Front sheet

Title

Increased alcohol consumption among Swedish 70-year-olds 1976-2016: analysis of data from The Gothenburg H70 Birth Cohort Studies, Sweden

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Acknowledgement

This research was supported by The Alcohol Research Council of the Swedish Alcohol Retailing Monopoly (no 2017-0051, 2016-0059), The Swedish Research Council (no 2017-01604, 2016-01590, 2015-02830, 2013-8717, 2012-5041), Swedish Research Council for Health, Working Life and Welfare (2016-07097, 2013-2496, AGECAP 2013-2300, 2013-1202, 2013-0475), Sahlgrenska University Hospital (ALF), Stiftelsen Handlaren Hjalmar Svenssons Forskningsfond, Stiftelsen Wilhelm och Martina Lundgrens vetenskapsfond, and Irisstipendiet.

Funding sources had no role in the study design, methods, data collection, analysis, decision to publish or preparation of the manuscript. We thank all participants in the H70 population studies, researchers and study staff who make the study possible.

Declaration of competing interest

None

Abstract word count: 294

Manuscript word count: 4 095

Tables: 3

Figures: 2

Abstract

Background

The older adult population is increasing worldwide, as is the number of older adults who consume alcohol. Although there is a growing body of research on alcohol consumption among older people, few studies focus on changes in at-risk consumption over time across well-defined birth cohorts of older adults.

Methods

This study used a serial cross-sectional design in order to compare alcohol consumption patterns among birth cohorts of Swedish 70-year-olds (total n=2 268) examined in 1976-77 (n=393), 1992-93 (n=248), 2000-02 (n=458), and 2014-16 (n=1169). Participants took part in a multidisciplinary study on health and ageing. Face-to-face interviews were conducted by health care professionals. Protocols regarding alcohol consumption were similar for all cohorts. The volume of weekly alcohol consumption was estimated during the past month. At-risk consumption was defined as ≥100 g alcohol/week corresponding roughly to the National Institute on Alcohol Abuse and Alcoholism definition of heavy consumption.

Results

The proportion of at-risk consumers among men increased from 16.1% in 1976-77 to 29.9% in 2000-02 ($p=0.001$) and 45.3% in 2014-16 ($p<0.001$). In women, proportions were low in 1976-77 (0.5%) and 1992-93 (2.0%; $p=0.134$), but increased to 9.5% in 2000-02 ($p<0.001$) and 24.3% in 2014-16 ($p<0.001$). The male:female ratio regarding consumption of ≥100 g/week decreased from 32.2:1 in 1976-77 to 3.1:1 in 2000-02 to 1.9:1 in 2014-16. Spirit consumption decreased dramatically among men during the study period, while women reported very low spirit consumption at all examinations. Wine consumption increased in both sexes between 2000-02 and 2014-16. Beer consumption increased among men between 2000-02 and 2014-16.

Conclusions

Recent cohorts of 70-year-olds in Sweden report significantly higher levels of alcohol consumption than previous cohorts. There was a dramatic increase in at-risk consumption among 70-year-olds from the 1970s to the mid-2010s, and this was particularly pronounced among women.

Key words

H70, alcohol, 70-year-olds, older adults, birth cohort

Introduction

Populations are ageing world-wide (Vaupel, 2010) and individuals aged 60 and over comprise the fastest growing segment (United Nations Department of Economic and Social Affairs PD, 2017). Although alcohol consumption typically declines with age (Molander et al., 2010), adverse effects of alcohol use in older adults are expected to have an increasing effect on public health. The number of adults aged 50 or over with substance use disorders in the United States is expected to reach 5.5 million in 2020, a figure twice the annual average for the period 2002-08 (2.8 million) (Han et al., 2009). Despite this, studies on alcohol use and abuse focus mainly on younger and middle-aged populations (Anderson et al., 2012). This is problematic as older adults are more sensitive to the adverse effects of alcohol (Barnes et al., 2010) due to declining health and physiological changes in metabolism and body composition (Wang and Andrade, 2013). Overconsumption of alcohol in older adults may increase the likelihood of various health risks, including suicidal behaviour (Morin et al., 2013), cognitive impairment, and falls (Reid et al., 2002).

Older adults do engage in alcohol consumption (Muñoz et al., 2018). From a public health perspective, data on alcohol consumption in the older segment of the population can serve a basis for structural planning and resource allocation (Keyes et al., 2011). By examining different birth cohorts of the same age, the influence of time period and birth cohort effects can be investigated. However, there are several challenges when measuring temporal changes in alcohol consumption, as study populations need to be representative, with similar ages and response rates, and examination methods should be consistent over time. While there are studies examining birth cohort differences in alcohol consumption (Slade et al., 2016, Meng et al., 2014), few have focused on birth cohort differences in well-characterized representative population-based samples of older adults.

The aim of this study was to compare alcohol consumption patterns among four population-based samples of 70-year-olds born 1906-07, 1922, 1930, and 1944, based on face-to-face interviews conducted by health care professionals.

Materials and methods

Participants

Data were derived from four waves of The Gothenburg H70 Birth Cohort Studies, Sweden. Samples were systematically selected from the Swedish Population Register based on birth dates, and included individuals living in both private households and residential care. This study has a serial cross-sectional design using data from examinations conducted in 1976-77 (birth cohort 1906-07), 1992-93 (birth cohort 1922, only women), 2000-02 (birth cohort 1930) and 2014-16 (birth cohort 1944). All examinations were approved by the Ethical Review Board in Gothenburg. Informed consent was obtained from all participants or their close relatives, and conducted according to the Helsinki Declaration.

Birth cohort 1906-07

In 1976-77, the study comprised 1036 participants (response rate 81%). All participants were given a number from 1 to 5. Those with numbers 1 and 2 (n=404; 180 men and 241 women) were selected for a psychiatric examination, which included questions regarding alcohol consumption. The sample has been described in detail previously (Nilsson, 1983). Individuals with dementia (n=8) and individuals with missing data on all alcohol variables (n=3) were excluded, leaving 393 individuals (age range: 70.04-71.31) for analysis.

Birth cohort 1922 (women only)

In 1992-93, the study comprised 299 70-year-old women (response rate 63%), and 286 agreed to take part in the psychiatric examination, which included questions on alcohol consumption. The sample has been described in detail previously (Bengtsson et al., 1997).

Individuals with dementia (n=11) or missing data on all alcohol variables (n=27) were excluded, leaving 248 women (age range: 70.32-71.54) for analysis.

Birth cohort 1930

In 2000-02, the study comprised 524 participants (response rate 70%). A sample of 499 70-year-olds (229 men and 270 women) took part in the psychiatric examination, which included questions on alcohol consumption. Individuals with dementia (n=14) and individuals with missing data on all alcohol variables (n=27) were excluded, leaving 458 individuals (age range: 70.14-72.08) for analysis.

Birth cohort 1944

In 2014-16, the study comprised 1203 participants (response rate 72%; 559 men and 644 women). The psychiatric examination and the alcohol questions were part of the main examination. Individuals with dementia (n=24) and individuals with missing data on all alcohol variables (n=10) were excluded, leaving 1169 individuals (age range: 70.01-72.01) for analysis.

Examinations

Participants were examined at an outpatient clinic or during a home visit. In order to facilitate birth cohort comparisons, procedures were virtually identical at all examinations. These included comprehensive social, physical, cognitive, functional, and psychiatric examinations, as well as close informant interviews and a battery of laboratory examinations.

Measures of alcohol use

Information on alcohol use was obtained from semi-structured face-to face interviews performed by psychiatrists in 1976-77 and 1992-93, and by research nurses in 2000-02 and 2014-16. Questions were asked about frequency of consumption during the past month (never', '≤2 days/week', '3-5 days/week', or '>5 days/week') for each beverage type (wine, beer, spirits). The duration of total abstinence was recorded when applicable.

Self-reported alcohol consumption was measured by asking about weekly consumption levels of beer, wine, and spirits in centilitres during the past month. Based on these volumes, average weekly grams of alcohol consumption was calculated using conversion factors based on average alcohol concentration by volume (spirits 1 cl=3 g, wine 1 cl=1g, beer >3.5% 1 cl=1/3 g). These were not changed over time. Weekly alcohol consumption was categorized as follows: '0 g', '1-20 g', '20-40 g', '40-60 g', '100-150 g', '150-250 g', '250-500 g' or '>500 g'.

Spirit consumption was classified into '0 cl', '<37 cl', '37-75 cl', '75-150 cl', '150-200 cl' or '>200 cl'. Exact levels of consumption (cl) for beer and wine were not documented in 1976-77 and 1992-93. Thus, comparisons regarding exact measures were only done between 2000 and 2014 for these beverages. Consumption was further organized into non-mutually exclusive categories to harmonize with bottle sizes. Beer consumption was categorized as '≥100 cl/week', '≥200 cl/week', '≥300 cl/week', and '≥400 cl/week'. Wine consumption was categorized as '≥37 cl/week', '≥75 cl/week', '≥150 cl/week', and '≥225 cl/week'.

Definitions of at-risk consumption

'At-risk' consumption was defined as *≥100 g/week*. This corresponds roughly to the definition of heavy consumption (more than seven drinks á 14 g per week) for men and women aged 65 and over by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (U.S. Department of Health and Human Services National Institutes of Health National Institute on Alcohol Abuse and Alcoholism, Updated 2005 edition).

The gender-specific Swedish guidelines were also applied (Swedish National Board of Health and Welfare). In these guidelines, which lack age-specific recommendations, the cut-off for heavy consumption is higher for men (>14 drinks á 12g/week; roughly to ≥150 g/week), but similar for women (>9 drinks á 12g/week), compared to the NIAAA.

Demographic factors

Marital status was dichotomized as having partner (married or cohabiting, or having a non-cohabiting partner) or not (divorced, widowed, or never married). Educational level was dichotomized as compulsory (i.e. 6 years for those born 1906-07 and 1922, 7 years for those born 1930, and 9 years for those born 1944), or more than compulsory. During the 20th century, regulations for mandatory years in Swedish compulsory schooling changed several times leading, which explains the different cut-off points for educational level in this study. Smoking was categorized as never, former smokers and current smokers. Snus consumption was reported as yes (consumer) or no (non-consumer) at the time of the interview.

Statistical analysis

Data from each examination year are cross-sectional and presented with percentages and frequencies. Differences in proportions between each cohort were tested using the Chi-square test. Differences in continuous variables (i.e. exact volume of weekly consumption) were tested with the Mann-Whitney U-test. Analyses were carried out using IBM SPSS Statistics 24 for Windows. All p-values were two-tailed and p-values <0.05 were considered statistically significant.

Results

Characteristics of the study samples are presented in Table 1.

[Table 1 here]

Mutually exclusive proportions of weekly alcohol consumption for men and women during the past month are illustrated in Figure 1.

[Figure 1 here]

At-risk and weekly consumption

The proportion of at-risk consumers according to the NIAAA guidelines (≥100 g/week) increased in both sexes during the study period (Table 2). The proportion was higher

among men at all examinations. The proportion of at-risk consumers increased in men from 16.1% in 1976-77 to 29.9% in 2000-02 (p=0.001), and 45.3% in 2014-16 (p<0.001). In women, there was a non-significant increase from 0.5% in 1976-77 to 2.0% in 1992-93 (p=0.134). The proportion increased to 9.5% in 2000-02 (p<0.001) and 24.3% in 2014-16 (p<0.001). The male:female (M:F) ratio regarding at-risk consumption decreased from 32.2:1 in 1976-77 to 3.1:1 in 2000-02 and 1.9:1 in 2014-16.

[Table 2 here]

As shown in Table 2, the proportion of men consuming ≥150 g/week increased from 8.6% in 1976-77 to 19.2% in 2000-02 (p = 0.003), and 28.9% in 2014-16 (p=0.006). In women, the proportion was minimal in 1976-77 (0%) and 1992-93 (0.4%; p=0.346), but increased to 2.9% in 2000-02 (p=0.03) and 12.8% in 2014-16 (p<0.001). The M:F ratio regarding consumption of ≥150 g/week decreased from 6.6:1 in 2000-02 to 2.3:1 in 2014-16. As no woman consumed ≥150 g/week in 1976-77, the M:F ratio could not be calculated.

Information regarding exact volume of weekly alcohol consumption was only available in the examinations 2000-02 and 2014-16. Among men, the median increased from 50 g/week (interquartile range: 8.63 to 115.03 g/week) in 2000-02 to 85 g/week (interquartile range: 22.0 to 158.33 g/week) in 2014-16 (Mann-Whitney U=47090, p<0.001). Among women, the median increased from 15 g/week (interquartile range: 0 to 44.5 g/week) in 2000-02 to 41 g/week (interquartile range: 6.0 to 95.25 g/week) in 2014-16 (Mann-Whitney U=54543, p<0.001).

The proportion consuming no alcohol during the past month did not differ between cohorts examined in 1976-77 (29.0%) and 2000-02 (24.6%; p=0.144), but decreased to 19.1% in 2014-16 (p=0.014). The proportion consuming no alcohol was lower in men compared to women at all examinations. The proportion of total abstainers among men decreased from 14.4% in 1976-77 to 7.4% in 2000-02 (p=0.027), and 5.5% in 2014-16 (p=0.319). In women,

the proportion decreased from 15.1% in 1976-77 to 4.8% in 1992-93 ($p<0.001$). However, there was an increase from 4.8% to 9.5% ($p=0.046$) in female total abstainers between 1992-93 and 2000-02. The proportion decreased to 7.8% in 2014-16 ($p=0.432$). There were no significant differences between sexes regarding the proportion of abstainers (see Table 2).

Beverage-specific consumption

Weekly beverage-specific consumption during the past month is shown in Table 3. Weekly spirit consumption decreased dramatically among men during the study period. The proportion consuming ≥37 cl decreased from 20.1% in 1976-77 to 6.1% in 2000-02 ($p<0.001$), and 3.7% in 2014-16 ($p=0.147$). Women in all four birth cohorts reported very low consumption. Reported frequency of spirit consumption did not differ between cohorts, except that the proportion of women reporting no weekly consumption of spirits increased from 67.4% to 77.5% ($p=0.002$) between 2000-02 and 2014-16. Men reported more frequent consumption of spirits than women did at all examinations.

[Table 3 here]

Reported frequency of wine consumption increased between 1976-77 and 2000-02 in men, and between 2000-02 and 2014-16 in women. Weekly beer and wine intake was only available from the examinations in 2000-02 and 2014-16. Weekly wine intake increased in both sexes between 2000-02 and 2014-16. The proportion of men consuming ≥75 cl per week increased from 18.4% in 2000-02 to 35.4% in 2014-16 ($p<0.001$), and in women from 10.3% in 2000-02 to 30.4% in 2014-16 ($p<0.001$). There were no sex differences in weekly amount of wine in 2014-16, except that the proportion consuming ≥150 cl was higher in men ($p=0.019$).The M:F ratios regarding wine intake decreased between 2000-02 and 2014-16 from 1.4 to 1.0 (≥37 cl), 1.8 to 1.2 (≥75 cl), 5.8 to 1.5 (≥150 cl) and 4.1 to 1.2 (≥225 cl).

Weekly beer intake increased in men between 2000-02 and 2014-16 (Table 3). Women reported low consumption at all examinations, and the proportions did not differ

between examinations, except the proportion consuming ≥100 cl, which increased from 0.4% in 2000-02 to 2.7% in 2014-16 (p=0.033). Men consumed more beer than women at both examinations. Reported frequency of beer consumption in men increased between 1976-77 and 2000-02 (Table 3). In women, the frequency of beer consumption did not differ among cohorts. Men consumed beer more frequently than women at all examinations.

Discussion

We found that alcohol consumption increased substantially from 1976-77 to 2014-16 in representative birth cohorts of Swedish 70-year-old men and women. Sex differences in alcohol consumption decreased during the study period. While at-risk consumption according to NIAAA guidelines was almost negligible among 70-year-old women in 1976-77, approximately one fourth reached this level in 2014-16. Almost half of the men were at-risk consumers in 2014-16 according to NIAAA. A dramatic increase in wine consumption in both sexes and a decrease in consumption of spirits among men was observed over the study period.

An increase in the prevalence of at-risk consumers (defined by AUDIT score) was found among 65-85 year-olds in a Swedish national survey conducted between 2004 and 2015 (The Public Health Agency of Sweden, 2016). However, the reported prevalence of at-risk consumers was only 8% in 2015, a figure substantially lower than that observed in our study (34% in 2014-16). This may be due to the lower age in our sample, our higher response rate (72% versus 47%), our less strict definition of at-risk consumption and the fact that our study involved an urban sample, while the national survey covered the entire country. An increase in weekly alcohol consumption was also observed in a Swedish population ≥77 years examined mainly by face-to-face interviews in 1992, 2002 and 2011 (Kelfve et al., 2014). Internationally, few studies have examined birth cohort differences in alcohol consumption and at-risk consumption among older adults. A smaller age-related decline in consumption

was found in more recent birth cohorts of US citizens (Moore et al., 2005), suggesting an increase in alcohol consumption among older adults.

There are several potential reasons for changes in alcohol consumption in Sweden among recent birth cohorts of older adults, both due to period and birth cohort effects (Figure 2).

[Figure 2 here]

Birth cohort and period effects may be difficult to disentangle. Individuals within specific birth cohorts share the same historical context, which may have crucial effects on alcohol consumption. For example, those born 1906-07 were aged 13-49 years while the rationing system was in effect in Sweden, which may have generated long-term moderate drinking habits in this birth cohort. On the other hand, the higher levels of alcohol consumption in later born cohorts can be an effect of circumstances at the time of examination, such as changes in alcohol policies. It is well documented that both price and availability of alcohol influence consumption (Babor, 2010, Wagenaar et al., 2009). Strict alcohol regulations and norms are more likely to generate less per capita consumption (Andreasson et al., 2006, Henderson et al., 2004, Johnson and Gerstein, 1998, Norstrom and Ramstedt, 2005, Room et al., 2009). Dramatic changes in Swedish alcohol policies occurred during the study period. The availability of alcohol was limited during 1982-2001, and this might have influenced consumption in the cohorts examined in 1992 and 2000. The Swedish state-owned alcohol wholesaler and retail chain had restricted opening hours during this period, and stores were closed on Saturdays. Sweden joined the European Union in 1995, which changed Swedish alcohol policy (e.g. regarding increased travellers' allowances and competition among alcohol producers, decreased alcohol taxes, and reduced prices) (Ramstedt, 2010), which may in part explain the increased consumption in later born cohorts. The increase in alcohol consumption among 70-year-olds may also be due to increases in survival rates and healthy life years in

later born cohorts. Data from Statistics Sweden show an increased proportion of the population surviving to age 70, from 54% of men and 65% of women in 1976-77 to 76% of men and 83% of women in 2014. Longer life, better health and greater wealth facilitates the continuation of alcohol habits into older ages (Moore et al., 2005), impacting also on lifestyle phenomena such as restaurant visits and travelling (Holdsworth et al., 2017, Room et al., 2009).

The reported prevalence of at-risk consumption among older adults varies among countries (Nuevo et al., 2015), due in part to varying definitions of at-risk consumption (Kalinowski and Humphreys, 2016). Examples of this comes from studies conducted on adults aged 65 and over conducted in Finland 2007 (>84g/week) (Immonen et al., 2011), the Netherlands 2009-12 (>140g/week) (Geels et al., 2013), the US 2005-06 (>196g/week) (Blazer and Wu, 2009), and England 2003 (>224g/week for men, 168g/week for women) (Knott et al., 2013). Our cut-off (≥100g/week) was thus relatively low compared to these other studies. Applying the local definitions to our study, we had lower figures in 2000-02 compared to US and England, and higher in 2014-16 than the studies from Finland and the Netherlands.

Sex differences in alcohol consumption in 70-year-olds diminished gradually over the study period, and at-risk consumption increased particularly in women, mainly due to increased wine consumption. We have previously reported a diminishing gap between sexes in alcohol consumption among 75-year olds born 1930 compared to those born 1901-02 (Waern et al., 2014). This parallels findings from the US (mixed-age sample) (Keyes et al., 2008), New Zealand (20-49 year-olds) (McPherson et al., 2004), and Denmark (50-74 year-olds) (Bjork et al., 2008). This phenomenon is suggested to be particularly pronounced in countries with increasing gender equality (Parker and Harford, 1992, Rahav et al., 2006, Seedat et al., 2009, Wilsnack and Wilsnack, 2002). In Sweden, the role of women changed

dramatically during the 20th century in terms of suffrage, family structure, higher education, paid employment, and economic independence.

We found large changes in beverage preference over the study period, in concordance with another Swedish population study involving a broad age range (16-80 years) (Kraus et al., 2015). The most notable changes in our study included an increase in wine consumption among both sexes, an increase in beer consumption among men, and a dramatic decrease in consumption of spirits among men. A decreasing consumption of spirits was also observed 1979-2000 in the US (Kerr et al., 2004). Moreover, our results parallel data on alcohol sales in Sweden 2001-2012 (Trolldal and Leifman, 2015). There are several potential explanations for the beverage shift. First, Sweden launched a campaign encouraging wine consumption in 1957, aiming to shift the pattern of alcohol use. This may have had a greater impact on individuals in later born cohorts, as their alcohol habits were being formed at that time. Second, Swedish media has repeatedly reported on the protective health effects of wine shown in some studies. Third, a greater exposure to 'continental' alcohol consumption patterns together with new product design (i.e. "bag in box") may partly explain the shift from a traditional northern European pattern, with binge drinking of spirits during weekends, to a 'continental' wine-drinking pattern throughout the week (Waern et al., 2014).

While prevalence figures are not directly comparable due to methodological differences, there are several reasons for different results among studies. First, age of study sample varies among studies. Broader age categories result in more heterogenic groups in relation to e.g. cognitive function, health and living conditions. We examined a relatively 'young' group of older adults so higher figures for at-risk consumption would be anticipated. Second, studies are conducted in different years. Third, response rates differ between studies. Non-responders may have high alcohol consumption compared to responders (Kelfve and Ahacic, 2015, Meiklejohn et al., 2012, Lissner et al., 2003). Our response rate was relatively

high, facilitating inclusion of high consumers. Fourth, willingness to answer questions about alcohol may also vary between studies due to variations in country-specific factors such as culture, religion, acceptability, ageism, attitudes to alcohol consumption, and status of authorities. Our study was set in Sweden's second largest city, in which conditions probably differ compared to other study settings. Overconsumption of alcohol is, for example, more prevalent in urban areas in high-income countries (Borders and Booth, 2007, Li et al., 2017). Fifth, data collection (e.g. surveys, interviews, registers) and sampling (primary care patients or randomly selected community samples) will influence results. Sixth, most studies measure alcohol consumption over the last 12 months. We asked about alcohol consumption within the past month, which reduces the risk of recall bias.

Limitations and strengths

Our study has several limitations. First, the study was carried out in a Swedish urban sample of 70-year-olds limiting the generalizability of the findings to a Swedish context. Thus, the changes in alcohol consumption levels shown in this study do not necessarily reflect alcohol consumption levels among 70-year-olds in other countries. Second, response rates differ across examinations (between 63% and 81%). As a result, the effect of selection bias may vary among samples included in the study. However, differences in response rate cannot entirely explain the large birth cohort changes. Third, our study relies on self-reported alcohol consumption, thus introducing potential biases in recall and reporting. Recall bias is considered low as participants reported consumption during the past month. Nevertheless, changing attitudes in later born cohorts might have resulted in more accurate reporting of alcohol consumption. Our results may thus in part reflect a more open-minded societal attitude regarding alcohol rather than real changes in alcohol consumption. This might have overestimated the cohort differences, especially among women. It might also have overestimated the diminishing gender gap, as there was a greater stigma against older

women's drinking in the 1970s. However, changes in total alcohol sales in Sweden support that we measured real changes in consumption, and the cohort differences were so large, especially among women, that changing attitudes (and thus willingness to report consumption) could not completely explain the results. Fourth, the administrator of the alcohol questions changed during the study period from psychiatrists (in 1976-77 and 1992-93) to nurses (in 2000-02 and 2014-16), which may have influenced reporting and to some extent explain differences in prevalence across examinations. However, all nurses were trained by the last author (IS), who in his turn was trained by the psychiatrists who conducted the interviews in the 1970s. In addition, most nurses were psychiatric nurses with major experience in making interviews. Fifth, we used conversion factors to estimate alcohol consumption in grams. As alcohol content may differ considerably even within the same beverages, the estimations are only approximations. In addition, the strength of alcoholic beverages, particularly wine, has increased over time as have standard serving sizes (Kerr et al., 2006). While this will not change our main results, it may lead to an underestimation of the proportion of at-risk consumers in the later born cohorts. Sixth, the overall sample size of 2 268 is relatively small, which may affect the precision of the estimates. Consequently, the number of participants in some of the subgroups was small, leading to low statistical power for some analyses. If anything, this might have led to some false negative findings.

The major strength of this study is the use of four general population samples examined with identical methods over a 40-year period, which is unique. In addition, questions regarding alcohol consumption were part of a comprehensive examination on ageing and thus did not explicitly recruit individuals with a particular consumption pattern.

Conclusion

Recent cohorts of 70-year-olds in Sweden report significantly higher levels of alcohol consumption than previous cohorts. We found a dramatic increase in at-risk consumption

among 70-year-olds from the 1970s to the mid-2010s, and this was particularly pronounced among women. Our results highlight the need for both public health and clinical initiatives that target older men and women, and for strategies to support responsible alcohol consumption in later life. In the short-term, it is reasonable to assume that the issue of at-risk consumption and associated harm will persist among older persons and therefore should be acknowledged by public health and health practitioners. Findings emphasize the need to increase our knowledge about alcohol consumption in older adults in relation to alcohol-related harm and determinants of at-risk consumption.

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Figure Legends

Figure 1 Alcohol consumption (gram/week) in birth cohorts of 70-year-old men and women

Figure 2 Historical context over the life course for cohorts born 1906-07, 1922, 1930, and 1944

Adapted from Skoog, I. Nature Reviews Neurology 12, 316-318 (2016)

Table 1 Study sample characteristics in 70-year-olds by sex and year of examination

	Men			Women			
Birth cohort	1906-07	1930	1944	1906-07	1922	1930	1944
Examination year	1976-77	2000-02	2014-16	1976-77	1992-93	2000-02	2014-16
% of birth cohort (N)	44.3 (174)	46.9 (215)	46.4 (543)	55.7 (219)	100.0 (248)	53.1 (243)	53.6 (626)
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
Marital status							
Having partner	78.0 (135)	86.0 (185)	81.4 (434)	43.4 (95)	56.7 (140)	52.3 (127)	63.1 (389)
Education							
>Compulsory	17.9 (31)	44.4 (95)	81.4 (433)	17.7 (38)	38.5 (79)	37.5 (90)	85.6 (528)
Smoking							
Current smoker	28.7 (50)	14.4 (31)	7.2 (39)	5.5 (12)	18.7 (46)	16.9 (41)	11.0 (69)
Former smoker	32.2 (56)	52.1 (112)	55.9 (303)	9.2 (20)	25.6 (63)	23.5 (57)	50.0 (313)
Never	39.1 (68)	33.5 (72)	36.9 (200)	85.3 (186)	55.7 (137)	59.7 (145)	39.0 (244)
Snus consumption[a]							
Yes	-	13.1 (28)	27.4 (149)	-	0.0 (0)	0.4 (1)	3.7 (23)

'Marital status' are based on 173 men in 1976-77, 214 men in 2000-02, 533 men in 2014-16, 247 women in 1992-93, 240 women in 2000-02, and 616 women in 2014-16.
'Education' are based on 173 men in 1976-77, 532 men in 2014-16, 215 women in 1976-77, 205 women in 1992-93, and 617 women in 2014-16.
'Smoking' are based on 218 women in 1976-77, 246 women in 1992-93.
'Snus consumption' are based on 213 men in 2000-02, 224 women in 1992-93, 226 women in 2000-02, and 625 women in 2014-16.
[a] Data missing in 1976-77

Table 2 Alcohol abstainers and weekly alcohol consumption in 70-year-olds by sex and year of examination

	All				**Men**				**Women**				
Examination year	1976-77 *n=393*	2000-02 *n=458*	2014-16 *n=1169*		1976-77 *n=174*	2000-02 *n=215*	2014-16 *n=543*		1976-77 *n=219*	1992-93 *n=248*	2000-02 *n=243*	2014-16 *n=626*	
	% (95% CI)	% (95% CI)	% (95% CI)	*p-value trend*	% (95% CI)	% (95% CI)	% (95% CI)	*p-value trend*	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	*p-value trend*
Abstainer													
Yes	14.8 (11.6-18.7)	8.5* (6.3-11.5)	6.8 (5.4-8.4)	*<0.001*	14.4 (9.9-20.4)	7.4* (4.6-11.8)	5.5 (3.9-7.8)	*<0.001*	15.1 (10.9-20.5)	4.8* (2.5-8.3)	9.5* (6.3-13.9)	7.8 (6.0-10.2)	*0.04*
Weekly consumption													
0 g/week	29.0 (24.7-33.7)	24.6 (20.8-28.7)	19.1* (16.9-21.4)	*<0.001*	23.6° (17.8-30.4)	20.1° (15.2-26.0)	16.0° (13.2-19.4)	*0.02*	33.3° (27.4-39.8)	28.7 (23.2-34.8)	28.5° (23.2-34.5)	21.7*° (18.7-25.1)	*<0.001*
≥60 g/week	10.4 (7.8-13.9)	30.5* (26.4-34.9)	51.5* (48.6-54.4)	*<0.001*	23.0° (17.3-29.8)	43.0*° (36.5-49.7)	61.3*° (57.2-65.3)	*<0.001*	0.5° (0.0-2.8)	4.0* (2.0-7.3)	19.4*° (14.9-24.9)	43.0*° (39.1-46.9)	*<0.001*
≥100 g/week	7.4 (5.2-7.4)	19.1* (15.7-22.9)	34.0* (31.4-36.8)	*<0.001*	16.1° (11.3-22.3)	29.9*° (24.2-36.4)	45.3*° (41.2-49.5)	*<0.001*	0.5° (0.0-2.8)	2.0 (.7-4.7)	9.5*° (6.4-13.9)	24.3*° (21.1-27.8)	*<0.001*
≥150 g/week	3.8 (2.3-6.3)	10.5* (8.0-13.7)	20.3* (18.1-22.7)	*<0.001*	8.6° (5.2-13.8)	19.2*° (14.4-25.0)	28.9*° (25.3-32.9)	*<0.001*	0.0°	0.4 (.01-2.2)	2.9*° (1.3-6.0)	12. 8*° (10.4-15.6)	*<0.001*

'Abstainer' are based on 218 women in 1976-77. 'Weekly consumption' are based on 214 men in 2000-02, 247 women in 1992-93, and 242 women in 2000-02.

* Significant ($p<0.05$) difference compared to previous cohort

° Significant ($p<0.05$) difference between sexes within the same cohort

Table 3 Beverage specific consumption patterns in 70-year-olds by sex and examination year

	All				**Men**				**Women**				
Examination year	1976-77 *n=393*	2000-02 *n=456*	2014-16 *n=1169*		1976-77 *n=174*	2000-02 *n=214*	2014-16 *n=543*		1976-77 *n=219*	1992-93 *n=248*	2000-02 *n=242*	2014-16 *n=626*	
	% (95% CI)	% (95% CI)	% (95% CI)	*p-value trend*	% (95% CI)	% (95% CI)	% (95% CI)	*p-value trend*	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	*p-value trend*
CENTILITRE (cl/week)													
Spirits													
>37 cl	9.4 (6.9-12.7)	2.9* (1.6-4.9)	1.9 (1.2-2.8)	*<0.001*	20.1° (14.8-26.7)	6. 1°* (3.5-10.2)	3.7° (2.4-5.7)	*<0.001*	0.9° (0.03-3.5)	1.6 (.4-4.1)	0.0*	0.3° (.01-1.2)	*0.09*
>75 cl	5.3 (3.5-8.1)	0.4* (.01-1.7)	0.8 (0.4-1.5)	*<0.001*	12.1° (8.0-17.8)	0.9* (.03-3.6)	1.5° (.7-3.0)	*<0.001*	0.0°	0.0[a]	0.0[a]	0.2° (0.0-1.0)	*1.00*
>150 cl	2.5 (1.3-4.7)	0.4* (.01-1.7)	0.3 (.1-.8)	*<0.001*	5.7° (3.0-10.4)	0.9* (.03-3.6)	0.6 (.1-1.7)	*<0.001*	0.0°	0.0[a]	0.0[a]	0.0[a]	-
Wine[b]													
≥37 cl	-	27.9 (23.9-32.1)	52.7* (49.8-55.5)	*<0.001*	-	32.7° (26.8-39.3)	52.3* (48.1-56.5)	*<0.001*	-	-	23.6° (18.6-29.3)	53.0* (49.1-56.9)	*<0.001*
≥75 cl	-	14.0 (11.1-17.5)	32.7* (30.0-35.4)	*<0.001*	-	18.4° (13.6-24.0)	35.4* (31.5-39.5)	*<0.001*	-	-	10.3° (7.0-14.9)	30.4* (26.9-34.1)	*<0.001*
≥150 cl	-	3.9 (2.5-6.2)	12.0* (10.3-14.0)	*<0.001*	-	7.0° (4.2-11.3)	14.4*° (11.7-17.6)	*<0.01*	-	-	1.2° (.2-3.8)	9.9*° (7.8-12.5)	*<0.001*
≥225 cl	-	2.0 (1.0-3.8)	5.5* (4.3-6.9)	*<0.01*	-	3.3 (1.5-6.7)	6.1 (4.3-8.4)	*0.13*	-	-	0.8 (.03-3.2)	5.0* (3.5-7.0)	*0.01*
Beer (>3,5%)[b]													
≥100 cl	-	3.7 (2.3-5.9)	12.5* (10.7-14.5)	*<0.001*	-	7.5° (4.6-11.9)	23.8*° (20.4-27.1)	*<0.001*	-	-	0.4° (0.0-2.5)	2.7*° (1.7-4.3)	*0.06*
≥200 cl	-	2.4 (1.3-4.3)	6.1* (4.8-7.6)	*<0.01*	-	4.7° (2.5-8.5)	11.6*° (9.2-14.6)	*<0.01*	-	-	0.4° (0.0-2.5)	1.3° (.6-2.5)	*0.28*
≥300 cl	-	1.1 (.4-2.6)	2.9* (2.1-4.0)	*0.04*	-	1.9 (.6-4.9)	5.9*° (4.2-8.2)	*0.03*	-	-	0.4 (0.0-2.5)	0.3° (.01-1.2)	*0.83*
≥400 cl	-	0.2	1.6*	*0.05*	-	0.5	3.3*°	*0.05*	-	-	0.0	0.2°	*0.97*

		(0.0-1.4)	(1.0-2.5)			(0.0-2.9)	(2.1-5.2)					(0.0-1.0)	
FREQUENCY (times/week)													
Spirits													
0 times	56.1 (51.2-61.0)	56.8 (52.2-61.3)	63.7* (60.9-66.4)	*0.02*	40.2° (33.2-47.7)	44.9° (38.3-51.6)	47.7° (43.5-51.9)	*0.08*	68.8° (62.4-74.6)	62.9 (56.6-68.9)	67.4° (61.2-73.0)	77.5*° (74.0-80.6)	*<0.001*
≥3 times	4.3 (2.7-6.9)	6.6 (4.6-9.3)	5.1 (4.0-6.6)	*0.19*	7.5° (4.3-12.5)	11.2° (7.6-16.2)	9.2° (7.1-12.0)	*0.56*	1.8° (0.5-4.8)	1.6 (.4-4.1)	2.5° (1.0-5.4)	1.6° (.8-3.0)	*0.86*
≥5 times	2.0 (1.0-4.0)	2.4 (1.3-4.3)	1.5 (.9-2.3)	*0.75*	3.4 (1.4-7.5)	4.7° (2.5-8.5)	2.8° (1.6-4.6)	*0.58*	0.9 (.03-3.5)	0.4 (.01-2.2)	0.4° (0.0-2.5)	0.3° (.01-1.2)	*0.34*
Wine													
0 times	56.9 (51.9-61.7)	37.2* (32.9-41.8)	28.1* (25.6-30.8)	*<0.001*	62.1 (54.7-68.9)	37.4* (31.1-44.0)	31.5° (27.7-35.5)	*<0.001*	52.8 (46.1-59.3)	43.5* (37.3-50.0)	37.1 (31.2-43.4)	25.2*° (21.9-28.8)	*<0.001*
≥3 times	2.3 (1.1-4.4)	11.2* (8.6-14.5)	24.3* (22.0-26.9)	*<0.001*	1.7 (0.4-5.2)	15.9*° (11.6-21.4)	24.8* (21.4-28.6)	*<0.001*	2.8 (1.1-6.0)	4.0 (2.0-7.3)	7.1° (4.4-11.1)	24.0* (20.7-27.4)	*<0.001*
≥5 times	0.0	4.0* (2.5-6.2)	8.8* (7.3-10.5)	*<0.001*	0.0[a]	5.1* (2.8-9.1)	8.3 (6.3-11.0)	*<0.001*	0.0 [a]	2.0* (5.7-4.6)	2.9 (1.3-6.0)	9.1* (7.1-11.7)	*<0.001*
Beer (>3,5 %)[c]													
0 times	47.3 (42.4-52.3)	34.6* (30.4-39.1)	-	*<0.001*	35.1° (28.4-42.4)	22.9*° (17.8-29.0)	-	*0.01*	57.1° (50.5-63.5)	39.9* (33.8-46.3)	45.0° (38.9-51.3)	-	*0.01*
≥3 times	22.4 (18.5-26.8)	26.8 (22.9-31.0)	-	*0.11*	28.2° (22.0-35.3)	40.2*° (33.8-46.9)	-	*0.01*	17.8° (13.3-23.4)	17.7 (13.2-23.1)	14.9° (10.9-19.9)	-	*0.39*
≥5 times	15.0 (11.8-18.9)	18.4 (15.1-22.2)	-	*0.16*	20.7° (15.3-27.3)	27.6° (22.0-33.9)	-	*0.12*	10.5° (7.0-15.3)	12.9 (9.0-17.7)	10.3° (7.0-14.9)	-	*0.93*

'Centilitre (cl/week)' are based on 247 women in 1992-93. 'Frequency (times/week)' are based on 541 men in 2014-16 (spirits), 540 men in 2014-16 (wine), 218 women in 1976-77 (spirits and wine), 240 women in 2000-02 (wine), and 623 women in 2014-16 (wine).

* Significant ($p<0.05$) difference compared to previous cohort

° Significant ($p<0.05$) difference between sexes within the same cohort

[a] Comparisons not possible due to no value

[b] Data missing in 1976-77 and 1992

[c] Data missing in 2014-16