was cardiovascular medications (n=927), followed by lipid-lowering medications (n=729) and anti-hypertensives (n=665). The total number of drugs taken by individuals, treated as a continuous variable gave a mean of 2.5 drugs per individual (SD=1.9, Range=0-8, n=1638), with 79.4% taking at least one of the prescribed medications.

Sixty-three percent (n=1373) of participants had their BMI measured, and 26.5% were normal/underweight (BMI<25), 43.3% overweight (BMI 25-29), 20.8% Obese1 (BMI) 30-34), and 9.2% Obese2 (BMI>34). Fifty five percent (n=1197) of participants provided cholesterol data, and of these 49.9% had total cholesterol levels $\geq$ 5mmol/litre. Nearly seventy per cent (n=1459) of individuals had their blood pressure measured. Taking the cut off as a systolic reading of 140 or more [26], 35.9% (n=524) could be classified as having hypertension. Only 28.4% of participants ate five or more portions of fruit and vegetables daily. The results for self-rating of general health was as follows; very good/good 57.2% (n=1242), fair 29.9% (n=650), and poor 12.9% (n=277). Over eighty percent (n=1740) answered the question concerning physical exercise (time spent walking and no of steps, per day) and 51.8% were classified low (<30 mins, <2,500 steps), 23.7% medium (30-60 mins, 2,500-5,000 steps), and 24.3% high (>60 mins, >5,000 steps) .[22] The mental health

and well-being scores (WEMWBS) [23] indicated that most participants had good mental health and well-being (n=1846, Mean=52.0, SD=8.5).

Table 1: Percentage of socio-demographic, smoking, and drinking categories in the sample.

Variable (n)	**Category**	**%**
Gender (2169)	Male	47.8
	Female	52.2
Ethnicity (2158)	White British	92.2
	Other	7.8
Marital status (2169)	Single	5.6
	Married	59.8
	Divorced/Separated	10.4
	Widowed	24.0
	Other	0.2
Rurality of dwelling (2169)	Urban	75.2
	Town & fringe areas	11.8
	Rural	13.0
Deprivation index, IMD (2169)	Quintile 1 (least)	23.7
	Quintile 2	23.8
	Quintile 3	22.4
	Quintile 4	15.8
	Quintile 5	14.2
Social class[21, 22] (2087)	I Professional	4.9
	II Managerial/Technical	28.6
	IIIN Skilled Non-manual	24.5
	IIIM Skilled Manual	20.0
	IV Semi-skilled manual	16.2
	V Unskilled manual	5.8
Cigarettes per day (2162)	Non-smoker	90.6
	Light (<10)	3.1
	Moderate (10-20)	4.1
	Heavy (>20)	2.2
Alcohol consumption, past 7 days (2119)	None (past 12 months)	21.7
	<1 unit	17.0
	1 – 7 units	27.7
	>7 – 10 units	6.7
	>10 – 14 units	6.2
	>14 – 21units	7.2
	>21 – 28 units	4.9
	>28 – 35 units	3.3
	>35 – 50 units	3.0
	>50 units	1.9

The Office of Population Censuses Surveys (1991)[20] categorisations were used to assign social class, and occupations were coded according to guidance provided (Office of National Statistics 2000). [21]

Stage 1 analysis: (All participants)

This analysis included all participants aged 65-89 years. The association between alcohol consumption, and socio demographic, health-related, and prescribed drugs variables, was explored (Table 2). The socio-demographic variables that were associated with alcohol consumption were: gender (males drinking more, $\chi 2(4)=156.710$, $p<0.0001$), social class (I&II, drinking more, $\chi 2(20)=93.436$, $p<0.0001$), marital status (married drinking more, $\chi 2(12)=62.320$, $p<0.0001$),

rurality of dwelling (urbanites drinking less, $\chi 2(8)=24.334$, $p=0.002$) and deprivation index IMD (most deprived drinking less, $\chi 2(16)=73.994$, $p<0.0001$).

The health-related factors that were associated with alcohol consumption were smoking (moderate/heavy smokers drinking more, $\chi 2(12)=23.037$, $p=0.027$), self-reported general health (decreased use of alcohol with poorer health, $\chi 2(8)=121.740$, $p<0.0001$), exercise levels (higher levels of exercise with less drinking, $\chi 2(8)=65.549$, $p<0.0001$), and BMI (decreased use of alcohol associated with higher BMI, $\chi 2(12)=22.185$, $p=0.035$). BP ($\chi 2(8, n=1434) =5.848$, $p=0.664$) and cholesterol levels $F(4,1177)=1.420$, $p=0.225$) were not associated with alcohol consumption.

One thousand six hundred and seven participants (75.8%) provided data on prescription drug use in the past seven days and of these (n=1301,79.4%) were taking at least one prescription drug. As only 75.8% of the participants had provided data on prescription drugs, a check on the representativeness of this subset of individuals, to the full sample, was made in terms of their age, gender, ethnicity, social class, and alcohol consumption, which showed no difference in these factors (Table 3).

The prescription drugs associated to alcohol consumption in the past 7 days, were anti-depressants ($\chi 2(4)=15.341$, $p=0.004$), analgesics ($\chi 2(4)=27.503$, $p < 0.0001$), cardiovascular medications ($\chi 2(4)=19.561$, $p=0.001$), and anti-diabetic drugs ($\chi 2(4)=10.621$, $p=0.031$), proton pump inhibitors ($\chi 2(4)=17.993$, $p=0.001$), and anti-platelets ($\chi 2(4)=10.798$, $p=0.029$) (Table 2). Higher prescription drug use was associated with less alcohol consumption or abstinence. Anti-hypertensive ($\chi 2(4) =8.758$, $p=0.067$), lipid lowering ($\chi 2(4) =6.330$, $p=0.176$), anti-asthma/COPD ($\chi 2(4) =7.820$, $p=0.098$), and anti-bacterial medication ($\chi 2(4) =5.213$, $p=0.266$) was not associated with alcohol consumption levels. Three continuous variables, also associated with alcohol consumption, were age (OR -0.279, 95% CI -0.365 to -0.193, $p<0.001$), WEMWBS scores (OR 0.101, 95% CI 0.028 to 0.173, $p=0.006$), and number of prescription drugs (OR -0.011, 95% CI -0.018 to -0.004, $p=0.001$).

Variables not statistically significantly associated with alcohol consumption were BP, cholesterol level, and prescription medication of anti-hypertensive, lipid lowering, anti-asthma/COPD, and anti-bacterial medication.

Table 2: Socio-demographic, health related, prescription drug factors with alcohol consumption during past 7 days.

Variable (n)	Non-drinkers n (Row %)	1-10 units n (row %)	>10 - 21 units n (row %)	>21 - 35 units n (row %)	>36 units n (row %)	p-value
Gender (2119)						< 0.0001
Male	285 (28.3)	347 (34.2)	167 (16.5)	128 (12.6)	85 (8.4)	
Female	535 (48.4)	382 (34.6)	120 (10.9)	47 (4.3)	21 (1.9)	
Social class (2087)						< 0.0001
I Professional	23 (23.0)	43 (43.0)	14 (14.0)	15 (15.0)	5 (5)	
II Managerial/Technical	174 (29.7)	216 (36.9)	93 (15.9)	62 (10.6)	41 (7.0)	
IIIN Skilled Non-manual	193 (38.6)	190 (38.0)	71 (14.2)	34 (6.8)	12 (2.4)	
IIIM Skilled-Manual	149 (36.8)	127 (31.4)	64 (15.8)	38 (9.4)	27 (6.7)	
IV Semi-skilled manual	165 (49.1)	114 (33.9)	31 (9.2)	12 (3.6)	14 (4.2)	
V Unskilled manual	65 (55.6)	30 (25.6)	8 (6.8)	11 (9.4)	3 (2.6)	
Marital status (2169)						< 0.0001
Single	49 (42.6)	35 (30.4)	11 (9.6)	14 (12.2)	6 (5.2)	
Married	426 (33.5)	456 (35.8)	202 (15.9)	117 (9.2)	72 (5.7)	
Divorced/Separated	87 (40.1)	78 (35.9)	20 (9.2)	17 (7.8)	15 (6.9)	
Widowed	260 (50.6)	160 (31.1)	54 (10.5)	27 (8.3)	13 (2.5)	
Rurality of dwelling (2119)						0.002
Urban	649 (40.8)	549 (34.5)	204 (12.8)	112 (7.0)	76 (4.8)	
Town and fringe areas	84 (33.2)	91 (36.0)	40 (15.8)	27 (10.7)	11 (4.3)	
Rural	89 (32.2)	89 (32.2)	43 (15.6)	36 (13.0)	19 (6.9)	
Deprivation index, IMD (2119)						< 0.0001
Quintile 1 (Least)	143 (28.1)	197 (38.8)	90 (17.7)	50 (9.8)	28 (5.5)	
Quintile 2	169 (33.3)	189 (37.3)	70 (13.8)	48 (9.5)	31 (6.1)	
Quintile 3	199 (42.0)	165 (34.8)	57 (12.0)	33 (7.0)	20 (4.2)	
Quintile 4	149 (45.2)	102 (30.9)	44 (13.3)	22 (6.7)	13 (3.9)	
Quintile 5 (Most)	162 (54.0)	76 (25.3)	26 (8.7)	22 (7.3)	14 (4.7)	
Cigarettes/day (2117)						0.027
Non-smoker	732 (38.2)	678 (35.4)	262 (13.7)	152 (7.9)	106 (5.0)	
Light (<10)	35 (52.2)	15 (22.4)	7 (10.4)	5 (7.5)	5 (7.5)	
Moderate (10-20)	30 (34.5)	26 (29.9)	15 (17.2)	11 (12.6)	5 (5.7)	
Heavy (>20)	23 (47.9)	10 (20.8)	3 (6.3)	7 (14.6)	5 (10.4)	
General health (2118)						< 0.0001
Very good/Good	366 (30.0)	461 (37.7)	199 (16.3)	130 (10.6)	66 (5.4)	
Fair	293 (46.7)	201 (32.0)	72 (11.5)	32 (5.1)	30 (4.8)	
Bad/Very bad	163 (60.8)	66 (24.6)	16 (6.0)	13 (4.9)	10 (3.7)	
Exercise level (1708)						< 0.0001
Low	388 (43.8)	280 (31.6)	95 (10.7)	70 (7.9)	53 (6.0)	
Medium	122 (29.8)	165 (40.3)	63 (15.4)	41 (10.0)	18 (4.4)	
High	104 (25.2)	162 (39.2)	83 (20.1)	47 (11.4)	17 (4.1)	
BMI (1349)						0.035
Normal/Underweight (<25)	120 (33.3)	144 (40.0)	50 (13.9)	32 (8.9)	14 (3.9)	
Overweight (25 - <30)	181 (31.2)	229 (39.4)	87 (15.0)	51 8.8)	33 (5.7)	
Obese I (30 - <35)	97 (34.4)	104 (36.9)	42 (14.9)	24 (8.5)	15 (5.3)	
Obese II & III (≥35)	65 (51.6)	34 (27.0)	11 (8.7)	10 (7.9)	6 (4.8)	
Prescription drugs, taken last 7 days (1607)						
Anti-depressants, Yes	77 (51.3)	43 (28.7)	14 (9.3)	12 (8.0)	4 (2.7)	0.004
No	(35.6)	(37.1)	(13.5)	(8.6)	(5.2)	
Analgesics, Yes	171 (47.5)	118 (32.8)	43 (11.9)	20 (5.6)	8 (2.2)	< 0.0001
No	(34.1)	(37.3)	(13.5)	(9.4)	(5.8)	
Anti-hypertensives, Yes	272 (55.9)	234 (35.2)	80 (12.0)	47 (7.1)	32 (4.8)	0.067
No	(34.4)	(37.0)	(13.9)	(9.6)	(5.1)	
Cardiovascular, Yes	381 (41.1)	321 (34.6)	113 (12.2)	64 (6.9)	48 (5.2)	0.001
No	(31.6)	(38.5)	(14.4)	(10.7)	(4.7)	
Anti-diabetic, Yes	91 (47.2)	64 (33.2)	18 (9.3)	13 (6.7)	7 (3.6)	0.031
No	(35.7)	(36.7)	(13.6)	(8.8)	(5.2)	
Proton pump inhibitor, Yes	176 (46.0)	126 (32.9)	39 (10.2)	26 (6.8)	16 (4.2)	0.001
No	(34.3)	(37.3)	(14.1)	(9.1)	(5.2)	
Anti-platelet, Yes	168 (42.4)	128 (32.3)	53 (13.4)	24 (6.1)	23 (5.8)	0.029
No	(35.3)	(37.6)	(13.0)	(9.3)	(4.7)	
Lipid-lowering, Yes	284 (39.0)	252 (34.6)	89 (12.2)	60 (8.2)	44 (6.0)	0.176
No	(35.5)	(37.7)	(13.9)	(8.8)	(4.1)	
Asthma/COPD, Yes	82 (42.9)	72 (37.7)	16 (8.4)	11 (5.8)	10 (5.2)	0.098
No	(36.3)	(36.1)	(13.8)	(8.9)	(4.9)	
Anti-bacterial, Yes	12 (32.4)	19 (51.4)	3 (8.1)	3 (8.1)	0 (0.0)	0.266
No	(37.2)	(35.9)	(13.2)	(8.5)	(5.1)	

Table 3: Socio-demographic, and alcohol consumption, comparison of total sample with prescription drug users only.

	Total sample (n=2169) %	Prescription Drug users only (n=1301) %
Gender: (n=2169)		
Male	47.8	48.6
Female	52.2	51.4
Ethnicity: (n=2158)		
White British	92.2	93.6
Other	7.8	6.4
Social class: (n=2087)		
I: Professional	4.9	4.1
II: Managerial/Technical	28.6	28.6
IIIN: Skilled Non-manual	44.5	44.4
IIIM: Skilled Manual	20.0	20.1
IV: Semi-skilled manual	16.2	17.1
V: Unskilled manual	5.8	5.9
Alcohol consumption, past 7 days**: (n=2119)**		
None in past twelve months, or <1 unit	38.7	38.9
1-10 units	34.4	34.9
>10 - 21 units	13.4	12.1
>21- 28 units	4.9	4.6
>28 - 50 units	6.3	5.8
>50 units	1.9	1.8
Age, years**: (n=2169)**	Mean=73.7 (SD=6.5)	Mean=73.9 (SD=6.4)

Stage 2 analysis: Alcohol drinkers

All variables which were associated to alcohol consumption in stage 1 analysis, were used as predictors in logistic regressions using AR vs not-AR drinking (>10 units of alcohol in the last 7 days as cut-off). These were gender, age, social class, marital status, rurality of dwelling, deprivation index, general health, cigarette smoking, BMI, exercise level, and WEMWBS scores, number of prescription drugs.

Individuals who had not drunk any alcohol in the previous 12 months were excluded. Table 4a shows that men were 3.44 (95%CI: 2.59 to 4.57, $p < 0.0001$) times more likely to be AR drinkers than women, after controlling for age, use of prescription medication, and rurality of dwelling. Other variables were not significant predictors. Higher age was associated with a lower probability of AR drinking, by a factor of 0.95 (95%CI: 0.93 to 0.98, $p< 0.0001$) for each year older the individual is. Using a prescription drug reduces AR drinking by a factor of 0.92 (95%CI: 0.85 to 0.93, p=0.033). A similar analysis was conducted excluding anti-depressants from the total number of drugs taken which showed that there was little difference in the odds ratio (OR 0.92, 95% CI 0.86 to 0.99, p=0.020), compared to the original model in table 4a.

A further logistic regression analysis was conducted using the higher cut-off point for AR drinking of >14 units per week (Table 4b), which showed similar results to the lower cut-off point logistic

regression model. Again, if we excluded antidepressants from the total number of drugs taken, there was little difference in the odds ratio (OR 0.90, 95% CI 0.83 to 0.97, p=0.005) compared to the model in table 4b.

Table 4a: Logistic regression model: AR drinkers (>10 units per week, n=566, 34.2%) vs not-AR drinkers (n=1093, 65.8%)

Variables	Odds Ratio (95% CI)	p-value
Gender (Reference category: Female)	3.44 (2.59 to 4.57)	< 0.0001
Age	0.95 (0.93 to 0.98)	< 0.0001
Total no of prescription drugs taken	0.92 (0.85 to 0.93)	0.033
Rurality of dwelling (Reference category: Rural)		0.046
Urban	0.74 (0.50 to 1.10)	0.136
Town and fringe areas	1.16 (0.70 to 1.92)	0.568

Table 4b: Logistic regression model: AR drinkers (>14 units per week, n=330, 25.6%) vs not-AR drinkers (n=960, 74.4%)

Variables	Odds Ratio	p-value
Gender (Reference category: Female)	3.27 (2.49 to 4.31)	< 0.0001
Age	0.97 (0.95 to 0.99)	0.004
Total no of prescription drugs taken	0.91 (0.84 to 0.98)	0.008
Rurality of dwelling (Reference category: Rural)		0.088
Urban	0.67 (0.47 to 0.96)	0.028
Town and fringe areas	0.75 (0.47 to 1.21)	0.239

Discussion

Summary

The main finding from this study shows that there is an association of decreased AR drinking as individuals age, and using prescription drugs is also associated with a reduction in the probability of AR drinking. A recent BMJ editorial [3] has highlighted that substance misuse (including illicit drugs but predominantly alcohol) by a group they term baby boomers (people born 1946-1964) is likely to treble in the US and double in Europe by 2020. [27] The term baby boomers usually refer to those aged 50 and above. In the current study, we have only used data collected on individuals 65 or above and have assessed AR drinking by using criteria suggested for those aged 65 or above others by the Royal College of Psychiatrists [7] and the current Department of Health guidelines .[4]

Not-AR drinking was associated with high prescription medication levels, and men were more likely to be AR drinkers than women. There was also an association between rurality of dwelling and AR drinking showing that living in rural areas was associated with a higher level of AR drinking of >10 units per week. Greater age, and being on prescribed drugs, was associated with a lower level of AR drinking. This suggests that diminished health status as indicated by being prescribed drugs is associated with less AR drinking in individuals aged 65-89 years. Similar trends were evident when the cut-off point for AR drinking was taken as >14 units per week.

Comparison with existing literature

Our study is consistent with findings that alcohol consumption is likely to reduce because of declining health status [28], in particular, being on prescription drugs. The finding that community-based men over 65 are more likely to be AR drinkers than women is similar to data from the American National Survey on Drug Use and Health. [29] There are indications that living in a rural area or village is associated with a greater likelihood of AR drinking. This is an under-researched area but Li et al [30] found that Norwegian older adults living in urban areas were more likely to drink alcohol and this was associated with positive health outcomes. In contrast poor health outcomes including greater alcohol consumption were reported in the same paper in a Chinese sample of men living in rural areas. [30] The association with the diminished likelihood of AR drinking as an individual gets older has been confirmed by international research [31]. An American survey (n=83,321) of alcohol use and prescription drug in older people [32] found that nearly twenty percent of the sample reported being prescribed an alcohol interactive medication and continued to drink. This is consistent with our finding that there are a proportion of older people who consume alcohol in combination with those medications known to cause an adverse reaction and are likely to be unaware of the risks involved. [7] In this context it is noteworthy that one third, of all men and women aged 65 and over are prescribed four or more types of prescription drug daily [33] notwithstanding OTC drug consumption. There was no relationship between social class and AR drinking. The English Longitudinal Study of Ageing (ELSA) [34] suggests that affluence, higher social class and alcohol consumption is associated with "successful" ageing. [35] The Royal College of Psychiatrists [8] acknowledged, that alcohol abuse in older people now needs to be considered in the context that alcohol plays in encouraging "social cohesion". Important insights are provided by a 10-year longitudinal study [36] which confirmed that higher social class was associated with greater alcohol consumption, and equally poor self-rated health was associated less alcohol consumption over time. The authors [36] suggest that as successful ageing could be associated with a level of drinking, as it provides greater opportunities for social interaction, and as health declines there are fewer opportunities to facilitate this. However, it should be noted that ELSA includes individuals who are aged 50 or more, unlike the current study which only considers those 65 years or more. The finding that being prescribed medication is associated with less AR drinking but not social

class suggests that as some individuals age the positive impact of drinking and social class lessens, as their health status diminishes.

Strengths and Limitations:

The main strength of this study is that it is based on data taken from an established national dataset using a complex random probability sample derived from post codes. [16] However prescription drugs use is reliant on self-report and limited to those included in the survey. Thus, it was not possible to investigate the role of e.g. prescribed psychotropic medication other than anti-depressants. The role of over the counter (OTC) medication cannot be assessed as this data was not collected in the HSE. US evidence indicates that older people living in the community, regularly use OTC medication though this was based upon self-report data, [37] and a study across 15 European countries found that in a sample of 46,394 adults with chronic pain over half of the sample used OTC analgesic medication. [38] Alcohol consumption levels reported, may also have been under-estimated. It is likely that heavy drinkers would not participate in a general population survey [39] this is coupled with a tendency towards underestimation of alcohol consumption in the general population [40] and into what constitutes a unit of alcohol. [41] In addition, estimates of reported wine consumption have underestimated the impact of the strength of drinks consumed and the size of glasses in which they are either served or poured. [42]

Implications for Research and/or Practice:

We suggest that future waves of the HSE continue to survey prescription drug use, but expand the types of prescription drugs being assessed, and consider how to integrate assessing use of OTC medications. Thus, we recommend that public health professionals should highlight the need for GPs, pharmacists and other professionals to address the possible interaction of any prescribed or OTC medications with alcohol in older people. In addition, it would be beneficial to design information leaflets that can be distributed in health centres and pharmacies providing information concerning the interaction between certain prescription drugs/OTC medicines and alcohol. Finally, we also suggest that professional medical training bodies such as the GMC (medicine), NMC (nursing) and GPhC (pharmacy) address their current curricula to take steps to ascertain current practice and thus ensure that medication interactions with alcohol are addressed.

Contributions of the Authors:

Both authors conceived and designed the study. JF obtained the publicly available database and wrote the methodology, results and discussion sections of the paper. SP conducted the statistical analysis for the study and contributed to the writing of the paper. Both authors approved the final manuscript**.**

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