



Published in final edited form as:

Addiction. 2009 January ; 104(1): 27–37. doi:10.1111/j.1360-0443.2008.02391.x.

Age-period-cohort modelling of alcohol volume and heavy drinking days in the US National Alcohol Surveys: Divergence in younger and older adult trends

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Abstract

Aims—The decomposition of trends in alcohol volume and heavy drinking days into age, period, cohort and demographic effects offers an important perspective on the dynamics of change in alcohol use patterns in the US.

Design—The present study utilizes data from six National Alcohol Surveys conducted over the 26 year period between 1979 and 2005.

Setting—United States.

Measurements—Alcohol volume and the number of days when 5 or more and 8 or more drinks were consumed were derived from overall and beverage-specific graduated frequency questions.

Results—Trend analyses show that while mean values of drinking measures have continued to decline for those aged 26 and older, there has been a substantial increase in both alcohol volume and 5+ days among those aged 18 to 25. Age-period-cohort models indicate a potential positive cohort effect among those born after 1975. However, an alternative interpretation of an age-cohort interaction where drinking falls off more steeply in the late twenties than was the case in the oldest surveys cannot be ruled out. For women only, the 1956–60 birth cohort appears to drink more heavily than those born just before or after. Models also indicate the importance of income, ethnicity, education and marital status in determining these alcohol measures.

Conclusions—Increased heavy drinking among young adults in recent surveys presents a significant challenge for alcohol policy and may indicate a sustained increase in future US alcohol consumption.

Keywords

Heavy Episodic Drinking; Age-Period-Cohort Modelling; Trends; Young Adults

INTRODUCTION

The decomposition of trends in alcohol volume and heavy drinking measures into age, period, cohort and demographic effects offers an important perspective on the dynamics of change and has the potential for the prediction of problematic drinking [1] and alcohol-attributable disease burden [2] in the future. Recorded consumption of alcohol in the US peaked around 1981 at 10.94 liters of ethanol per capita aged 15 and older and subsequently declined to around 8.14 liters by 1993 [3]. Since then it has risen to 8.23 liters of ethanol in

2002 and has continued to increase since to about 8.32 liters in 2005 (extrapolated using data from industry sources [4]). Underlying this change have been shifts in beverage choice with beer gaining market share through the mid 1990's and then wine and spirits regaining sales since then. To some extent these shifts have been attributed to cohort preferences with older cohorts appearing to prefer spirits while the baby boom cohorts (roughly 1946 to 1965) seem to prefer beer [5]. While the rise in US per capita ethanol consumption has been small and drinking remains well below the peak levels seen around 25 years ago, the change in direction may still be a cause for concern if it represents a birth cohort shift towards more heavy drinking.

The effect of birth cohort on alcohol consumption incidence, volume, heavy drinking pattern and alcohol dependence in US samples has been evaluated in previous research using different types of data. Longitudinal data with overlapping cohorts at the same ages at different measurement points may offer the clearest picture of cohort differences. In the Normative Aging Study men born between 1901 and 1945 were compared interviewed three times over 18 years. Results indicated higher consumption in the 1928 to 1936 birth cohort relative to others [6]. Analyses of longitudinal data with four measurements of current drinking from the NHANES I included some more recent birth years and found no birth cohort effect for heavy drinking [7]. For the volume of consumption, models detected no cohort effect but indicated an interaction between age and cohort suggesting that older cohorts may have drunk more at younger ages [8]. Cohort effects have also been evaluated using retrospective measures. In sharp contrast, an analyses of the NESARC sample found that the prevalence of weekly 5+ drinkers and of alcohol dependence increased dramatically across four broad birth cohorts from 1913 to 1984 [9]. However, comparison of retrospective measures across age groups is complicated by recall bias and differential mortality. An analysis of the same NESARC data along with the NLAES sample from 10 years earlier showed that reports of lifetime alcohol dependence declined with age in the same birth cohort, contrary to logic [10]. Comparing prevalence of drinking and alcohol dependence between birth cohorts measured at the same ages, they find no significant cohort effects for men but an increased risk of drinking and alcohol dependence for women born between 1954 and 1963.

Heavy episodic drinking, measured in this case as 5 or more drinks in a day and 8 or more drinks in a day, or through alternative measures such as subjective drunkenness or binge drinking (5+ men / 4+ women on an occasion or in 2 hours) has been generally conceptualized as the major indicator of acute and, for some causes, even chronic harms [11] resulting from alcohol consumption. Therefore, the number of such days or occasions is potentially the best indicator of a risky drinking style in a population or sub-group. Alcohol volume, measured as the sum of reported beer, wine and spirits drinks consumed in a typical month, is the clearest measure of total drinking in the population. The current study will utilize six National Alcohol Surveys (NAS), cross-sectional samples of the US population conducted between 1979 and 2005, to estimate the age, period, cohort and demographic influences on measures of alcohol volume and heavy drinking days. Repeated cross-sectional models, similar to those used in our previous analyses of beverage-specific consumption will be estimated [5].

METHOD

DATA

Data used in all analyses come from six National Alcohol Surveys conducted for the Alcohol Research Group between 1979 and 2005. A high degree of comparability between these surveys and their fairly even intervals make them quite suitable for undertaking age-period-cohort analyses. Major differences between surveys are over-sampling of Hispanics

and African Americans in 1984, 1995, 2000 and 2005 (but not in the other surveys) and a mode switch from face-to-face interviews with stratified, clustered sampling, used in the 1979, 1984, 1990 and 1995 NAS, to telephone interviews and random-digit dialed sampling in 2000 and 2005. All surveys are weighted to the general population of the US at the time they were conducted taking account of age, sex, ethnic group and geographic area. Thus, over-sampling will not bias the results as it is accounted for by the weights in the analyses. The 1979 survey ($n=1,772$) was conducted by Response Analysis Corp. as a multistage stratified sample of 100 Primary Sampling Units (PSU's) with a 71% response rate. The next four surveys were conducted by the Institute for Survey Research (ISR), Temple University. The 1984 survey ($n=5,221$) was a multistage stratified sample of 100 PSU's, plus an over-sample of African Americans and Hispanics in 10 PSU's, and had a 72% response rate overall. The 1990 survey ($n=2,058$) was a multistage stratified sample of 100 PSU's with a 70% response rate. The 1995 survey ($n=4,925$) was a multistage stratified sample of 100 PSU's with an over-sample of African Americans and Hispanics in 10 PSU's and had a 77% response rate. The 2000 survey ($n=7,612$) was a random digit dialed (RDD) telephone survey including an over-sample of African Americans, Hispanics and also of low-population states and had an AAPOR cooperation rate 3 of 58% [12]. The 2005 NAS was conducted in 2005 and 2006 ($n=6,919$) by DataStat Inc. and is a random telephone sample of the US covering all 50 states and the District of Columbia. The design over-samples African-Americans, Hispanics and low population states and the AAPOR cooperation rate 3 was 56%.

Extensive methodological work on interview modes found no significant difference in national estimates of mean alcohol intake based on modality of interviewing in the NAS studies (telephone vs. face-to-face) even though response rates of the telephone surveys were lower than the in-person ones [13,14]. The largest of these studies [13] involved a between-subjects design comparing estimates of alcohol volume based on the face-to-face 1990 NAS ($n = 2,058$) and the 1990 national telephone warning label survey ($n = 2,000$). The analyses of the 1995 NAS data [14] also evaluated the number of 5+ days and found significantly more reported 5+ days in the face-to-face survey. However, further analyses determined that the difference occurred among those with less than monthly 5+ frequency. Even if there is a general interview mode effect it would appear as a period effect in the analyses and would not bias the age and cohort coefficients unless the mode effect differed along these dimensions. The lower response rates seen in the most recent surveys are consistent with the general decline in response rates across all types of surveys [15]. Declines in response rates of similar magnitude have been shown to have little impact on results [16] in a methodologic comparison.

DEPENDENT VARIABLES

The two main dependent variables are the monthly number of drinks consumed and the number of days in the past year on which 5 or more drinks were consumed. In the US a standard drink is defined as having about 14 grams of ethanol or about 44 ml. of spirits, 150ml. of wine or 350 ml. of beer at typical strengths. A variable summarizing the number of days in the past year on which 8 or more drinks were consumed was also analyzed for men only. Responses to questions on the beverage-specific frequency of drinking were used to estimate the number of days each beverage had been drunk in the prior year. A maximum of 365 days was allowed for each beverage and multiple occasions per day were counted as one day's drinking [17,18]. For each beverage type (wine, beer, spirits), respondents were then asked: "When you drink wine/beer/drinks containing whiskey or liquor, how often do you have 1-2, 3-4, or as many as five or six glasses/12-ounce cans or bottles/drinks?" Answer categories included "nearly every time", "more than half the time", "less than half the time", "once in a while", and "never", which were coded as 0.9, 0.7, 0.3, 0.1 and 0

respectively and applied to the frequency of consuming each beverage. The number of 5+ days was calculated as the sum of 5+ days for each beverage with a maximum of 365 days per year.

The frequency of 8+ days in the past year was derived from the overall Graduated Frequency series [17]. The number of 8+ days was calculated as the sum of the 12+ and 8–11 drink categories. This measure was not available for the 1979 NAS but is in all later surveys. The measure of alcohol volume utilized information from both the beverage specific and overall graduated frequency questions. The respondent's answers to the overall frequency of 5–7, 8–11 and 12+ drinking days was used to determine the typical number of drinks consumed on 5+ days for each beverage. Information on this frequency and the frequency of 1–2 and 3–4 drink days for each beverage were summed to calculate a typical monthly number of drinks.

OTHER VARIABLES

Independent variables were defined in terms of population subgroups and were represented by categorical variables. Age was defined in eight groups starting with the truncated 18 to 20 year old under legal drinking age group, followed by the 21–25, 26–30 and 31–40 age groups and continuing in ten year groups through the 71 and older age group, choosing a reference group of ages 41 to 50. Birth cohort was defined in mostly five-year groups starting with 1900 to 1920 birthdates, followed by 1921–25 and continuing in five year groups through 1981 to 1985 plus a 1986–88 group (not presented) for a total of 15 groups. Year of birth was self-reported or calculated from age and date of interview and a reference group was selected as the 1956 to 1960 cohort. Period indicators are included for each survey with the 2005 NAS as the reference period. Income was converted to 2005 dollars from the mid-point of the category chosen and re-categorized as \$0 to \$20,000, \$20,000 to \$40,000, \$40,000 to \$70,000, \$70,000 and above and income missing. Ethnicity was coded as white (Non-Hispanic), black (Non-Hispanic), Hispanic, Asian, Native American, and all other ethnicities. Geographic region was defined by five Census regions: Northeast, Midwest, South, Mountain and Pacific. Marital status was coded as married, widowed, divorced or separated and never married. Educational attainment was coded as less than high school graduate, high school graduate only, attended some college, and college graduate or higher. Variables representing interactions between the college graduate or higher group and each age group were included in additional models to evaluate the age profile of educational effects.

ANALYSES

The final negative binomial generalized linear models of the natural logarithm of alcohol volume, 5+ days and 8+ days (for men) presented in the paper were estimated in Stata 9 using pseudo-maximum likelihood methods modified to account for sample weights, which sum to the sample size in each survey, and to take account of the stratified design in the earlier surveys [19]. The models estimated here assume that the outcome variable is distributed as a negative binomial random variable and can be described as $E(y) = \mu = g^{-1}(X\beta)$ where g is the link function (here the canonical log link is used), X is the matrix of covariates, and β is the vector of unknown parameters. The matrix X includes both a unit vector (the intercept), a sequence of indicator variables for age, period, and cohort category groups, coded separately as described above, as well as other control variables also described above. Results are presented in terms of exponentiated coefficients known as the incidence rate ratio (IRR). Data from the six surveys were stacked and assigned separate strata corresponding to those in each single survey with two or more primary sampling units per strata to adjust standard errors for design effects [20]. Because the 2000 and 2005 NAS are random samples there is only one stratum per survey. Sample weights also adjusted

estimates to reflect the respective Census-based population, taking account of age, sex, ethnic group (white/other, non-Hispanic black, Hispanic) and geographic area of the US. Separate analyses were conducted for men and women. The datasets used to estimate the presented models include 27,432 individuals with 12,612 men and 15,820 women. Negative binomial models were used to address the issue of a substantial number of zero (abstainers or those with no heavy drinking days) values for each dependent variable and were chosen over poisson models based on the over-dispersion of the dependent variable distributions as indicated by likelihood ratio tests [19,21]. The use of a one year interval for period effects and the combinations of age and cohort groups described above, identified the models such that no additional assumptions were required. Analyses of the eigenvalues from principal components analyses [22] of the covariance matrix containing age, period and cohort indicators used in the final models confirmed that the models are identifiable [23].

RESULTS

TRENDS

Trends in mean alcohol volume consumed per month and the mean number of days consuming 5 or more drinks per year between 1979 and 2005 for the US are presented in Figure 1. The top graphs illustrate the overall declines in both volume and 5+ days for men and women. These declines mainly took place during the 1980's with the reported mean number of 5+ days for men dropping from 28 in 1979 to 15 in 1990. After a slight increase in 1995 and 2000, this mean declined further to 13.7 in 2005. For women, the reported mean number of 5+ days declined from about six in 1979 to three in 1990 and further to a mean of 2.5 in 2005, resulting in both genders 5+ days in 2005 being about half of their peak levels. In accord with these proportional declines in 5+ days the relationship between mean 5+ days among men and women has also remained stable, with men reporting about five times as many 5+ days as women in 2005, the same ratio as in 1979. The middle and lowest sets of graphs show the subgroup trends by age for men and women respectively. The divergence of trends between the 18–25 age group and the 26 and older age group are clearly seen for each gender and outcome measure. For men, while both age groups decline between 1984 and 1990, the older group continues to reduce average volume and 5+ days in 2000 and 2005 while the younger group rebounds to 1984 levels. A similar, though somewhat less clear pattern, is seen for women.

AGE-PERIOD-COHORT MODELS

The age, period, and cohort results of models predicting alcohol volume are shown in Figure 2. Age effects are seen to peak in the early 20's with a decline into the 41–50 age group for women, and to the 51–60 group for men, and then another decline after age 70 for both genders. The alcohol volume consumed in the underage group (18–20) is about at the level of the 41–50 age group. Period effects are found to be highest in the 1979 and 1984 surveys declining to an intermediate level in 1990 and 1995. For men, period effects decline further in 2000 with a small rebound in 2005. For women the decline in 2000 is more substantial and significant with a rebound in 2005 to the same level as 1990 and 1995. Cohort effects for men indicate that the most recent cohorts born between 1976 and 1985 have the highest levels, although no significant differences across cohorts are found. For women the most recent cohorts are also the highest with the 1956 to 1960 cohort also standing out from earlier and later groups and significant differences between the oldest and youngest cohorts.

The results of negative binomial models predicting the number of 5+ days for men and women and are shown in Figure 3 and results for the number of 8+ days for men are shown in Figure 4. Age (maturation) effects are steeper than the effects seen in Figure 2 for alcohol volume. These effects peak in the 21–25 age group in all models and appear to be similar for

5+ and 8+ measures among men. For women the effects of age appear to be small among groups under age 40 and then to decline steeply in older age groups. Period effects are similar to those seen for alcohol volume with a decline for men and a decline for women through 2000 followed by a substantial rebound in 2005. Period effects for men's 8+ drinking are found to decline more steeply over time than the effects found in the 5+ model. This may be reflected in the estimated cohort effects for 8+ drinking, which increase more steeply among recent birth cohorts as compared to those for 5+ drinking and indicate that cohorts after 1961 have significantly more 8+ days. Cohort effects for 5+ days vary more than those for alcohol volume indicating a decline from the 1920's to 1940's birth cohort groups and increasing effects in each cohort thereafter. Cohort effects for women's 5+ days are similar to, but more steeply increasing, than those found for alcohol volume, with increasing effects among recent cohorts and the 1956–1960 cohort having a larger coefficient than those around it and being significantly higher than the 1941–45 and 1900–25 cohorts.

Demographic effects on alcohol volume, shown in Table 1, show a strong and positive effect of income for both men and women. The effects of educational attainment are also positive and models including interaction terms for college education by age group (not shown) indicate that this effect occurs primarily in the aged 50 and older groups. Results for ethnic groups indicate reduced volume among Asian, Hispanic and African American respondents. Married respondents are found to have lower alcohol volume as compared to those who are divorced, separated or who were never married and to widowed men only. Regional differences are noted with significantly lower consumption found in the South and Mountain regions as compared to the Northeast.

Demographic results for models of 5+ days, also presented in Table 1, show that Asian and African American men and women, and Hispanic women, have less 5+ days than whites. Compared to married individuals, those who were never married or are divorced or separated had more 5+ days. Geographic region was also predictive of the number of 5+ days. For men, those in the Northeast reported the most days, while those in the South and Mountain regions reported the least. For women those in the South had the lowest number of 5+ days. Having a college education was associated less 5+ days among men only. A model considering interaction effects of college education by age indicated that the negative effect of education was strongest in middle aged groups, with no differences seen for those under 26 or over 70.

AGE PROFILES OF DRINKING

The age group profiles for mean alcohol consumption volume and number of 5+ drinking days for men and women are shown in Figure 5. The three earliest surveys are illustrated in dashed lines while the three most recent surveys are illustrated with solid lines. The two darker solid lines in each graph are the 2000 and 2005 surveys. For men especially, the two most recent surveys stand out as having high levels of drinking in the under 26 age groups and relatively low levels of drinking in all older age groups. For women the recent surveys also show lower drinking measures in the age groups between 26 and 50.

DISCUSSION

Findings suggest that more recent birth cohorts in the US have had generally higher alcohol volume and significantly more 5+ and 8+ (examined for men only) days, on average, than older birth cohorts when age, period and demographic effects are controlled. For women, an additional pattern seen is that the 1956 to 1960 birth cohort stands out from adjacent cohorts being especially high for both outcomes. Members of this cohort were in their early twenties during peak of US per capita consumption around 1980 and may have developed heavier

drinking habits at that time. The confluence of a wet period of drinking and decreased social sanctions on women's drinking in the 1970's [9] may have resulted in more lasting effects on drinking pattern for women than for men. For men's drinking, the contrast of declining period effects with increasing cohort effects among recent birth cohorts indicates a situation, seen clearly in Figure 1, in which older drinkers have continued to drink at reduced levels relative to the 1970's and 1980's but the younger drinkers have returned to the higher levels of consumption and heavy drinking seen in earlier surveys when per capita consumption was near its peak. We see two potential interpretations of these results, each with different implications for predictions of future drinking patterns. If the estimated cohort effects for the 1976–1985 groups represent true cohort effects, and a trend toward increased volume and heavy drinking in later (younger) cohorts, we can expect a continued and increasingly steep rise in per capita consumption along with related increases in alcohol related health and social consequences in future years. Alternatively, the results could be interpreted as reflecting an interaction between cohort and age effects, such that these more recent cohorts drink more at younger ages but this effect does not persist as they grow older. As shown in Figure 5, male age patterns for volume and 5+ occasions in the 2000 and 2005 surveys appear to have a different profile from the earlier surveys. In the recent surveys high consumption is seen in the 18 to 25 group but drops off steeply in the 26 to 30 and then declines gradually thereafter. For women, lower drinking measure values are also seen in the middle aged groups. These new age patterns are consistent with increased educational attainment in the population having an overall impact along the lines of the interactions between age and college education reported above. Those with a college education or higher were found to have about the same volume and 5+ days as those with less education in their twenties but to have fewer 5+ days at middle ages and higher volume at older ages indicating a flatter age profile after age 30. The implications of this second interpretation are less severe than those of the first, indicating that while the difficult task of controlling heavy drinking in young adults remains an important problem, it does not foreshadow persistent heavy drinking over the life course to the degree seen in the 1970's and early 1980's.

There are a number of potential limitations of the data and analyses that should be recognized. The data come from self-reported alcohol measures and are subject to the usual caveats regarding under-report [24]. The use of six surveys over 25 years further complicates the situation with potential effects from mode of interview, sampling procedures, general prevailing attitudes toward alcohol and other factors involved in survey implementation[1]. Small sample sizes in some groups, particularly for the smaller 1979 and 1990 surveys, may also exacerbate measurement error. Comparisons across age, birth cohort and period may also be biased through attitudes potentially effecting response options that are associated with these dimensions [25]. Analyses may be compromised by strong assumptions required for model identification, particularly the absence of interactions between age, period and cohort effects as discussed above regarding alternative possible explanations of cohort effects [26]. Estimated cohort effects for the oldest and the youngest cohorts are based on measures taken in only one or two age groups at very old or very young ages and are therefore less reliable than those for cohorts present in three to six surveys. There may have been an interview mode effect on the 5+ drinking days measure, which may limit comparability across surveys if this effect differed by age or birth cohort group. The variable for 5+ drinking days is also limited by the inability to account for days where 5+ drinks were achieved through multiple beverage types. We have attempted to consider these limitations in the analyses and their interpretations but confirmation or elaboration of our results in other US data is warranted.

If these results regarding increasing cohort patterns of heavy drinking are born out in future studies there are significant implications for alcohol policy in the US. Policy changes occurring in the 1980's including raising the minimum drinking age [27], lowering the per

se blood alcohol concentration limit for drunk driving to 0.08 [28] and increasing enforcement and associated penalties were seen as effective in reducing drinking in general [29], in addition to addressing the specific issues of young people drinking and drinking and driving related accidents. The apparent rebound of young peoples drinking indicates that new measures may be needed to reduce risky drinking in these groups. In recent years in the US the real price of alcohol has continued to decline due to the erosion of the real value of taxes due to inflation, making alcoholic beverages increasingly affordable to young people who may have been constrained by low incomes in earlier eras [30]. While per capita consumption remains low by recent historical standards in the US, the apparent trend toward increased heavy drinking among younger birth cohorts is of intrinsic concern and, although this is not assured, it could signal a sustained upward trend in consumption and related health and social outcomes into the future.

Acknowledgments

Funding: National Institute on Alcohol Abuse and Alcoholism (P30-AA05595)

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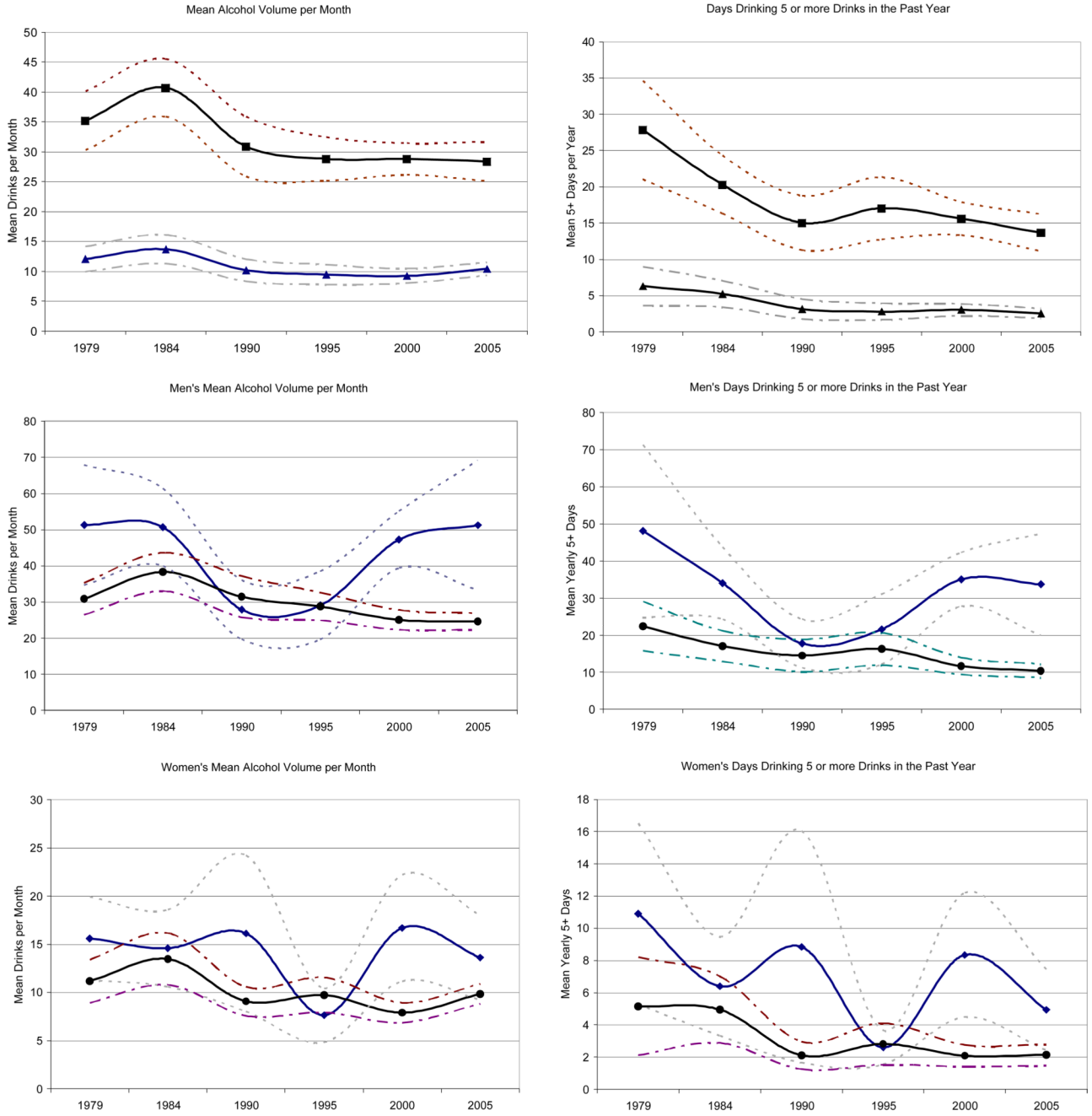


Figure 1. Trends in mean alcohol volume and 5+ days in the past year by gender and age group. Dotted lines represent estimated 95% confidence intervals. Squares- men; triangles- women; diamonds- aged 18–25; circles- aged 26 and older.

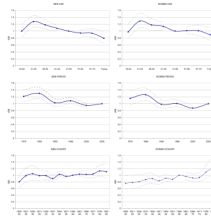


Figure 2.

Age, period and cohort effects for men and women displayed as incidence rate ratios (IRR) from negative binomial generalized linear models of alcohol volume from 6 National Alcohol Surveys. Reference groups are the 41–50 age group, the 2005 survey and the 1955 to 1960 birth cohort. Dotted lines represent estimated 95% confidence intervals.

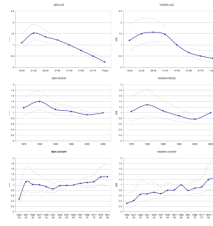


Figure 3.

Age, period and cohort effects for men and women displayed as incidence rate ratios (IRR) from negative binomial generalized linear models of the number of days having 5+ drinks from 6 National Alcohol Surveys. Reference groups are the 41–50 age group, the 2005 survey and the 1955 to 1960 birth cohort. Dotted lines represent estimated 95% confidence intervals.

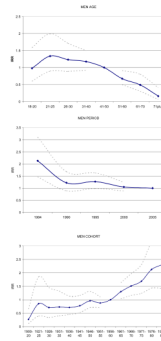


Figure 4. Age, period and cohort effects for men displayed as incidence rate ratios (IRR) from negative binomial generalized linear models of the number of days having 8+ drinks from 6 National Alcohol Surveys. Reference groups are the 41–50 age group, the 2005 survey and the 1955 to 1960 birth cohort. Dotted lines represent estimated 95% confidence intervals.

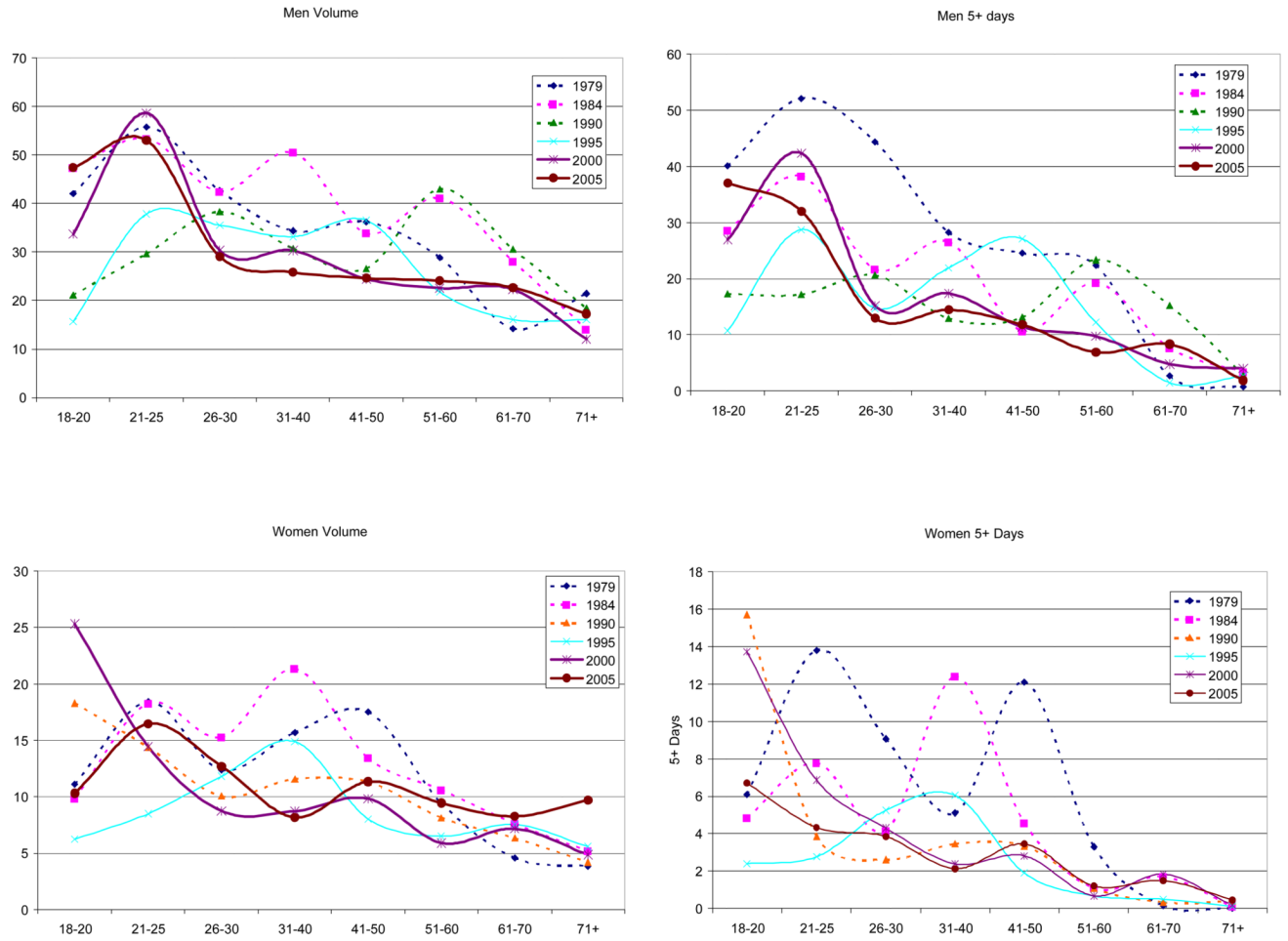


Figure 5. Mean monthly alcohol volume and yearly 5+ days for men and women by age group in each of the 6 National Alcohol Surveys.

Table 1

Estimated effects of demographic variables from age, period cohort models for men and women on alcohol volume and 5+ days.

	Men Volume	Men 5+ Days	Women Volume	Women 5+ Days
	Coefficient	Coefficient	Coefficient	Coefficient
Income (\$2005)				
Income Missing	0.833*	0.694*	0.806*	0.836
Income <\$20,000	0.897*	0.983	0.789*	1.110
\$20,000 to \$40,000	0.916*	1.001	0.924*	1.097
\$40,000 to \$60,000	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>
Income > \$60,000	1.174*	1.107	1.235*	1.211*
Ethnicity				
White	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>
Asian	0.652*	0.535*	0.661*	0.390*
African American	0.878*	0.810*	0.758*	0.734*
Hispanic	0.937*	0.977	0.711*	0.736*
Native American	0.862	0.962	0.883	1.270
Other Ethnicity	0.990	0.988	0.951	0.970
Education				
Less than HS	0.925*	0.965	0.796*	0.949
HS Graduate	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>
Some College	1.027	0.929	1.157*	0.917
College Grad. or more	1.089*	0.792*	1.321*	0.920
Partnership Status				
Married	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>
Divorced/Separated	1.259*	1.554*	1.324*	1.543*
Widowed	1.193*	1.395	0.914	0.959
Never Married	1.084*	1.193*	1.314*	1.742*
Region of US				
Northeast	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>
Midwest	0.965	1.105	0.887*	0.998
Pacific	0.972	0.988	0.979	1.070
South	0.839*	0.894*	0.713*	0.713*
Mountain	0.864*	0.838*	0.852*	1.038

* indicates coefficients that are significantly different from the reference group at the 95% confidence level.