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Front sheet

Title

Women's role in the rise in drinking in Australia 1950-1980: an age-period-cohort analysis of data from the Melbourne Collaborative Cohort Study

Running head

Gender trends in Australian drinking 1950-90

Authors and affiliations

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Abstract

Background and Aims:

In Australia as in many countries, alcohol consumption increased dramatically during the second half of the 20th century, with increased availability of alcohol, relaxation of attitudes towards drinking, and shifting roles and opportunities for women as facilitating factors. We sought to investigate drinking trends by gender and birth cohort in Australia during this period.

Design: Retrospective cohort study

Setting/Participants/Measurements:

Using the usual frequency and quantity of beverage-specific alcohol intake for 10-year periods from age 20, retrospectively reported from 40,789 participants aged 40-69 years (born 1920-1949) at recruitment to the Melbourne Collaborative Cohort Study in 1990-1994, we compared trends in alcohol consumption by sex in Australia between 1950 and 1990. Participants' average daily consumption for age decades were transformed to estimated intakes for 1950, 1960, 1970, 1980 and 1990.

Findings:

Alcohol consumption was higher for men than women during each decade. Alcohol consumption increased for both sexes in the 1950s, 1960s and 1970s, and fell after 1980. The rise before 1980 was roughly equal in absolute terms for both sexes, but much greater relative to 1950 for women.

Women born during 1930-39 and 1940-49 drank more alcohol during early-middle adulthood (ages 20-40) than women born during 1920-29. In the 1980s, the fall was greater in absolute terms for men, but roughly equal relative to 1950 for both sexes. In both sexes, the decline in drinking in the 1980s for birth-decade cohorts was roughly in parallel.

Conclusions:

Specific birth cohorts were influential in the rise in alcohol consumption by Australian women born in 1920-1949 after World War II. Much of the convergence with men's drinking after 1980 reflects large reductions in drinking among men.

Keywords

Alcohol, drinking, trends, gender, women, birth cohort, age-period-cohort analysis, Australia

Introduction

Alcohol consumption is a significant contributor to morbidity and mortality, not only to drinkers themselves (1, 2), but also to those exposed to drinkers (3-6), and is a barrier to socioeconomic development (1, 7-10). Generally, per-capita alcohol consumption (the average volume of alcohol consumed per person, usually defined in litres of pure alcohol consumed per year) is, along with patterns of drinking, related to the amount of alcohol-related burden and harm within a population (11).

Alcohol consumption in Australia increased dramatically following World War II. According to the Australian Bureau of Statistics (ABS) estimates of per-capita consumption of Australians aged ≥ 15 years, beer consumption more than doubled in the 30 years following the end of the war, rising from 3.71 L of pure alcohol per-capita in the 1944-45 financial year to 9.22 L in 1974-75 (12). Per-capita alcohol consumption increased relatively rapidly from 1960-61 (when the first ABS data on total alcohol is available), peaked then plateaued between 1974-75 and 1980-81, then decreased rapidly during the 1980s and early 1990s, to levels slightly above the per-capita consumption recorded in 1960-61. After 1990, apparent per-capita alcohol consumption fluctuated relatively little until 2013-14 (12).

While recent trends in Australian alcohol consumption have been analysed and compared for various population subgroups such as by sex (13-16), comprehensive analyses have not been possible for demographic trends in alcohol consumption prior to 1990 due to a lack of repeated large-scale representative surveys measuring alcohol consumption. The National Drug Strategy Household Survey (NDSHS) (17) was initiated in 1985, and the National Health Survey (18, 19) in 1989-90; no data have been available from before then to estimate changes in consumption by different population sub-groups.

There is reason to think that trends in consumption by sex differed between 1950 and 1990. Following World-War II, a number of social and cultural shifts related to attitudes, norms and expectations about alcohol occurred which influenced both the level consumed in the overall population, and its distribution among subgroups. There was a generational reaction against the temperance movement, which had disapproved of drinking, particularly by women, and had succeeded in confining drinking mostly to groups of men in hotel bars (20). 'Civilised drinking', or drinking in moderation, and drinking by the middle class, was popularised (20, 21). Meanwhile, European migration brought with it new drinking customs and a rise in European-style restaurants (20), coinciding with a sharp rise in the popularity of wine (20-22). By the 1960s and 1970s, drinking shifted to being a typical regular activity of many adults, and drinking alcohol at home, with meals, and by women, was normalised (20). The outcome of such changes was an increasing availability and consumption of alcohol in Australia during the three decades that followed the end of World War II (12), and a substantial participation of women in social drinking occasions, likely to be associated with an increase in alcohol consumption by Australian women (20, 23).

One study which compared alcohol consumption in the South Australian adult population in 1977 and 1983 surveys (24) estimated that average daily consumption of pure alcohol was 0.5mL lower in 1983 than in 1977 for men, while consumption by women had increased from 6.1 mL of alcohol/person/day in 1977 to 7.4 mL in 1983. The few other surveys between 1968 and 1990 (e.g., 25-27) did not yield comparable data which could track trends over time by sex.

Recent studies have shown that the prevalence of drinking and heavy drinking differ according to birth cohort, often reporting higher rates by later birth cohorts (28). Slade et al.'s (29) systematic review and meta-regression indicates the gap in men and women's alcohol consumption is narrower for later, but also younger, birth cohorts. When controlling for age and period effects,

however, recent cohorts had lower rates of drinking participation and average consumption volume than older cohorts in an Australian sample (13).

In summary, apparent consumption data provides evidence of increasing per-capita consumption in Australia between 1945 and 1975 (12). However, while there is qualitative historical evidence of an increase in women's consumption during the post-World War II era, there is a substantial gap in the literature for a quantitative analysis of sex and birth-cohort-specific trends in consumption in the post-World War II period.

Project aims

Using retrospectively collected alcohol consumption data for participants aged between 40 and 69 years when recruited into the Melbourne Collaborative Cohort Study (MCCS) in 1990-94 (30), this study aims to describe:

- 1) How did alcohol consumption change in a cohort of Australians between 1950 and 1990?
- 2) Were there sex differences in consumption changes over this period?
- 3) Were any changes consistent across birth cohorts?

We expected to observe an increase in per-capita alcohol consumption over time among men, and a proportionally larger increase among women, between 1950 and 1990. Given that findings of birth-cohort differences in drinking are common for recent study periods, we expected to observe differences in trends of alcohol consumption between birth cohorts.

Methods

Study population

The MCCS is an Australian prospective cohort study of 41,513 Melbourne residents (99.2% aged 40-69 years; 58.9% women) recruited during 1990-94. Participants were mostly identified from the Victorian Electoral Enrolment Register and the Melbourne metropolitan phone directory and invited by letter to participate, whereas others were recruited via other strategies (30, 31). As this was

a volunteer sample (i.e. respondents were not all individually approached to take part in the study), a response rate is not calculable (31). Compared with metropolitan Melbourne residents aged 40–69 years and the general population of Australia at the time of recruitment, the sample was older and more likely to be female (Supplementary Table S1). Southern European migrants were deliberately over-sampled to extend the range of lifestyle factors and genetic variation, and comprised approximately 25% of this sample, resulting in a greater proportion of Southern European migrants and fewer Australian-born participants compared with Victorians and Australians aged 40–69 years (Supplementary Table S1). For a more detailed explanation of the MCCS, see (30).

At study entry (baseline), participants' demographic and lifestyle information was collected via interviewer-administered questionnaires, and dietary information via a self-administered questionnaire. This study draws on data collected in a section of the baseline dietary questionnaire, which asked all participants to retrospectively report on their alcohol consumption during various age brackets throughout their life.

Altogether 382 participants were excluded either for unclear responses to the retrospective quantity-frequency alcohol consumption questions ($N = 71$) or reporting implausibly high alcohol consumption ($N = 311$) (reported average daily consumption $>150\text{g}$ of alcohol from any beverage type, or $>200\text{g}$ from all beverages combined, during a 10-year age bracket). Another 323 were excluded because they were outside the age range of 40–69 years, and 19 due to missing alcohol consumption data. The final sample comprised 16,579 men and 24,210 women aged 40–69 years at enrolment.

Alcohol consumption

Participants who had consumed at least 12 alcoholic drinks in a year were asked to report their usual frequency of consumption and usual quantity consumed per drinking occasion for beer, wine and spirits separately for 10-year age periods commencing at age 20 up to the decade of their

age at baseline attendance. Frequency of consumption was reported as the number of times per day, week, month or year. Quantity consumed was measured as the number of glasses, pots, cans, stubbies or bottles for beer; glasses, bottles or litres for wine; and glasses for spirits. We calculated grams of ethanol (alcohol) consumed per day from beer, wine and spirits combined, during each age period, by multiplying intake frequency by quantity and standard amount of alcohol per container, using Australian food composition tables (32-34). We converted all estimates to Australian Standard Drinks (ASDs; 10g alcohol per ASD (35)).

To ascertain daily alcohol consumption for 1950, 1960, 1970, 1980 and 1990, we transformed the decadal intakes under the following assumptions, consistent with a previous analysis of the MCCS data (36): intake for decade of life that encompasses age at baseline (e.g. consumption for 60-69 years for someone aged 65 years at baseline) was defined as consumption during 1990; and intakes for second, third, fourth and fifth-most recent age decades were defined as consumption during 1980, 1970, 1960, and 1950, respectively.

ASDs consumed per day at baseline were derived from reported consumption in 1990. Lifetime ASDs consumed per day were derived by dividing the total number of ASDs consumed between ages 20-69 years by the number of days alive between ages 20-69 years. Participants were categorised as lifetime abstainers (did not consume alcohol between age 20-69 years), ex-drinkers, and current drinkers according to intake for 1990. The denominator for all estimates of average daily alcohol consumption included drinkers and abstainers.

Estimated drinking levels in MCCS were lower than the ABS estimates of per-capita consumption for Australians aged ≥ 15 years at 10-year intervals between 1950-51 and 2000-01 (12), but the relative trends in per-capita alcohol consumption were almost identical [Figure 1].

[Figure 1 here]

Statistical analysis

Trends in daily alcohol consumption over time for men and for women, and according to birth cohort (via an age-period-cohort descriptive analysis (13, 37)), were estimated using daily intakes for 1950, 1960, 1970, 1980 and 1990. All counts and estimates were unweighted. Independent sample t-tests tested for differences in estimated mean daily alcohol consumption at various ages and time-points between gender and birth cohort groups. All analyses were conducted using Stata version 14 (38), and graphical representations of estimates were constructed using Microsoft Excel, 2013 edition (39).

Results

The sample comprised more women (59%) than men (41%). Sociodemographic characteristics and information on alcohol intake by sex are depicted in Table 1. There were nearly three times more abstainers among women than among men, and men consumed over three times more alcohol than women per day during their lifetime, on average.

[Table 1 here]

Figure 2 (a) depicts the estimated average daily alcohol consumption by men and women at 10-yearly intervals between 1950 and 1990. Men consumed more alcohol at each time-point compared with women (all $p < .001$), but the trends in intake were similar, i.e. both increased initially, then decreased after 1980. Between 1950 and 1980, the average daily consumption for men and women increased by similar amounts (men = +0.6 ASDs/day; women = +0.5 ASDs/day). Between 1980 and 1990, the decrease was larger for men (men = 0.5 ASDs/day; women = 0.1 ASDs/day; $p = < .001$). While the difference between intakes by sex narrowed from 1950 (mean difference = 1.4 ASDs/day) to 1990 (mean difference = 1.1 ASDs/day), the daily consumption was still 2.7 times higher ($p < .001$) for men.

Trends in daily alcohol consumption at 10-yearly intervals relative to the mean consumption during 1950 are plotted in Figure 2 (b). From 1950 to 1980, the daily alcohol consumption more than

tripled from 0.2 ASDs/day to 0.7 ASDs/day for women (i.e. a 240% increase). Men's consumption increased just 1.36-fold (i.e. by 36%) from 1950 to 1980. The proportional decrease in consumption between 1980 and 1990, expressed as a change in percentage of the 1950 consumption, was similar for both men and women (men = 30%; women = 38%). Overall, these trends resulted in a 203% increase in consumption by women, and a 6% increase by men between 1950 and 1990.

[Figure 2 here]

Figure 3 depicts trends in the daily alcohol consumption at 10-year intervals from 1950 to 1990 by decade of birth. Trends in consumption were largely consistent across sex-stratified birth cohorts, with average alcohol consumption increasing from 1950 to 1980 then decreasing until 1990 in all groups. For men, a much sharper increase in consumption from 1960 to 1970 was observed for those born during the 1930s (aged approximately 30-39 years from 1960-1970) (+0.45 ASDs/day) than those born before 1930 (+0.19 ASDs/day). For women, the increase in consumption between 1960 and 1970 was greater for those born in the 1930s than for those born in the 1920s (a difference of only +0.06 ASDs/day).

[Figure 3 here]

Figure 4 displays the daily alcohol consumption of men and women at various ages by birth cohort. Women born during 1940-49 had a higher daily alcohol consumption than women born during 1930-39 and 1920-29 during their 20s (both $p < .001$) and 30s (both $p < .001$). The convergence of women's age-specific alcohol consumption aligned with the decline in consumption by all women during the 1980s. Men born during 1940-49 had a higher daily alcohol consumption during their 20s than both men born during 1930-39 ($p < .001$) and men born during 1920-29 ($p < .001$), but not during other age brackets. The decline in intake for men during the 1980s translated to all three age-cohorts consuming much less alcohol per day than in the previous decade.

[Figure 4 here]

Discussion

Sex differences in trends in alcohol consumption during the post-World War II era

Both men's and women's average daily alcohol consumption increased throughout the 1950s, 1960s and 1970s, and then declined during the 1980s – a pattern that mimics the estimated trends of the Australian population aged ≥ 15 years from apparent per-capita consumption data (12). The estimated decline in consumption during the 1980s was of such magnitude that the average alcohol consumption by men returned to slightly above that observed in 1950. The relative increase in consumption from 1950 to 1980 appeared far greater for women than men during this time and, despite a decrease in consumption during the 1980s, women's average daily consumption around 1990 was estimated to be triple that around 1950. Thus, the findings indicate a narrowing of the gap between men's and women's alcohol consumption from 1950 to 1990. Similar convergences have been observed in many countries after World War II (28). Importantly, while the gap between men and women narrowed between 1950 and 1990, men still reported drinking much more alcohol than women (2.7 times on average) at the end of the study period in 1990.

These findings provide rare quantitative evidence, albeit from retrospective survey data from a sample from the Melbourne metropolitan area (30), to support qualitative claims based mostly on social and political history that Australian women's alcohol consumption underwent a period of relatively rapid increase in the few decades following World War II (20, 21). They also add weight to historical discussions which propose that a changing role of women in Australia, including an increased presence in traditionally male-dominated industries and pastimes (20, 23), coupled with increased availability of alcohol (40) and reactions against early 20th century temperance culture (20, 41), contributed to increases in women's alcohol consumption in the 30 years following World War II. Alcohol consumption similarly increased in many countries in the 1960s and 1970s, particularly those with a history as a 'temperance culture' (42-45). For example, a consistent result has been

reported for women in the United States (US) according to cross-sectional surveys (46) and birth cohort comparisons (47, 48). Numerous explanations for US women's increasing consumption in the years following World War II have been offered, such as greater economic power and therefore purchasing power for alcohol for women (49), increased participation in workplaces with subcultures that may encourage drinking (50) and changes in attitudes towards women's drinking (47) including greater acceptability of drinking by women (51).

Sharp declines in daily consumption for men and women may have contributed to the rapid decrease in adult per-capita recorded consumption in Australia during the 1980s (12). In this period, alcohol became a public health concern and some public policies to address these concerns were established – many to combat drink-driving, but some also to address broader issues (20, 41).

Interpretation of these trends needs to take account of this study's finding that the decrease after 1980 may be attributable to large reductions in men's drinking in absolute terms, but similar reductions in both genders' drinking relative to gender-specific alcohol consumption.

Influence of birth cohort on trends in men's and women's alcohol consumption

The roughly parallel differences by sex in alcohol consumption of birth cohort subgroups over time may indicate changing social norms regarding sex and alcohol consumption (28) in post-World War II Australia. The higher alcohol consumption by women born in later birth cohorts during early to middle adulthood (particularly during their 20s and 30s for women born in the 1940s) was an important driver in women's increasing average daily alcohol consumption between 1950 and 1980. Largely in line with the findings of this study, cross-cohort comparisons have found that drinking prevalence (13), alcohol consumption by drinkers (13) and lifetime prevalence of alcohol dependence (52) were typically higher in later birth cohorts for Australian women born between 1916 and 1949 (13). Similarly, in the US, women born between 1944 and 1953 were at higher odds (OR = 1.3) of

lifetime drinking than women born between 1934 and 1943 (47), and there is partial evidence for this association with birth cohort for alcohol disorders (28), but see 47).

Alcohol consumption differed across the age spectrum of men and women, such that alcohol consumption of men and women appeared more influenced by factors that were acting in real historical time than by generational differences in alcohol consumption. Alcohol consumption of men and women appeared to change in one direction across birth cohorts in real time (increased in the 1960s and 1970s, and decreased in the 1980s). As a result, women born during the 1940s reported the highest age-specific alcohol consumption among women, but the difference in alcohol consumption between birth cohorts reduced over time. Also, men born in later decades had a higher daily alcohol consumption during their 20s than men born in earlier decades, but consumed far less alcohol in their 40s and 50s than men from earlier birth cohorts. These real historical time trends further highlight potential societal shifts in drinking attitudes and behaviours.

Strengths and limitations

The study is based on retrospective self-reporting on drinking in decades of life, with validity limited by recall bias and measurement error (53). Further, measurements of alcohol consumption for earlier decades may be less valid or reliable than for the more recent decades because the risk of recall bias is greater for measurements using longer recall periods (54). In comparison with the ABS's apparent consumption data, based on sales and taxes data (12), our study underestimated average daily consumption by Australian adults by approximately 61%. This 39% coverage is relatively low compared with the 53%-57% attained by Australia's premier alcohol and drug survey, the NDSHS (14).

This study's sample was drawn only from the Melbourne metropolitan area, with an overrepresentation of Southern European migrants, and thus is not representative of the total Australian adult population. As previously explained, a response rate was not calculable (31). As

alcohol consumption among Southern European women in this sample was relatively stable over time and alcohol consumption decreased relatively steeply among Southern European men in the 1980s, the increase in women's alcohol consumption between 1950 and 1980 may be slightly underestimated, and the decrease in men's alcohol consumption during the 1980s may be overestimated. As adults aged either under 40 years or over 69 years at recruitment were not considered, trends observed in alcohol consumption may pertain only to men and women in the included birth cohorts, not in the general population. Reassuringly, however, a visual comparison indicates the relative changes over time (trends) in consumption from the MCCS-derived estimates are almost perfectly aligned with the relative trends in ABS's apparent consumption estimates.

In this analysis, we assumed the baseline age bracket corresponded to 1990, and the next preceding 10-year age bracket corresponded to participants' consumption in 1980, and so on for 1970, 1960 and 1950. Given that participants were recruited to the study between 1990 and 1994 (30), the age brackets assumed for participants are approximations, which may vary from their true age bracket by up to four years.

Implications

Understanding how broad social changes relate to changes in drinking is useful to better understand historical developments and discover clues that allow us to anticipate, and perhaps predict, changes in alcohol consumption in Australia and other countries as broad social constructs such as gender roles and drinking norms change.

These findings pose some questions for further historical and quantitative analysis of how changes in sex roles and drinking norms have affected the place of alcohol in Australian society, alcohol consumption levels and related harms. Specifically, understanding these historical data will enable more robust analyses of the aggregate relationship between alcohol consumption and harms

(55, 56). These often assume per-capita consumption changes are spread evenly between men and women, when these results suggest that this is not the case.

Conclusions

This study identifies specific birth cohorts which were influential in reducing the gender gap in alcohol consumption in Australia after World War II. Among a sample of Australians born between 1920 and 1949, women's drinking increased proportionately more than men's before 1980, though the absolute increases were much the same. In absolute terms, convergence between the genders occurred primarily after 1980, with the greater decrease among men. These findings provide an empirical frame for interpretations of social and circumstantial factors in changes in alcohol's place in Australian society between 1905 and 1990.

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Figures and tables with legends

Table 1: Sociodemographic characteristics, drinking status and alcohol consumption of the sample^a, by sex.

	Men	Women
<i>N</i>	16,579	24,210
<i>Age at baseline</i>		
Mean years (SD)	55.8 (8.7)	55.1 (8.5)
<i>Birth cohort</i>		
% Born 1920-1929 (N)	30.3 (5,023)	32.3 (7,829)
% Born 1930-1939 (N)	31.1 (5,163)	33.9 (8,206)
% Born 1940-1949 (N)	38.6 (6,393)	33.8 (8,175)
<i>Country of birth</i>		
% Australia/New Zealand (N)	65.5 (10,852)	71.1 (17,217)
% UK (N)	7.3 (1,203)	5.8 (1,411)
% Italy/Greece/Malta (N)	27.3 (4,524)	23.1 (5,582)
<i>Socio-Economic Disadvantage at baseline</i>		
Mean IRSD ^b decile (SD)	5.81 (3.00)	5.79 (3.02)
<i>Drinking status at baseline (in 1990)</i>		
% Lifetime abstainers (N)	14.3 (2,375)	39.0 (9,450)
% Ex-drinkers (N)	12.8 (2,116)	9.1 (2,205)
% Current drinkers (N)	72.9 (12,088)	51.9 (12,555)
<i>Alcohol consumption at baseline (in 1990)</i>		
Mean ASDs/day (SD)	1.76 (2.36)	0.65 (1.21)
<i>Lifetime alcohol consumption</i>		
Mean ASDs/day since age 20 (SD)	2.06 (2.19)	0.58 (0.96)

^a 40-69 years-olds at baseline; ^b Population decile of relative socio-economic disadvantage (ranging from 1 “least disadvantaged” to 10 “most disadvantaged”) [Index of Relative Socio-Economic Disadvantage (IRSD) (57, 58)]; UK: included 3 participants from non-UK northern European countries (Netherlands, Latvia); Italy/Greece/Malta: included 8 participants from other southern European countries (Macedonia, Spain, other); ASD = Australian standard drink (10 g ethanol); 95% confidence intervals in parentheses.

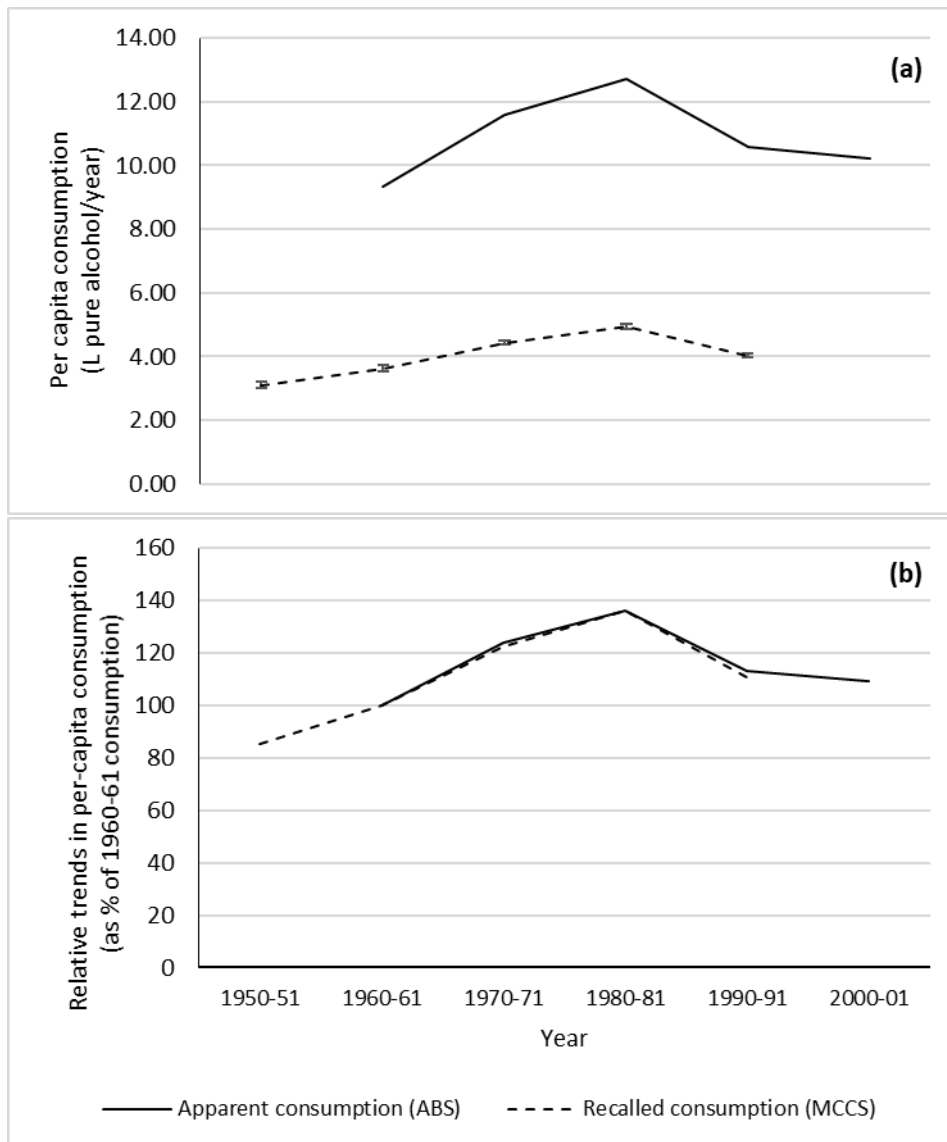


Figure 1: Estimated absolute (a) and relative (b) trends in Australian per-capita consumption between 1950-51 and 2000-01 from ‘apparent’ per-capita consumption^a compared to the recalled consumption of participants from the Melbourne Collaborative Cohort study (MCCS)^b.

^a Australian Bureau of Statistics estimates of ‘apparent’ per-capita consumption for Australians aged ≥ 15 years (12);

^b Derived from the responses of 40,789 Australian Victorian residents aged 40-49 years in 1990 to retrospective questions about their alcohol consumption at various ages (30, 34);

95% confidence intervals of absolute estimates are depicted by capped vertical lines around effect estimates.

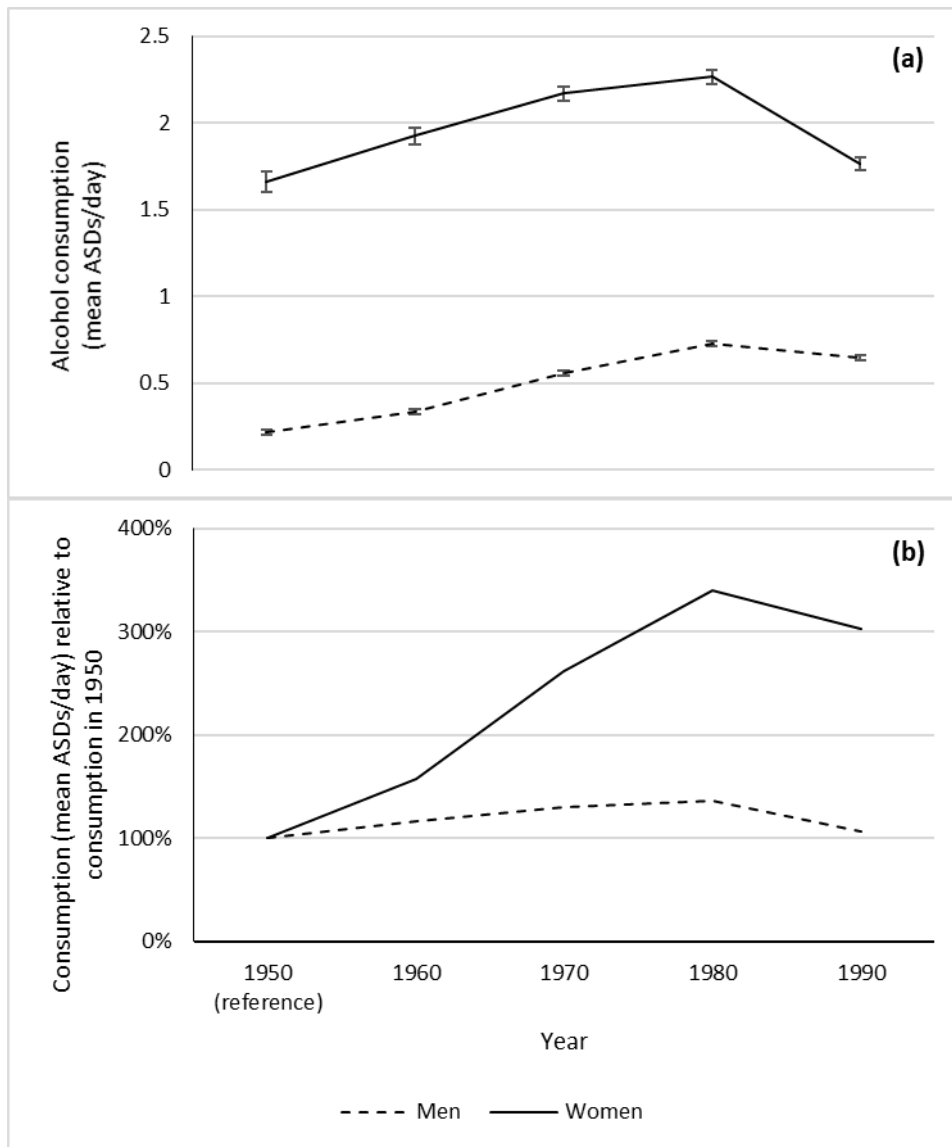


Figure 2: Estimated absolute (a) and relative (b) trends in alcohol consumption from 1950 to 1990 among men and women.

ASD = Australian standard drink (10g alcohol);

95% confidence intervals of absolute estimates are depicted by capped vertical lines around effect estimates;

Men N: 1950 = 6,393, 1960 = 11,555, 1970 = 16,578, 1980 = 16,577, 1990 = 16,579;

Women N: 1950 = 8,175, 1960 = 16,381, 1970 = 24,209, 1980 = 24,209, 1990 = 24,210.

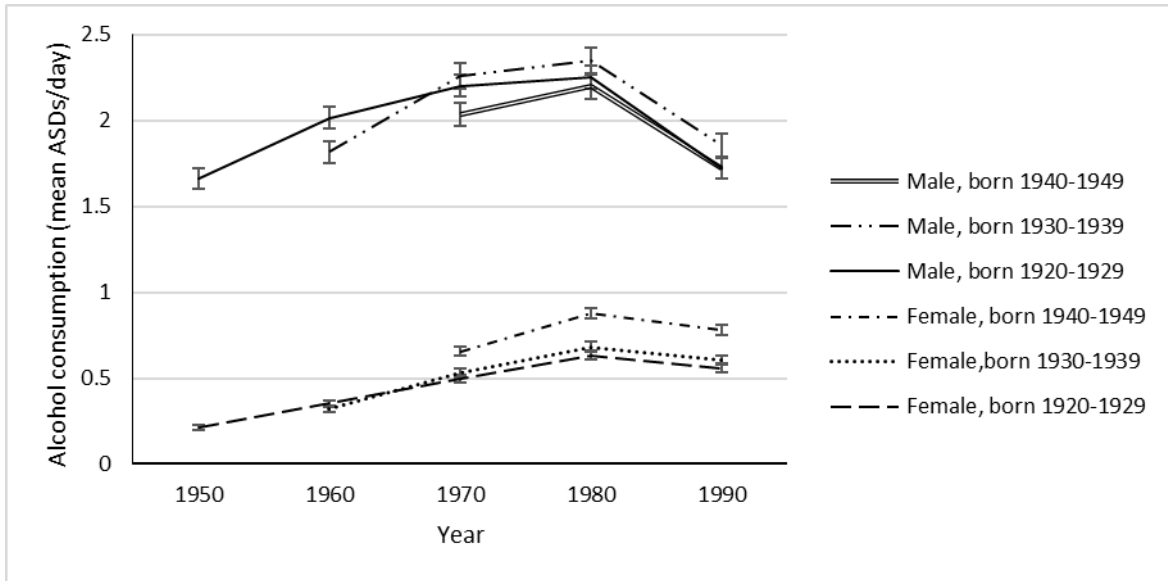


Figure 3: Trends in mean alcohol consumption from 1950 to 1990 among men and women by birth cohort.

ASD = Australian standard drink (10g alcohol);

95% confidence intervals are depicted by capped vertical lines around effect estimates;

Male N: born 1940-1949 = 5,023, born 1930-1939 = 5163, born 1920-1929 = 6,393;

Female N: born 1940-1949 = 7,829, born 1930-1939 = 8,206, born 1920-1929 = 8,175.

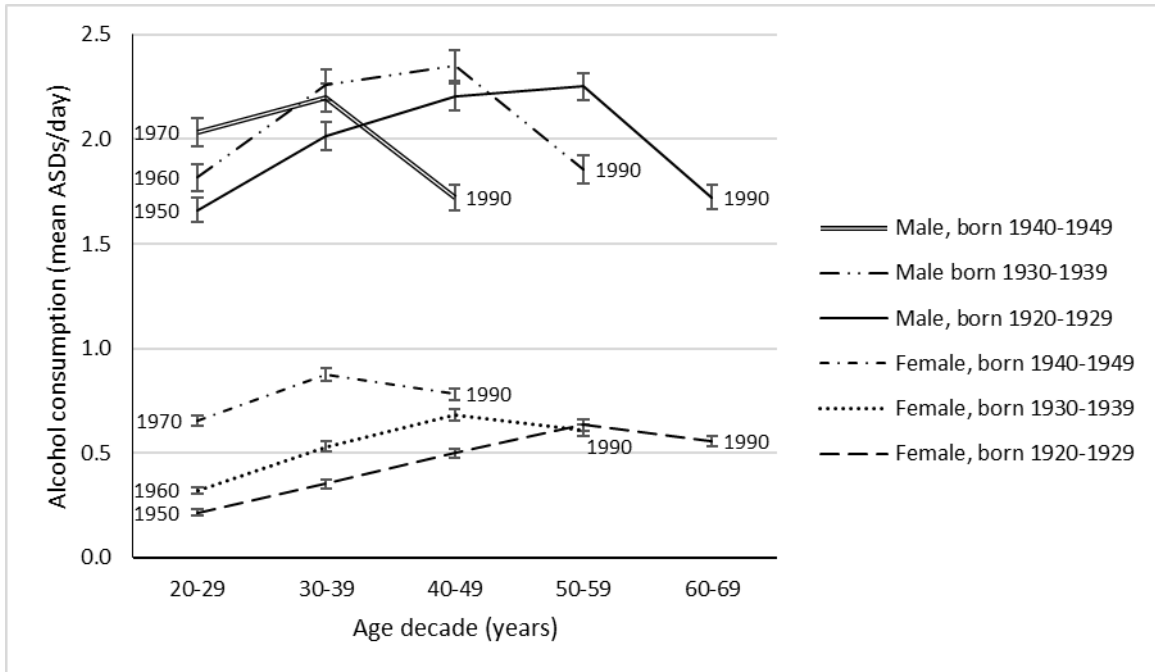


Figure 4: Average daily alcohol consumption during 10-year age brackets, among men and women and by birth cohort between 1950 and 1990.

ASD = Australian standard drink (10g alcohol);

95% confidence intervals are depicted by capped vertical lines around effect estimates;

Male N: born 1940-1949 = 5,023, born 1930-1939 = 5163, born 1920-1929 = 6,393;

Female N: born 1940-1949 = 7,829, born 1930-1939 = 8,206, born 1920-1929 = 8,175.



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