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Secular changes in at-risk drinking in Sweden: birth cohort comparisons in 75-year-old men and women 1976–2006

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Abstract

Background: little is known about the prevalence of at-risk drinking in older adults.
Objective: to compare rates of at-risk drinking in 75-year-olds examined in 1976–77 and in 2005–06.
Design: cross-sectional survey.
Setting: two samples representative of the general population in Gothenburg, Sweden.
Participants: 75-year-olds born in 1901–02 ($n = 303$) and in 1930 ($n = 753$).
Methods: participants took part in a multidisciplinary study on health and ageing. Protocols regarding alcohol consumption were identical for both cohorts. Total weekly alcohol intake was estimated and at-risk drinking was defined as ≥100 g alcohol/week.
Results: the proportion abstaining differed significantly between birth cohorts (18% in 1976–77 versus 9% in 2005, $P < 0.001$). Frequencies of drinking beer and liquor were similar in the two cohorts for men, but were lower for women in the later-born cohort. Proportions drinking wine were higher in the later-born cohort for both sexes. Total weekly alcohol intake was higher for both men and women. At-risk drinking was observed in 19.3% of the men in the earlier-born cohort, and in 27.4% in the later-born cohort ($P = 0.117$). Corresponding figures for women were 0.6 and 10.4% ($P < 0.001$). At-risk drinking was significantly associated with birth cohort in women (OR: 13.77, CI: 1.82–104.0, $P = 0.011$) and the occupational group in men (OR: 1.60, CI: 1.13–2.26, $P = 0.008$).
Conclusions: alcohol consumption in 75-year-olds has changed markedly, especially in women. Studies need to be carried out in varied settings in order to evaluate the clinical and public health implications of changing trends in alcohol consumption.

Keywords: *older people, alcohol, at-risk drinking, cohort comparisons*

Introduction

Overconsumption of alcohol may increase the likelihood of cognitive impairment, self-neglect, falls and other health risks in older people [1]. Mild-to-moderate alcohol consumption, on the other hand, has been shown to associate with health benefits including better cardiac and cerebrovascular health [2], decreased risk for dementia [3] as well as increased psychological wellbeing and improved quality of life [4]. This might be one explanation for the observation that the previously noted decrease in alcohol use with age is now less pronounced [5].This, taken together with shifting demographics, provides reason to believe that the number of older adults with substance use disorder will double by the year 2020 [6]. Also older persons who do not fulfil diagnostic criteria for alcohol use disorder may be at risk for detrimental health effects of alcohol. The impact of overconsumption may be more harmful in older than in younger persons, as alcohol is metabolised more slowly, and its effects may be exacerbated by physical illness. Multimorbidity is common in this age group, often resulting in polypharmacy and medication interactions with alcohol are prevalent [7]. Considering this, it is surprising that we know so little about the extent to which older people engage in potentially harmful consumption of alcohol. A couple of US studies have demonstrated that at-risk consumption is common in older males [8–10], but prevalence data regarding older populations outside the USA are sparse. The aim of the current study was to compare at-risk drinking in two birth cohorts of 75-year-olds, those born at the start of the twentieth century, and those born three decades later in 1930.

Methods

Cohorts

Cohort 1901–02

All 75-year-olds living in Gothenburg and born between 1 July 1901 and 30 June 1902 on dates ending with 2, 5 or 8 were invited to a health examination in 1976–77. All individuals were numbered consecutively from 1 to 5. Those with numbers 1 and 2 ($n = 388$) were invited to take part in a psychiatric examination. Among those, 303 (117 men and 186 women) were examined (response rate 78%). The sample has been described in detail previously [11].

Cohort 1930

All 75-year-olds living in Gothenburg and born during 1930 on Days 2, 3, 5, 6, 11, 12, 16, 18, 20, 21, 24, 27 or 30 of each month were invited to a health examination in 2005–06 ($n = 1250$). Ten died before they could be examined, 32 could not speak Swedish and 18 could not be traced, leaving an effective sample of 1188 individuals. Among those, 753 (321 men, 432 women) accepted to take part in the psychiatric examination (response rate 63.4%).

Participants and non-participants in each of the samples (1976–77, 2005–06) were similar regarding gender and marital status. A detailed drop-out analysis is presented for each birth cohort in Supplementary data are available in *Age and Ageing* online, Appendix 1.

Examinations

Psychiatric examinations were carried out by psychiatrists (1976–77) or psychiatric nurses (2005–06).The nurses were supervised and trained by a psychiatrist who, in his turn, was trained by the psychiatrists who performed the examinations in 1976–77. Inter-rater reliability was high [12].

Dementia was used as an exclusion criterion only (1901–02 cohort: $n = 15$; 1930 cohort $n = 45$). Please see Supplementary data, available at *Age and Ageing* online, Appendix 2 for a description of the procedure used to identify cases with dementia, and Supplementary data are available in *Age and Ageing* online, Appendix 3 for details regarding the occupational classification system employed in the study.

Measure of alcohol use

The psychiatric interview included questions regarding alcohol consumption. Protocols were identical for both cohorts regarding abstention and consumption by volume for wine, beer and spirits. The interviewer converted consumption figures into an approximated total weekly consumption in grams of alcohol using the following conversion factors: beer: 0.33, wine: 1, spirits: 3.The aggregated estimate of total alcohol consumption per week (g) was then categorised (0, 1–20, 20–40, 40–60 etc.). 'At-risk' drinking was defined as ≥100 g/week, corresponding roughly with the American Geriatric Society guidelines of no more than two drinks per day [13].

Statistical analysis

Fisher's exact tests and Chi-squared tests were used to compare proportions. A Mann–Whitney U test was used to compare ordinal categories of alcohol consumption and multiple logistic regressions were used to test the influence of factors related to at-risk alcohol consumption. All exploratory and formal statistical tests were carried out using SPSS for Windows (Version 15, SPSS, Inc., Chicago, IL, USA). All *P*-values were two-tailed and *P*-values <0.05 were considered statistically significant.

Results

Table 1 shows characteristics of the study participants by birth cohort. Nine percent of the participants in the later-born cohort characterised themselves as total abstainers compared to 18% in the earlier-born cohort ($P = 0.002$). Separate analyses for men and women yielded similar figures (Table 1). Drinking frequencies by beverage type were based on data available for 284 out of 288 participants in the 1901–02 cohort and 696 out of 708 participants in the 1930 birth cohort. While the frequency of beer-drinking remained

Table 1. Study sample characteristics of non-demented 75-year-olds by birth cohort and sex

	Men			Women		
	1901–02 *n* (%)	1930 *n* (%)	Test[a]	1901–02 *n* (%)	1930 *n* (%)	Test*
All	109	299		179	409	
Civil status						
Married	82 (75)	234 (80)	$P = 0.007$	57 (32)	182 (45)	$P < 0.001$
Widowed	18 (17)	21 (7)	Chi-sq. = 12.0	78 (44)	134 (33)	Chi-sq. = 66.6
Divorced	5 (5)	33 (11)	3 df	7 (4)	72 (18)	
Never married	4 (4)	6 (2)		37 (21)	15 (4)	3 df
Education						
Basic 7-year education only	89 (82)	153 (51)	$P < 0.001$	154 (86)	224 (55)	$P < 0.001$
Occupational group						
Manual	84 (79)	110 (37)	$P < 0.001$	140 (80)	166 (44)	$P < 0.001$
Service	21 (20)	109 (37)	Chi-sq. = 57.6	35 (20)	183 (49)	Chi-sq. = 62.6
Professional	2 (2)	75 (26)	2 df	1 (1)	27 (7)	2 df
Current smokers	31 (28)	27 (9)	$P < 0.001$	6 (3)	37 (9)	$P = 0.004$
Alcohol abstainers	19 (17)	20 (7)	$P = 0.002$	31 (17)	40 (10)	$P = 0.013$
Drinking frequency by beverage type						
Beer						
None in latest month	36 (33)	94 (31)	$P = 0.720$	106 (61)	243 (59)	$P = 0.006$
Up to two times per week	28 (26)	87 (29)	Chi-sq. = 0.66	39 (22	124 (30)	Chi-sq. = 10.3
Three or more times per week	45 (41)	112 (37)	2 df	30 (17)	36 (9)	2 df
Wine						
None in latest month	56 (51)	109 (36)	$P < 0.001$	88 (50)	141 (34)	$P < 0.001$
Up to two times per week	51 (47)	134 (45)	Chi-sq. = 17.8	8146	219 (54)	Chi-sq. = 16.3
Three or more times per week	2 (2)	49 (16)	2 df	6 (3)	43 (11)	2 df
Spirits						
None in latest month	47 (43)	127 (42)	$P = 0.759$	114 (65)	289 (72)	$P = 0.148$
Up to two times per week	46 (42	130 (43)	Chi-sq. = 0.55	53 (30	105 (26)	Chi-sq. = 3.8
Three or more times per week	16 (15)	35 (12)	2 df	8 (5)	9 (2)	2 df

Four women did not answer questions on alcohol in the first cohort and so the proportions are based on 175.
*P-values from Fisher's exact test unless otherwise stated.

unchanged in men, a decrease was noted in women. The frequency of wine-drinking increased significantly in both sexes, with roughly two-thirds of those in the later-born cohort reporting past month consumption of wine. Proportions drinking wine at least three times per week were similar in men (16%) and women (11%) in the 1930 cohort. About 60% of the men in either birth cohort reported drinking liquor during the past month. Proportions were somewhat lower in women. No cohort change could be observed regarding the frequency of consumption of spirits.

Estimates of total weekly alcohol consumption are shown for men and women by birth cohort in Figure 1. In men, mean total weekly consumption was 56 g per week in the 1901 cohort and 81 g per week in the 1930 cohort (Mann–Whitney $U = 12152$, $P = 0.004$).For women the mean value changed from 14 to 39 g per week (Mann–Whitney $U = 22900$, $P < 0.001$). Figure 1 shows further that at-risk drinking was observed in 19.3% of the men in the earlier-born cohort, and in 27.4% in the latter-born cohort ($P = 0.117$). Corresponding figures for women were 0.6 and 10.4% ($P < 0.001$). A cohort difference in proportions with at-risk drinking was observed in women with manual occupations (0–7%, $P = 0.002$). Corresponding figures for the service/professional group were 2.8%–13.9%, $P = 0.91$. There were no significant cohort changes within occupational groups in men (results not shown).

Multivariate binary logistic regression models testing the influence of birth cohort, education, occupational group and smoking on at-risk drinking were run for men and women separately (Table 2). For women, at-risk drinking was only associated with birth cohort. Only occupational group was significantly associated with at-risk drinking in men. As one might argue that a lower cut-off would be more appropriate in women, analyses were rerun using a limit of 60 g per week. In the multivariate regression model birth cohort was associated with a 15-fold risk for at-risk drinking in women using this alternative cut-off (OR: 14.9, 95% CI: 3.5–63.3, $P < 0.001$). Paralleling the above findings for the 100 g cut-off, none of the other factors remained significant in the multivariate regression model for women (results not shown).

Discussion

We compared alcohol consumption in two cohorts of 75-year-olds born 30 years apart. An increase in overall alcohol consumption was observed, and a 10-fold increase in the proportion with 'at-risk' consumption was observed in women. Older women may be at particular risk for adverse reactions [14], even at relatively low levels of alcohol intake [15].

To our knowledge, this is the first study to examine secular trends in at-risk drinking in older populations over

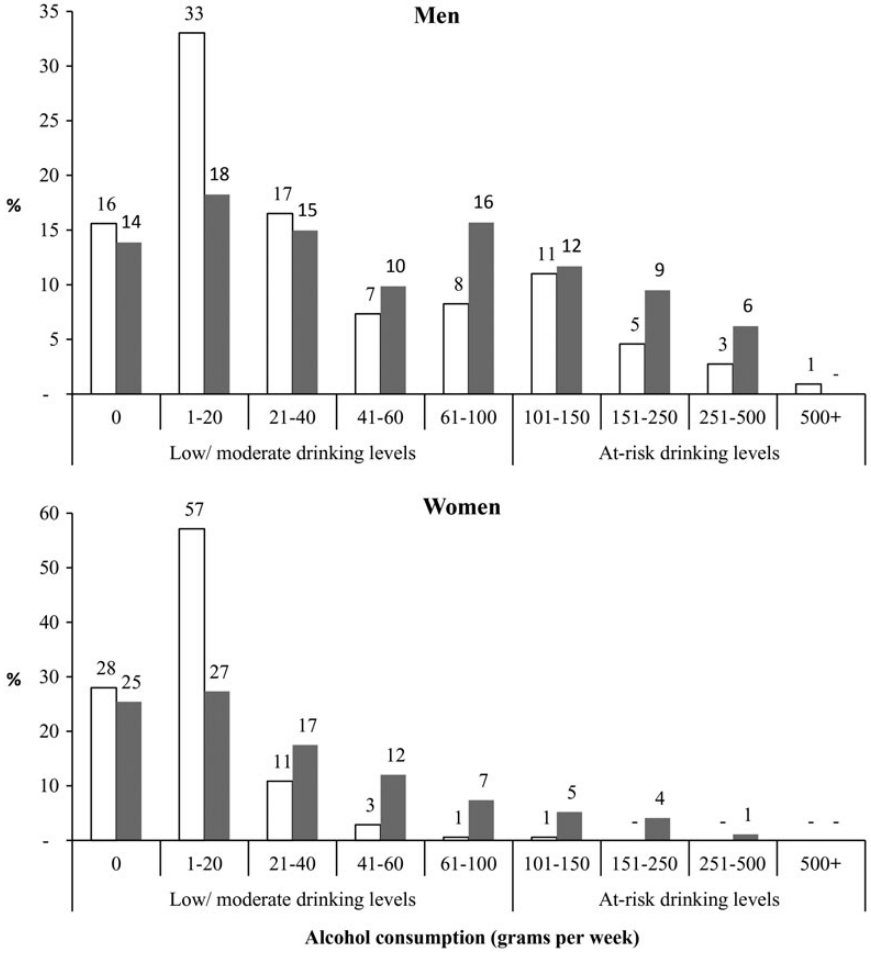

Figure 1. Alcohol consumption by sex and birth cohort (1901–02 birth cohort in white bars and 1930 birth cohort in dark grey bars).

Table 2. Association of factors in multivariate binary logistic regressions with at-risk alcohol consumption in population samples of non-demented 75-year-old men and women

	Odds ratio (95% CI)	*P*-value
Women		
Cohort[a]	14.4 (1.9–109.6)	0.010
Occupational group[b]	1.3 (0.7–2.5)	0.466
Smoking status[c]	1.4 (0.5–4.5)	0.536
Education[d]	1.9 (0.8–4.5)	0.135
Men		
Cohort[a]	1.1 (0.6–2.2)	0.669
Occupational group[b]	1.5 (1.0–2.2)	0.042
Smoking status[c]	1.5 (0.8–2.9)	0.238
Education[d]	1.2 (0.7–2.2)	0.538

[a]1901–02 birth cohort as reference group.
[b]Manual, service and professional occupations with manual as a reference group.
[c]Smoking status with never/ex-smokers as a reference group.
[d]Education only mandatory as a reference group.

three decades. Data from other settings are lacking for direct comparison. It can be noted that our prevalence figures regarding at-risk drinking in the later-born cohort were not unlike those reported in a recent US population study with a somewhat younger mean age [9]. Higher rates were identified in a US primary care-based study [10], but a broader definition of at-risk drinking was employed.

Increasing consumption patterns can in part be explained by changing attitudes regarding the social acceptance of alcohol. Participants who had their first experiences with alcohol during the post-World War II era would be expected to have very different attitudes compared with those who were in their teens during the twenties. Income was shown as a determinant of at-risk drinking [10] and period changes in household income would be expected to affect results [16]. While our study lacked specific data on income, we showed that the shift from manual to professional occupations was associated with increased at-risk drinking in men. There was a large cohort effect for women. Increasing alcohol consumption has been reported in women in mixed-age studies in other geographical settings [17], and increased drinking may reflect period changes regarding women's roles, including involvement in the work force and the adoption of traditionally male behaviours.

Changes in alcohol availability and alcohol policy also need to be taken into consideration. From 1917 to 1955, Sweden had very strict rules regarding alcohol sales. Males were allowed to buy <2 l of liquor per month. For females,

the amount was less and married women were not allowed to buy at all. This probably influenced drinking habits in the earlier-born cohort. During the 1970s, there was a campaign in Sweden encouraging people drink less liquor and more wine. This probably had a greater influence on the later-born cohort. A major transition with a shift towards less restrictive policy occurred after admittance to the European Union in 1995. Harmonising of alcohol policy with other European countries has resulted in extended opening hours, increased import quotas and reduced prices [18]. Greater exposure to the 'continental' drinking culture, taken together with product development (e.g. 'bag in box') may also help to explain the shift from a traditional northern European pattern (beer and spirits) to the wine-drinking pattern observed in the later-born cohort. Changes in societal acceptance and the context in which alcohol is imbibed might lead to a tendency to give a more accurate report of consumption levels in the later-born cohort, which would inflate cohort differences. While national data on overall trends in alcohol consumption of alcohol are not available for entire the study period, data for the general population aged 15 and above show that total yearly consumption increased from 8 l in 1996 to 10 l in 2006 [19]. Wine was the biggest contributor in the general population in 2006, as it was for our cohort examined that year.

As in all studies dealing with older populations, differential survival will affect results. It is possible that part of the cohort difference regarding at-risk drinking can be attributed to improved survival in individuals who over consume alcohol. Further, while older persons often stop drinking in the context of illness [20], overall improvements in the level of health in the general population might mean that the 'need' to abstain from alcohol for health reasons is lower in septuagenarians of today.

A major strength of this analysis was the relatively high age of the participants and the identical study design that was applied to birth cohorts born 30 years apart. Face-to-face interviews in the context of a multidisciplinary health examination might yield more reliable data regarding alcohol consumption than postal questionnaires or telephone interviews. The study design allowed for rigorous evaluation of cognitive function so that persons with dementia, whose responses might be less reliable, were excluded.

An obvious limitation is the fact that no standardised instrument for the measurement of alcohol consumption was available in 1975. While an internationally recognised instrument such as the AUDIT [21] could have been applied in the second cohort, the original study protocol was chosen for the advantage of comparability. This meant that raters estimated alcohol consumption and their tendency to round off consumption data may help to explain the bimodal pattern observed in men in Figure 1. Another methodological consideration is that differing drop-out rates can confound results. However, as we have previously shown that heavy drinkers in the catchment area are less likely to participate in this type of study [22], we do not anticipate that the cohort difference in participation rates would bias findings in the direction observed. Importantly, it was not possible to identify specific alcohol use disorders in the two birth cohorts due to the cross-sectional nature of the study and lack of information regarding social and physical consequences of alcohol use. Another limitation is the relatively small number of participants, especially in the earlier-born cohort, resulting in power problems in some of the analyses. Our failure to show an association between smoking and at-risk drinking might be an example of this. Nicotine dependence has been shown to be associated with at-risk drinking in older people [23].

A final methodological consideration is our definition of at-risk drinking. There is no international consensus concerning 'healthy' drinking limits for older people. The Royal College of Psychiatrists recommends a 'safe limit' of 11 units per week for older persons [24] and the National Institute of Alcohol Abuse and Alcoholism suggests that the line be drawn at 7 units [25]. There is a need for recommendations that are both gender and age-specific. Multimorbidity and polypharmacy must be taken into consideration when guidelines are developed for older people [26].

Our study is based on a Nordic population that is relatively ethnically homogenous. Studies on mixed-aged populations suggest that gender differences in alcohol consumption are less pronounced in northern Europe [27], and this may be the case in older populations as well. Further, findings cannot be extrapolated to future cohorts of septuagenarians. At mid-age, the Baby Boomer generation has higher alcohol consumption than earlier-born cohorts [28] and the degree to which these consumption levels will continue into late life remains an open question. Some predict that younger adults of today will be *less* likely to be heavy consumers of alcohol when they reach late life [29].

The high rate of potentially harmful drinking in men and the increase in such consumption in women suggest a need for studies designed to evaluate the clinical and public health consequences of changing trends in alcohol consumption in older people. Studies are needed in diverse cultural settings. Screening with standardised assessments of alcohol use could be incorporated in the routine clinical management of older patients in both primary care and specialist settings. Once identified, individuals with heavy use could be targeted for interventions. A Cochrane review speaks for the feasibility of brief interventions in primary care [30]. The authors concluded that one to four sessions could successfully reduce alcohol consumption. However, the benefit was not clear for women, and interventions focusing specifically on older people are needed.

Key points

- A marked increase in total alcohol consumption was observed in 75-year-olds over the 30-year study period.
- The frequency of wine-drinking increased significantly in both sexes.
- There was a tenfold increase in at-risk drinking in women.
- At-risk drinking was noted in over one-fourth of the men in the later-born cohort.

Acknowledgements

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Conflicts of interest

None declared.

Ethical approval

All participants received oral and written information about the study. They were assured that they had the right to withdraw from the study at any time, and informed consent was obtained. The Research Ethics Committee at the University of Gothenburg approved the study.

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Supplementary data

Supplementary data mentioned in the text is available to subscribers in *Age and Ageing* online.

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Epidemiology of lifetime fracture prevalence in England: a population study of adults aged 55 years and over

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Abstract

Background: fractures remain a substantial public health problem but epidemiological studies using survey data are sparse. This study explores the association between lifetime fracture prevalence and socio-demographic factors, health behaviours and health conditions.
Methods: fracture prevalence was calculated using a combined dataset of annual, nationally representative health surveys in England (2002–07) containing 24,725 adults aged 55 years and over. Odds of reporting any fracture was estimated separately for each gender using logistic regression.
Results: fracture prevalence was higher in men than women (49 and 40%, respectively). In men, factors having a significant independent association with fracture included being a former regular smoker [odds ratios, OR: 1.18 (1.06–1.31)], having a limiting long-standing illness [OR: 1.47 (1.31–1.66)] and consuming >8 units of alcohol on the heaviest drinking day in the past week [OR: 1.65 (1.37–1.98)]. In women, significant factors included being separated/divorced [OR: 1.30 (1.10–1.55)], having a 12-item General Health Questionnaire (GHQ-12) score of 4+ [OR: 1.59 (1.27–2.00)], consuming >6 units of alcohol in the past week [OR: 2.07 (1.28–3.35)] and being obese [OR: 1.25 (1.03–1.51)].
Conclusion: a range of socio-demographic, health behaviour and health conditions, known to increase the risk of chronic disease and premature death, are also associated with fracture occurrence, probably involving the aetiological pathways of poor bone health and fall-related trauma.

Keywords: *fracture sites, lifetime fracture prevalence, logistic regression, respondent recall, risk factors, older people*