

# Cohort effects on gender differences in alcohol dependence

Laura C. Holdcraft & William G. Iacono

University of Minnesota, Minnesota, USA

---

*Correspondence to:*

Laura Holdcraft PhD  
Department of Psychiatry and Behavioral  
Sciences  
University of Washington  
Harborview Medical Center  
Box 359797  
325 Ninth Avenue  
Seattle, WA 98104-2499  
USA

Submitted 21 May 2011;  
initial review completed 5 September 2011;  
final version accepted 12 December 2011

---

## ABSTRACT

**Aims** The present study investigated the presence of cohort effects on gender differences in the course, severity and symptomatology of DSM-III-R alcohol dependence in a community-based sample.

**Design** A comparison of substance-related variables among men and women divided into two groups based on the median birth year of the sample was conducted.

**Participants** Participants were 468 men and 132 women with life-time alcohol dependence, the vast majority of whom were born between 1941 and 1960.

**Measurements** Substance use and DSM-III-R substance use disorders were assessed by a structured interview administered in person.

**Findings** Individuals born after 1951 had higher rates of alcohol dependence. Among individuals with alcohol dependence, those born after 1951 had an earlier onset and longer duration of alcohol-related problems. Significant interactions indicated that these effects were stronger for women than men.

**Conclusions** Risk for alcohol dependence appears to be rising in younger generations, and particularly for younger women, making them an important target group for prevention and treatment programs.

**KEYWORDS** Alcohol dependence, birth cohorts, gender differences, social environment.

---

## INTRODUCTION

Recently, attention has turned to gender differences in the patterning of alcohol consumption over time and the course and presentation of alcohol dependence. In the 1960s and 1970s there were dramatic changes in attitudes toward alcohol and drug use, in the availability of these substances and in women's social roles that may well have led to changes in historical gender differences in alcohol dependence among individuals who were coming of age at this time. The Minnesota twin/family study (MTFS) provided access to adults from two different age cohorts because they had twin children aged either 11 or 17 years at the time the family was recruited for the study. These parents, most born between 1941 and 1960, experienced formative years with respect to substance use that were quite different depending on

whether they were born during the earlier or later part of this time period, thus entering the age of risk for developing substance use disorders before or after the mid-1960s.

### Birth cohort effects on age of onset of alcohol consumption and alcohol dependence rates: 1940s–1960s

A large body of research indicates that patterns of alcohol and drug use change over time. 'Birth cohort effects', or effects based on the years in which individuals were born, are shown clearly in life-time alcohol and drug use prevalence rates, onset of use and rates of alcohol dependence. Recent evidence indicates that the age of onset of alcohol consumption has become earlier over time. According to the monitoring the future study

(Johnston, O'Malley & Bachman 1991), 80% of high school seniors initiate alcohol use between approximately ages 12 and 18. The onset of alcohol dependence symptoms occurs on average at approximately age 20 years (Nelson, Heath & Kessler 1998). In a 25-year period, the percentage of individuals initiating regular alcohol use by age 21 increased from 33.4% in 1941–45 to 52.6% in 1961–65 (Johnson & Gerstein 1998). The US national longitudinal alcohol epidemiologic survey (NLAES; Grant 1997), which utilized a large nationally representative sample of adults from the US general population, indicates that the cumulative probability of alcohol use is successively higher for almost every later born cohort in each age category measured. In addition to the generation-wide change in age of onset during this time period, per capita ethanol consumption rose from 2 gallons of ethanol from 1950 to 1960, and then increased steadily until the early 1980s, when it peaked at approximately 2.7 gallons (NIAAA 1997). Both earlier age of alcohol initiation (Turner *et al.* 1993) and higher rates of consumption have been associated with higher risk for alcohol dependence (Kendell 1984; Sales *et al.* 1989). Specifically, Grant & Dawson (1997) found that individuals with earlier ages at onset of alcohol use (alcohol initiation at 14 or younger) were more likely than those with later ages of onset (20 years or older) to develop alcohol dependence at some point in their lives (more than 40% versus approximately 10%). Given that ages of initiation have become younger and consumption rates higher (until the late 1980s), MTFs adults born later are probably at elevated risk for alcohol dependence.

Elevated alcohol dependence rates among more recent cohorts have been observed in several US samples (Anthony, Warner & Kessler 1994; Grant 1997). NLAES data show that rates of alcohol dependence were much higher among individuals born after prohibition and after World War II (Grant 1997). Life-time alcohol dependence rates among those born between 1948 and 1957 were approximately 15%; this figure rose to approximately 19% among those born from 1958 to 1967. The national comorbidity survey (Anthony, Warner & Kessler 1994) showed a similar pattern, as history of life-time alcohol dependence was lower among 45–54-year-olds than 15–24-year-olds, indicating later-born individuals were at higher risk.

### **Social factors influencing alcohol consumption and misuse**

Numerous societal changes during the 1960s and 1970s may have placed individuals who were coming of age during that time period at a higher risk to use alcohol and develop alcohol dependence. The economic availability of alcohol has increased as the 'real' price of alcohol (i.e.

alcohol's price in the presence of inflation and/or personal income) declined between 1960 and 1980 due to increasing inflation. Greater physical availability of alcohol (i.e. greater density of alcohol outlets; Report of the Panel on Alternative Policies Affecting the Prevention of Alcohol Abuse & Alcoholism 1981), and lowered minimum legal drinking ages (Wechsler & Sands 1980) may also have contributed to a higher risk for increased alcohol consumption and disorders in the later-born participants. Although there is some dispute (see Moskowitz 1989 for a review), several economic theorists report positive relationships between economic and physical availability and higher alcohol consumption rates and problems such as liver mortality rates (Cook 1981; Ornstein & Hanssens 1985; Chaloupka 1993; Grossman *et al.* 1995).

During the same time period, experts on the sociology of substance use have noted changes in societal attitudes toward substance use (Musto 1997). Greater substance use accompanied the political upheaval of the 1960s over many critical issues in US history: civil rights, the women's movement and protests against the Vietnam War. Illicit drug use, often accompanied by drinking, has been viewed as a way to protest many political issues (Morgan 1981). The parallel increase in alcohol use during that time (Johnson & Gerstein 1998) suggests that similar changes in attitudes may have contributed to an increase in alcohol consumption.

### **Cohort effects on gender differences in alcohol use disorders**

Women with alcohol dependence have a different course of alcoholism than men (Blume 1986; Schmidt, Klee & Ames 1990; Lex 1991; Wilsnack & Wilsnack 1993). The most consistent finding in this field is that women have been found traditionally to develop problems with alcohol at a later age (Stabenau 1984; Beckman & Amaro 1986; Ross 1989; Lewis *et al.* 1996; Fillmore *et al.* 1997), and to develop problems over a shorter period of time, a phenomenon known as 'telescoping' (Orford & Keddie 1985; Randall *et al.* 1999). Women have a higher blood alcohol concentration after consuming an equivalent amount of alcohol than men (Lieber 1997) and some evidence suggests women have a higher vulnerability to the physical effects of alcohol (Wilkinson 1980; Mann *et al.* 1992; Lieber 1997). Women have been found to have more drinking-related familial consequences (Gomberg 1986), while men suffer more adverse social, occupational, legal and violence-related consequences (Frieze & Schafer 1984; Ross 1989; Schmidt, Klee & Ames 1990; Wilsnack & Wilsnack 1993) and consume alcohol in greater quantities of alcohol and more frequently than women (Beckman & Amaro 1986; Fillmore *et al.* 1997).

A small but growing body of research indicates that there may be gender differences in the time-related changes in alcohol consumption and problems. Research in the United States has shown consistently that men have higher rates of alcohol consumption and problems than women (Gomberg 1997). However, data from several national studies in the United States indicate that the male to female discrepancy in the prevalence of alcohol dependence may be shrinking (NIAAA 2000). Male to female ratios in the 1990–92 US national comorbidity survey (NCS; Kessler *et al.* 1994), have narrowed to 2.5:1 compared to approximately 5:1 in the 1982 ECA study (Helzer & Pryzbeck 1988), which captured fewer later-born individuals than the NCS. NLAES male to female life-time alcohol dependence rate ratios dropped from 4.9:1 for those born before WWII to 1.4:1 for those born in the Vietnam era (Grant 1997; NIAAA 2000). Recent data also indicate a narrowing, but not a true convergence, in the gender gap in age of alcohol initiation (SAMHSA 1995; Johnson & Gerstein 1998), age of onset (Nelson *et al.* 1998; Reich *et al.* 1988), and other data point to such changes in the prevalence rates of alcohol disorders (Grant *et al.* 1988; Herd 1988; Reich *et al.* 1988; Nelson *et al.* 1998).

#### Social environments in birth cohorts from the 1940s to 1960s: gender issues

The narrowing gender gap in the prevalence of alcohol disorders and age of onset may be a result of several factors. That women's drinking and drinking-related problems have been more stigmatized than men's (Schmidt *et al.* 1990) may be because drinking and alcohol-related problems conflict with women's traditional gender roles (Landrine, Bardwell & Dean 1988; Lemle & Mishkind 1989). As gender roles have been revolutionized in the past 30 years in the United States (Gerson 1985; Miller & Glass 1989; Moen 1992; Moen, Erickson & Dempster-McClain 1997), so there might have been changes in societal judgements of women's drinking and drinking-related problems. Secondly, the dramatic increase since the 1950s in the number of women in the work-place (Bianchi 1995) and women's higher occupational achievement may be associated with higher alcohol use and more alcohol-related disorders among women (Gomberg 1997). This might be explained by greater increased alcohol availability and acceptability associated with employment or work-related activities; there is higher alcohol consumption among employed compared to unemployed women (Parker *et al.* 1980; Shore 1992). Some theorize that increased role strains ('dual roles', or having roles both in the family and at work) for working women contribute to higher risk for alcohol problems (Johnson & Gerstein 1998). However,

this is contradictory to evidence that multiple roles are associated with lower risks of problematic alcohol use and perhaps better mental health for women and does not take into account that some subgroups (those in high-pressure occupations) of working women are at higher risk for problem drinking (LaRosa 1990; Wilsnack & Wilsnack 1991).

#### Hypotheses and implications

Previous research suggests that the gender gap in the prevalence of alcohol dependence and the age of initiation of use is narrowing. However, this age of onset trend has not been examined in a sample defined as alcohol-dependent, and no study has examined such cohort effects on variables other than age of onset, such as the duration, severity and consequences of alcohol dependence. Assessing whether gender differences in the clinical picture of alcohol dependence have changed over time is important given that most relevant research is based on samples born prior to the 1950s. It was hypothesized that younger adults would have more alcohol-related problems than older adults, and that this effect would be disproportionately pronounced for younger women. These outcomes were hypothesized to hold for age of onset, occupational impairment and prevalence, duration and severity of alcohol dependence.

## METHOD

### Participants

Participants were men and women who were the biological or step-parents of 11-year-old or 17-year-old same-sex twins born in the state of Minnesota and identified from public birth records. These families were recruited over a 12-year period in the MTFs, a study designed to examine the genetic and environmental antecedents of adult substance use disorders. Because men with substance use disorders have historically been under-represented when studies are conducted using direct interviewing (Andreasen *et al.* 1986), fathers who were no longer living with their children were recruited in order to improve representativeness. Participating adults were minimally different compared to recruited but non-participating adults with respect to socio-economic status and very similar with respect to prevalence of self-reported psychopathology and alcoholism (see Iacono *et al.* 1999).

### Demographic characteristics

From a total sample of 1323 men and 1384 women, Table 1 shows that 468 men (35.4% of men) and 132

**Table 1** Demographic characteristics by gender and alcohol dependence status.

Demographic characteristic	Non-alcohol-dependent		Alcohol-dependent		G	A	GxA
	Men (n= 841)	Women (n= 1247)	Men (n= 468)	Women (n= 132)			
Current age (at interview)	43.57 ± 5.98	41.34 ± 5.31	42.57 ± 6.00	38.41 ± 4.96	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>
Percentage Caucasian	98.4	98.2	97.4	95.4	NS	NS	NS
Percentage currently married	88.1	87.2	81.8	71.8	<b>0.011</b>	<b>&lt;0.001</b>	NS
Years of education	14.94 ± 6.93	13.88 ± 3.11	13.74 ± 4.47	13.70 ± 7.69	0.048	<b>0.012</b>	NS
Hollingshead occupational level <sup>1</sup>	3.48 ± 1.77	4.16 ± 1.98	4.22 ± 1.72	4.45 ± 1.91	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.027</b>
Percentage working full time	75.4	57.1	79.7	54.0	<b>&lt;0.001</b>	NS	NS

No analysis was missing more than 21 subjects except working full time, which was based on a total  $n = 2575$ .

For continuous dependent variables,  $M \pm SD$  is shown; percentages are shown for categorical variables.

Results that are significant using the modified Bonferroni approach are in bold type.

G = gender main effect; A = alcohol dependence main effect; GxA = gender by alcohol dependence interaction.

<sup>1</sup>Hollingshead occupational scale ranks occupations requiring an MA or PhD (1); requiring a bachelor's degree (2); requiring education, but less than a 4-year college degree (3); requiring some education (4); most skilled 'blue collar' (5); semi-skilled (6); low-skilled (7).

women (9.5% of women), a significant difference ( $\chi^2$  1 df,  $n = 600 = 261.72$ ,  $P < 0.001$ ), met criteria for life-time DSM-III-R alcohol dependence. Consistent with the demographics in Minnesota, most individuals in the sample were Caucasian. The sample of men and women were on average in their early 40s and men were older than women. Most individuals were currently married.

For both men and women, alcohol-dependent individuals were younger and less likely to be currently married than non-alcohol-dependent individuals (see Table 1). A gender  $\times$  age interaction effect showed that alcohol dependence was associated more strongly with younger age for women compared to men. Given that the current age (i.e. age at interview) was related to the age of the children in this sample, these data suggest that alcohol-dependent individuals had children at an earlier age, and that this effect was especially true for alcohol-dependent women. Occupational level was measured by the Hollingshead occupational scale (Hollingshead 1958), which ranks occupations from those requiring an MA or PhD (1) to low-skilled (7). Higher occupational level and more years of education (at a trend level of significance after the Bonferroni correction; see Data analysis) were associated with being male and non-alcohol-dependent. A significant interaction effect indicated that alcohol dependence was associated more strongly with lower occupational level for men than women. Regardless of alcohol dependence status, men were more likely to be employed full time. However, over 85% of women were employed outside the home in some capacity.

#### Determination of cohort years

Because the vast majority (90%) of alcohol-dependent parents in this sample were born between 1941 and

1960 and the literature suggesting that the birth cohort years of the early 1950s were transitional in ways that may influence substance use, the sample was split by the median birth year, 1952. Those born in or after 1952 were included in the later-born or higher risk (the term 'higher risk' will be used in this paper to describe a risk factor for substance abuse based on having a more recent birth year) cohort while those born prior to 1952 were considered to be in the earlier-born, lower-risk cohort.

Comparing alcohol-dependent men and women divided by cohort, Table 2 reveals that among alcohol-dependent individuals, race, marital status, education and occupational level were not associated with gender or birth cohort. Gender differences in working status were the same as those observed for the total sample. Not surprisingly, given how participants were assigned to groups, birth year and age were significantly different between genders and cohorts. In addition, men were older than women, as was true in the entire sample of adults.

#### Measures

Life-time psychiatric diagnoses were made using DSM-III-R (American Psychiatric Association 1987) criteria. Substance use history and disorders were assessed using a modified version of the expanded substance abuse module from the composite international diagnostic interview (CIDI; Robins *et al.* 1988). The number of alcohol dependence symptoms was considered to be the sum of nine possible DSM-III-R 'criterion A' symptoms assessed as present. Alcohol dependence was diagnosed according to DSM-III-R criteria, thus requiring the presence of at least three symptoms, at least one of which persisted for at least 1 month or occurred repeatedly. Age

**Table 2** Gender by cohort effects on demographic variables among alcohol-dependent individuals.

Demographic variable	Men		Women		Gender	Cohort	xCohort Gender
	Earlier-born cohort (N = 261)	Later-born cohort (N = 207)	Earlier-born cohort (N = 37)	Later-born cohort (N = 95)			
Birth year	1946.3 ± 4.3	1955.7 ± 3.0	1948.1 ± 3.2	1956.8 ± 3.1	<b>&lt;0.001</b>	<b>&lt;0.001</b>	NS
Current age (at interview)	46.48 ± 4.47	37.64 ± 3.57	44.08 ± 3.31	36.20 ± 3.53	<b>&lt;0.001</b>	<b>&lt;0.001</b>	NS
Percentage Caucasian	98.8	95.6	97.3	94.7	NS	NS	NS
Percentage currently married	83.8	79.1	67.6	73.4	NS	NS	NS
Years of education	13.86 ± 2.23	13.58 ± 6.26	13.27 ± 1.81	13.87 ± 9.02	NS	NS	NS
Hollingshead occupational level <sup>1</sup>	4.09 ± 1.74	4.43 ± 1.64	3.86 ± 1.79	4.28 ± 1.62	NS	NS	NS
Percentage working full time	77.3	82.7	52.8	54.5	<b>&lt;0.001</b>	NS	NS

No analysis was missing more than five subjects except occupational level ( $n = 584$ ) and working full time ( $N = 568$ ).

For continuous dependent variables,  $M \pm SD$  is shown; for categorical variables, percentages are shown.

Results that are significant using the modified Bonferroni approach are in bold type.

<sup>1</sup>See Table 1 note regarding interpretation of Hollingshead occupational scale values.

of onset variables included age at first intoxication and age at first alcohol-related problem. Alcohol-related problems were assessed broadly by inquiring about symptoms for all alcohol disorders measured by DSM-III (American Psychiatric Association 1980), DSM-III-R (American Psychiatric Association 1987), Feighner (Feighner *et al.* 1972), and research diagnostic criteria (Spitzer *et al.* 1975) diagnostic systems as well as problem drinking behaviors not defined as symptoms (e.g. creating rules to limit one's drinking, feeling dependent on alcohol). Duration of problem drinking was defined as the participant's estimate of years during which he or she had one or more alcohol-related problems. Amount consumed during the heaviest drinking period was computed using interviewer ratings that reflected frequency of drinking beer, wine and liquor and amount consumed on each drinking occasion, with high scores reflecting more consumption. For instance, someone who had three drinks once a day 3–4 days a week would obtain a score of 7, while someone having seven drinks twice a day every day would obtain a score of 56. The fifth and 95th percentile, respectively, on this scale corresponded to scores of 6 and 70. The number of life-time intoxications was estimated by the participant and coded with a 21-point scale covering one to over 200 intoxications (i.e. 1–10 = 1; 11–20 = 2 . . . 191–200 = 20; >200 = 21). Binges or benders were defined as continual intoxication for a couple of days or more.

Adverse occupational consequences were defined as impairments in work, household or school responsibilities due to alcohol use. Adverse familial consequences referred to family difficulties arising as a result of alcohol use. Interpersonal difficulties were considered present when drinking caused frequent problems with family members, friends or associates, or when friends were lost because of

drinking. Alcohol-related violence was characterized by repeated involvement in fights or becoming physically violent while drinking. Withdrawal symptoms referred to physical or psychological symptoms such as shakes or depressed mood after stopping or cutting down on drinking. Medical complications of drinking included physical symptoms such as stomach disease or vomiting blood caused by drinking. Alcohol treatment included detoxification, outpatient treatment, in-patient treatment, Alcoholics Anonymous or Antabuse. CIDI was used to measure all substance use variables, including treatment.

### Procedures

After written informed consent was obtained, participants were given the assessment battery. Bachelor's and master's level personnel trained by clinical psychologists and advanced clinical psychology graduate students administered structured interviews. Groups of at least two diagnosticians (advanced clinical psychology graduate students) reviewed the interviews and came to a consensus on symptom coding. If the diagnosticians were unsure about the content of the subject's response based on the interviewer's notes (e.g. if there were discrepancies in the information given), audiotapes of the structured interview were reviewed. A subset of the interviews was reviewed by a separate consensus staff for purposes of comparison to the initial diagnostic coding for a reliability study. The kappa reliability coefficient for the diagnosis of alcohol dependence using these procedures was 0.98.

### Data analysis

Factorial ANOVAs were used for continuous dependent variables and logit analyses were used for dichotomous

variables. Continuous dependent variables with non-normal distributions were transformed as noted in the Results section. Because of the large number of variables analyzed, a modified Bonferroni correction (Holland & DiPonzio Copenhaver 1988) was applied to sets of variables grouped by common themes (e.g. age of onset, adverse social consequences) to control for Type I errors. This correction was applied by ordering the *P*-values for each set of related variables from smallest to largest. Each *P*-value was compared to the significance level  $0.05/(k-i+1)$ , where *k* is the number of tests in the set, and for *k*-tests, *i* = 1, 2, . . . *k*.

## RESULTS

### Prevalence

Table 3 shows that in the earlier-born cohort, 261 of 785 men (33%) and 37 of 664 women (6%) met a life-time diagnosis of alcohol dependence. In the later-born cohort, 207 of 524 men (40%) and 95 of 715 women (13%) met a life-time diagnosis of alcohol dependence. As shown in Table 3, the logit analysis showed a significant gender main effect ( $Z = -10.21$ ;  $P < 0.001$ ), cohort main effect ( $Z = 4.71$ ;  $P < 0.001$ ), and gender by cohort interaction ( $Z = -2.91$ ;  $P = 0.004$ ). The younger cohort of both men and women had higher rates of alcohol dependence than the older cohort [men:  $\chi^2$  (1 df,  $n = 1309$ ) = 5.35,  $P = 0.021$ ; women:  $\chi^2$  (1 df,  $n = 1379$ ) = 23.7,  $P < 0.001$ ]. The interaction effect indicated a more pronounced increase in the prevalence of alcohol dependence among women. The prevalence of alcohol dependence was 21% greater in the younger than in the older men. However, when compared to older

women, the prevalence of alcohol dependence in younger women was 117% greater.

### Onset and course

Confirming that the phenomenon noted in previous studies was also present in our sample, we found similarly that the birth year in the total sample of adults (regardless of alcohol dependence status) was related negatively to the onset of several indicators of alcohol use and problematic use. Men and women born earlier in the century (approximately 1940–51) were first intoxicated at a significantly later age ( $M = 18.50$ ;  $SD = 3.91$ ) than those born later in the century [approximately 1952–60;  $M = 16.71$ ;  $SD = 2.84$ ;  $F(1, 2367) = 196.64$ ,  $P < 0.001$ ].

Table 3 shows that for men and women with alcohol dependence, for age at onset of first intoxication, gender and cohort effects were significant [ $F(1, 596) = 11.83$ ,  $P = 0.001$ ;  $F(1, 596) = 40.77$ ,  $P < 0.001$ , respectively], and a significant interaction was found between gender and cohort [ $F(1, 596) = 11.62$ ,  $P = 0.001$ ]. These results indicate that an earlier age of first intoxication was present in the younger cohort, and that the effect was more prominent for women. Table 3 shows that age at onset of problem drinking among this sample was significantly related to gender [ $F(1, 596) = 4.15$ ,  $P = 0.042$ ] and cohort [ $F(1, 596) = 41.88$ ,  $P < 0.001$ ], and the gender  $\times$  cohort interaction [ $F(1, 596) = 11.22$ ,  $P = 0.001$ ] was significant. Examination of simple effects suggested that for both men and women, age at first intoxication and age at onset of problem drinking are occurring earlier in the younger cohorts. Simple effects also revealed that ages at onset of intoxication and

**Table 3** Gender by cohort effects on course of alcohol-related variables among alcohol-dependent individuals.

Alcohol-related variable	Men		Women		Gender	Cohort	Gender $\times$ cohort
	Earlier-born cohort ( <i>N</i> = 261)	Later-born cohort ( <i>N</i> = 207)	Earlier-born cohort ( <i>N</i> = 37)	Later-born cohort ( <i>N</i> = 95)			
Severity							
Percentage of total sample with life-time alcohol dependence ( <i>n</i> alcohol-dependent/ <i>n</i> total sample)	33 (261/785)	40 (207/524)	6 (37/664)	13 (95/715)	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.004</b>
Age at onset of first intoxication	16.51 $\pm$ 2.88	15.58 $\pm$ 2.28	18.65 $\pm$ 5.37	15.59 $\pm$ 2.87	<b>0.001</b>	<b>&lt;0.001</b>	<b>0.001</b>
Age at onset of problem drinking	18.60 $\pm$ 3.58	17.50 $\pm$ 2.59	20.49 $\pm$ 4.52	17.04 $\pm$ 3.10	<b>0.042</b>	<b>&lt;0.001</b>	<b>0.001</b>
Duration of problem drinking (in years) <sup>1</sup>	17.79 $\pm$ 0.60	18.70 $\pm$ 0.61	13.28 $\pm$ 1.25	17.58 $\pm$ 0.88	<b>0.001</b>	<b>0.012</b>	<b>0.038</b>

Values for continuous variables are  $M \pm SD$  followed by significance levels; percentages are shown for categorical variables.

Results that are significant using the modified Bonferroni approach are in bold type.

<sup>1</sup>Standard error shown; mean adjusted for current age.

problem drinking in the older cohort differed significantly in the traditional direction: women experienced a later onset of problem drinking and first intoxication than men. Men and women in the younger cohort no longer differed with regard to both age of onset variables. Thus, the cohort effects on the age of onset variables were stronger for women than for men, as the onset of problem drinking and onset of intoxication both decreased by approximately 3 years for women, compared to 1 year for men from the earlier to the later-born cohorts.

As Table 2 shows, alcohol-dependent individuals in the earlier-born cohort were approximately 8 years older than those in the younger cohort. To rule out the possibility that differences in the duration of problem drinking were due to differences in current age between individuals in the two cohorts, the analysis comparing men and women by cohorts on duration of problematic drinking was conducted controlling for current age. As the bottom row of Table 3 shows, an ANCOVA revealed

that women were found to have a significantly shorter duration of problem drinking (controlled for age) than men [ $F(1, 595) = 11.69, P = 0.001$ ]. A significant cohort main effect [ $F(1, 595) = 6.30, P = 0.012$ ] and cohort  $\times$  gender effect [ $F(1, 595) = 4.34, P = 0.038$ ] were found for the duration of problem drinking. Simple effects revealed that men had a longer duration of problem drinking than women in the earlier-born cohort [ $F(2, 295) = 8.31, P = 0.004$ ] whereas men and women in the later-born cohort no longer differed with respect to duration of problem drinking [ $F(2, 299) = 2.25, P = \text{NS}$ ]. The interaction effect indicated that this cohort effect was stronger for women than for men.

### Severity of alcohol dependence

Table 4 indicates that for two of the three indicators of alcohol dependence severity (alcohol consumption during heaviest period, life-time intoxications and

**Table 4** Gender by cohort effects on alcohol-related variables among alcohol-dependent individuals.

Alcohol-related variable	Men		Women		Gender	Cohort	Gender $\times$ cohort
	Earlier-born cohort	Later-born cohort	Earlier-born cohort	Later-born cohort			
<b>Severity</b>							
Number of DSM-III-R alcohol dependence symptoms	4.76 $\pm$ 1.75	4.84 $\pm$ 1.71	4.43 $\pm$ 1.63	4.47 $\pm$ 1.55	NS	NS	NS
Rating of consumption during heaviest drinking period <sup>1</sup>	33.65 $\pm$ 26.14	31.82 $\pm$ 20.16	23.25 $\pm$ 17.86	19.85 $\pm$ 16.53	<b>&lt;0.001</b>	NS	NS
Rating of number of life-time intoxications <sup>2</sup>	11.99 $\pm$ 0.64	13.31 $\pm$ 0.65	7.28 $\pm$ 1.34	9.71 $\pm$ 0.94	<b>&lt;0.001</b>	NS	NS
Ever had binges/benders	35	31	6	14	<b>0.003</b>	NS	NS
<b>Adverse consequences</b>							
Occupational/academic/household impairment	43	39	40	39	0.038	NS	NS
Familial/marital disruption	74	69	61	65	NS	NS	NS
Interpersonal difficulties	31	29	22	31	NS	NS	NS
Legal difficulties	45	41	8	21	<b>0.001</b>	NS	NS
Alcohol-related violence	35	41	19	14	<b>&lt;0.001</b>	NS	NS
Withdrawal symptoms	47	49	51	43	NS	NS	NS
Medical symptoms	14	10	8	7	NS	NS	NS
<b>Contact with health-care professionals</b>							
Treated for alcoholism	25	28	22	17	NS	0.048	NS
Told a doctor about drinking problem	14	15	11	18	NS	NS	NS

Values refer to percentage of participants reporting each variable with the exception of the first three variables.

No analysis was missing more than two subjects except occupational impairment,  $n = 573$ ; familial/marital disruption,  $n = 586$ ; binges/benders,  $n = 597$ ; withdrawal symptoms,  $n = 592$ ; medical symptoms,  $n = 588$ ; told a doctor,  $n = 594$ .

Values for continuous variables are  $M \pm SD$  followed by significance levels; percentages are shown for categorical variables.

Results that are significant using the modified Bonferroni approach are in bold type.

<sup>1</sup>Rating of consumption during heaviest drinking was computed by taking into account quantity drunk on each occasion, number of occasions each day, and number days per unit time (see Method).

<sup>2</sup>Life-time intoxications were coded with a 21-point scale (i.e. 1–10 = 1; 11–20 = 2... 191–200 = 20; >200 = 21); standard error shown; mean adjusted for current age.

bingeing), men had significantly worse severity than women. The one exception was that men and women with alcohol dependence did not differ with respect to the number of dependence symptoms. There were no cohort effects and, contrary to predictions, no gender  $\times$  cohort interactions for any severity indicator.

#### Adverse consequences of drinking

As many women (39%) in this sample had occupational, academic or household impairment as men (41%; see Table 4). Men and women did not differ on familial/marital disruption due to drinking. As predicted, legal difficulties (being arrested or held at station because of drinking) were present in a higher percentage of alcohol-dependent men (43%) compared to women (17%). Multiple fights or physical violence when drinking were present in 37% of men compared to 15% of women, a significant difference. The percentage of men and women with withdrawal symptoms or medical symptoms (e.g. liver disease) was not found to differ. No cohort or gender  $\times$  cohort interactions were present for these adverse consequences of alcohol use.

#### Contact with health-care professionals

Similar percentages of women (16%) and men (15%) were found to have told a doctor about a drinking problem and to have received some type of treatment (26% of men versus 18% of women). The percentage reporting treatment is higher than that for telling a doctor about a drinking problem because treatment such as AA, which does not include evaluation by a doctor, was included in the definition. No cohort effects or gender  $\times$  cohort effects were found.

#### Effect of spouse

Women with affected (alcohol-dependent) spouses may differ in some way, e.g. have more severe alcohol dependence, than women without affected spouses, as there is evidence in the literature that women's substance use is influenced by their partner's use. Because this sample consisted primarily of women and men who at one time had been married this issue is relevant to this investigation. To examine the potential effect of having an affected spouse, women in this sample who were married to alcohol-dependent men were compared to those who were not married to alcohol-dependent men. Alcohol dependence status was assessed for spouses who visited the study, which included current spouses and a prior spouse if he was the biological father of the twins. The analyses compared 43 women with unaffected spouse(s) to 64 women with affected spouse(s) and revealed no sig-

nificant differences for any of the selected variables (DSM-III-R symptom count, onset of problem drinking, duration of problem drinking, amount consumed, occupational consequences, familial/marital disruption, alcohol treatment).

#### Covariate analyses

Antisocial personality disorder (ASPD), which is more common in men with alcoholism (Helzer & Pryzbeck 1988), has been shown to be associated with more severe alcoholism (Cadoret, Troughton & Widmer 1984; Lewis *et al.* 1996; Holdcraft, Iacono & McGue 1998) and poorer course (Rounsaville *et al.* 1987) whereas depression, more common in women with alcoholism (Helzer & Pryzbeck 1988) has been associated with less severe alcoholism compared to antisocial alcoholism (Holdcraft *et al.* 1998). Therefore, gender differences in alcoholism could be due indirectly to gender differences in psychiatric comorbidity. It was hypothesized that gender would predict the course and severity of alcoholism over and above the effect of these covariates: current age, duration of problem drinking, presence of DSM-III-R major depression and presence of DSM-III-R ASPD. Major depression was assessed using the structured clinical interview for DSM-III-R (Spitzer *et al.* 1987). An interview created by the MTF staff was used to assess DSM-III-R criteria for ASPD. Hierarchical multiple regressions and logistic regressions revealed that for each regression in which the relevant *t*-test or  $\chi^2$  test was significant, the effect of gender, i.e.  $R^2$  change or improvement  $\chi^2$ , at the second step of the regression, remained significant at the  $P < 0.05$  level after the covariates had been entered. Thus, these analyses indicate strongly that the effects of gender on the pattern, course and severity of alcohol dependence cannot be explained simply by the typical gender differences in such covariates.

## DISCUSSION

The central aim of the present study was to determine whether alcohol misuse and its consequences were becoming more pronounced for later-born individuals, particularly in women. Although increased alcohol availability and greater acceptance of substance use over the much of the last half century provide partial justification for this expectation, dramatic changes in women's roles and status led us to expect that cohort differences would be more pronounced for women than men. Many, but not all, of our findings supported these expectations. Significant cohort effects indicated that later-born men and women were more likely to have a life-time diagnosis of alcohol dependence, to be younger at the age of first

intoxication and when problem drinking became evident, and to have a longer duration of problem drinking even after controlling for differences in current age. All of these significant cohort effects were accompanied by significant interactions, each indicating that later-born women were especially likely to differ from those born earlier. The rate of alcoholism in the later-born women was more than double that of the earlier-born females, a grossly disproportionate increase compared to that evident between early and later born men. As Table 3 indicates, earlier-born alcoholic men differed from earlier-born alcoholic women, with men showing earlier onset and longer duration. However, later-born men differed little from later-born women on these same variables. Although the prevalence of alcoholism went up in the later-born cohorts, later-born alcoholic men and women did not differ from earlier-born alcoholics in severity, adverse consequences from drinking or contact with health care professionals (Table 4), indicating that the consequences of being alcoholic have changed little over the time period examined in this study.

These findings, in conjunction with other findings from national samples (i.e. Grant 1997), thus indicate that more women are becoming alcoholic, and they are doing so at an earlier age, similar to the age at which men begin to have alcohol problems. This study is the first to demonstrate that among individuals diagnosed with lifetime alcohol dependence, the age of onset of alcohol-related behaviors such as intoxication and problem drinking of women is converging with that of men. Although previous studies have found this effect for age of onset of alcohol-related problems among individuals in the general population (Nelson *et al.* 1998), none has documented this effect among men and women diagnosed with alcohol dependence.

Although no other study to our knowledge has examined these gender-related factors in alcohol-dependent individuals, gender differences in the nationally representative NLAES data appear to exhibit some similarities. The current study showed a 117% increase in women's rates of alcohol dependence (6% versus 13%) compared to a 21% increase in men's rates (33% versus 40%), comparing birth cohort years of 1941–51 to 1952–60. Rates of alcohol dependence among women in the NLAES increased by 67% (9% versus 15%) comparing birth cohort years of 1948–57 to 1958–67, whereas men's rate increased by 10% (21% versus 23%), a substantially higher percentage increase. That the percentage increase in dependence rates in the current study was almost twice as high as that in the national sample may be due to the difference in birth cohort years between the two studies. Secondly, men in the current study had higher life-time dependence rates, with rates differing by over 10%. Differences in study samples (e.g. living in

Minnesota, primarily Caucasian, education level) have probably influenced these prevalence rates. Despite these differences in male alcohol dependence rates, the NLAES results, although not evaluated for statistical significance, appear to indicate that women's rates in a comparable time period showed disproportionately higher increases similar to those observed in the present report.

Several environmental factors that occurred in the 1960s to 1980s were theorized to have led to cohort-related changes in alcohol use and dependence and potentially to decreases in gender differences (i.e. alcohol availability, gender roles, attitude changes). Some of these factors will probably be present in the near future, producing continued effects. For example, recent findings from a nationally representative sample indicate that in young individuals from a very recent cohort (age 11–14 in 1991–95), female ages of alcohol initiation have converged with those of males, suggesting that the trend in earlier problematic alcohol use may be reflective of a continuing, long-term effect (SAMHSA 1997; see also McGue *et al.* 2001). On the other hand, some social factors have changed. Attitudes about substance use have now swung back to increased intolerance compared to attitudes in the 1960s and early 1970s (Musto 1997), perhaps reflected in recent tightening of drunk driving penalties and lowering of the legal blood alcohol level limit for drunk driving. These and other social changes are not static, and therefore it is imperative to continue to monitor the differences in the course and prevalence of alcohol dependence in men and women. Lastly, alcohol consumption rates may also have influenced the likelihood of alcohol dependence in the decades under consideration, as rates of consumption rose until the 1980s. However, the drop in consumption since the 1980s and the similarity in alcohol consumption among alcohol-dependent individuals from the later- and earlier-born cohorts in this study raise some doubt with respect to this connection.

There are several possible explanations for the stronger cohort effects found for women. The coinciding changes in both gender roles for women and changes in attitudes towards alcohol and drug use probably contributed to the stronger cohort effects found for women. The later age of onset of alcohol dependence observed historically in women is often explained by the greater stigmatization of women's drinking problems than men's (Fillmore 1984; Schmidt *et al.* 1990). The equalizing of ages of onset of alcohol problems seen in the present study may well be indicative of changes in the stigmatization of women's drinking. Women may be at increased risk for drinking in general, developing alcohol disorders, and perhaps then, an earlier age of onset of drinking to intoxication and developing problem drinking. This may be reflected in the finding that women were found not to

differ from men with respect to having told a doctor about or sought treatment for problematic alcohol use, activities which may have been discouraged by stigmatization in the past. This finding runs contrary to previous findings that women underutilize alcohol treatment, but is consistent with data from the early 1990s which suggest women are more equally utilizing alcohol treatment (SAMHSA 1993).

This study is not without limitations. In particular, the sample chosen for this study is community-based, primarily married, Caucasian and from the Midwest region of the United States. Therefore caution is needed when generalizing these results to individuals who differ from this sample on these characteristics. The results and the interpretations offered pertain to North America, and particularly the United States. Further research is needed to determine if such patterns are applicable to other countries. However, the literature shows similarities in major trends observed in this sample with respect to alcohol dependence including the higher prevalence of alcohol dependence among individuals born around the time of the later-born cohort (Anthony *et al.* 1994; Grant 1997) and the progressively earlier onset of alcohol use described above. Age effects are confounded with cohort effects in cross-sectional research, and an alternative explanation to evaluate is whether earlier born individuals, who were older at the age of assessment, have less salient memories of alcohol-related symptoms. However, it is unlikely that older age would be associated with lower rates of alcohol dependence, later onset or longer duration among women in particular. This is particularly true given that the earlier- and later-born cohorts differ in age by only 8 years, and given that this interpretation would require men and women to differ in memory. Therefore, these findings are probably reflective of cohort, not age effects. An additional limitation, inherent in any study based on self-reported data, is the potential for the increases in alcohol dependence rates to reflect changes in participants' willingness to report or identify problems related to alcohol. Midanik (1999) reported that there have been changes over time in such self-reports, with those interviewed more recently describing that fewer drinks are necessary to notice the effects of alcohol. Perception of drunkenness was associated highly with symptoms of alcohol dependence. Thus, it is important to acknowledge that these biases may influence results based on self-reported symptomatology, and future research studies investigating reporting bias and its influence on periodic changes in alcohol dependence are needed.

It is disconcerting to see a rise in the percentage of younger individuals with alcohol dependence, particularly in women, and to see that many women are starting problem drinking earlier in life and for a longer period

of time. If trends apparent in this sample, which indicate that alcohol problems among women from later-born cohorts are rapidly growing, occurring at an earlier age and lasting longer, hold for the population at large, then young women are an especially important group for alcohol disorder prevention measures to target. With the greater occupational achievement of women, and the theorized relationship between working and a higher risk of developing alcohol dependence, work-place prevention programs and alcohol treatment programs could be designed to help women develop better coping skills in order to decrease their risk of alcohol-related problems. Future studies of alcohol-dependent individuals need to control for generational differences, particularly among young women, and should continue to closely monitor changes in the course, consequences, and prevalence of alcohol dependence in both men and women given the cohort effects observed in this and other studies.

## ACKNOWLEDGEMENTS

This research was supported by grants from the National Institute on Drug Abuse (DA 05147) and the National Institute of Alcohol Abuse and Alcoholism (AA 09367 and AA 00175).

## REFERENCES

- American Psychiatric Association (1980) *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edn. Washington, DC: Author.
- American Psychiatric Association (1987) *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edn, revised. Washington, DC: Author.
- Andreasen, N. C., Rice, J., Endicott, J., Reich, T. & Coryell, W. (1986) The family history approach to diagnosis: how useful is it? *Archives of General Psychiatry*, 43, 421–429.
- Anthony, J. C., Warner, L. A. & Kessler, R. C. (1994) Comparative epidemiology of dependence on tobacco, alcohol, controlled substances, and inhalants: basic findings from the National Comorbidity Study. *Experimental and Clinical Psychopharmacology*, 2, 244–268.
- Beckman, L. J. & Amaro, H. (1986) Personal and social difficulties faced by women and men entering alcoholism treatment. *Journal of Studies on Alcohol*, 47, 135–145.
- Bianchi, S. (1986) Changing economic roles of women and men. In: Farley, R., ed. *State of the Union: America in the 1990s*, Vol. 1, pp. 107–104. New York, NY: Russell Sage.
- Blume, S. B. (1986) Women and alcohol: a review. *Journal of the American Medical Association*, 256, 1467–1470.
- Cadore, R., Troughton, E. & Widmer, R. (1984) Clinical differences between antisocial and primary alcoholics. *Comprehensive Psychiatry*, 25, 1–8.
- Chaloupka, F. J. (1993) Effects of price on alcohol-related problems. *Alcohol Health and Research World*, 17, 46–53.
- Cook, P. J. (1981) The effect of liquor taxes on drinking, cirrhosis and auto accidents. In: Moore, M. H. & Gerstein, D. R., eds.

- Alcohol and Public Policy: Beyond the Shadow of Prohibition*, pp. 255–285. Washington, DC: National Academy Press.
- Feighner, J. P., Robins, E., Guze, S. B., Woodruff, R. A., Winokur, G. & Munoz, R. (1972) Diagnostic criteria for use in psychiatric research. *Archives of General Psychiatry*, 26, 57–63.
- Fillmore, K. M. (1984) When angels fall: women's drinking as cultural preoccupation and as reality. In: Wilsnack, S. C. & Beckman, L. J., eds. *Alcohol Problems in Women*, pp. 8–22. New York: Guilford Press.
- Fillmore, K. M., Golding, J. M., Leino, E. V., Motoyoshi, M., Shoemaker, C., Terry, H., Ager, C. A. & Ferrer, H. P. (1997) Patterns and trends in women's and men's drinking. In: Wilsnack, R. W. & Wilsnack, S. C., eds. *Gender and Alcohol: Individual and Social Perspectives*, pp. 21–48. New Brunswick, NJ: Rutgers Center of Alcohol Studies.
- Frieze, I. H. & Schafer, P. C. (1984) Alcohol use and marital violence: female and male differences in reactions to alcohol. In: Wilsnack, S. C. & Beckman, L. J., eds. *Alcohol Problems in Women*, pp. 260–279. New York: Guilford Press.
- Gerson, K. (1995) *Hard Choices: How Women Decided About Work, Career, and Motherhood*. Berkeley: University of California Press.
- Gomberg, E. S. L. (1986) Women and alcoholism: psychosocial issues. In: *Women and Alcohol: Health-related Issues*, pp. 78–120. NIAAA research monograph no 16. Publication (ADM) 86–1139. United States Department of Health and Human Services. Washington, DC: US Government Printing Office.
- Gomberg, E. S. L. (1997) Alcohol abuse: age and gender differences. In: Wilsnack, R. W. & Wilsnack, S. C., eds. *Gender and Alcohol: Individual and Social Perspectives*, pp. 225–244. New Brunswick, NJ: Rutgers Center of Alcohol Studies.
- Grant, B. F. & Dawson, D. A. (1997) Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: results from the Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse*, 9, 103–110.
- Grant, B. F. (1997) Prevalence and correlates of drug use and DSM-IV drug dependence in the United States: results of the National Longitudinal Alcohol epidemiologic Survey. *Journal of Substance Abuse*, 8, 195–210.
- Grant, B. F., Harford, T. C., Chou, P., Pickering, M. S., Dawson, D. A., Stinson, F. S. & Noble, J. (1988) Prevalence of DSM-III-R alcohol abuse and dependence: United States, 1988. *Alcohol Health and Research World*, 15, 91–96.
- Grossman, M., Chaloupka, F. J., Saffer, H. & Laixuthai, A. (1995) Effects of alcohol price policy on youth: a summary of economic research. In: Boyd, G. M., Howard, J. & Zucker, R. A., eds. *Alcohol Problems Among Adolescents: Current Directions in Prevention Research*, pp. 225–242. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Helzer, J. E. & Pryzbeck, T. R. (1988) The co-occurrence of alcoholism with other psychiatric disorders in the general population and its impact on treatment. *Journal of Studies on Alcohol*, 49, 219–224.
- Herd, D. (1988) Drinking and black and white women: results from a national survey. *Social Problems*, 35, 493–505.
- Holdcraft, L. C., Iacono, W. G. & McGue, M. K. (1998) Antisocial personality disorder and depression in relation to alcoholism: a community-based sample. *Journal of Studies on Alcohol*, 59, 222–226.
- Holland, B. S. & DiPonzio Copenhaver, M. (1988) Improved Bonferroni-type multiple testing procedures. *Psychological Bulletin*, 104, 145–149.
- Hollingshead, A. & Redlich, F. C. (1958) *Social Class and Mental Disease*. New York: Wiley.
- Iacono, W. G., Carlson, S. R., Taylor, J., Elkins, I. J. & McGue, M. (1999) Behavioral disinhibition and the development of substance-use disorders: findings from the Minnesota Twin Family Study. *Development and Psychopathology*, 11, 869–900.
- Johnson, R. A. & Gerstein, D. R. (1998) Initiation of use of alcohol, cigarettes, marijuana, cocaine, and other substances in US birth cohorts since 1919. *American Journal of Public Health*, 88, 27–33.
- Johnston, L. D., O'Malley, P. M. & Bachman, J. G. (1991) *Drug Use Among American High School Seniors, College Students, and Young Adults, 1975–90*. DHHS publication. Rockville, MD: National Institute on Drug Abuse.
- Kendell, R. E. (1984) The beneficial consequences of the United Kingdom's declining per capita consumption of alcohol in 1979–82. *Alcohol and Alcoholism*, 19, 271–276.
- Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., Wittchen, H. U. & Kendler, K. S. (1994) Life-time and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. *Archives of General Psychiatry*, 51, 8–19.
- Landrine, H., Bardwell, S. & Dean, T. (1988) Gender expectations for alcohol use: a study of the significance of the masculine role. *Sex Roles*, 19, 703–712.
- LaRosa, J. H. (1990) Executive women and health: perceptions and practices. *American Journal of Public Health*, 80, 1450–1454.
- Lemle, R. & Mishkind, M. E. (1989) Alcohol and masculinity. *Journal of Substance Abuse Treatment*, 6, 213–222.
- Lewis, C. E., Bucholz, K. K., Spitznagel, E. & Shayka, J. J. (1996) Effects of gender and comorbidity on problem drinking in a community sample. *Alcoholism: Clinical and Experimental Research*, 20, 466–476.
- Lex, B. W. (1991) Some gender differences in alcohol and poly-substance users. *Health Psychology*, 10, 121–132.
- Lieber, C. S. (1997) Gender differences in alcohol metabolism and susceptibility. In: Wilsnack, R. W. & Wilsnack, S. C., eds. *Gender and Alcohol: Individual and Social Perspectives*, pp. 77–89. New Brunswick, NJ: Rutgers Center of Alcohol Studies.
- Mann, K., Batra, A., Gunthner, A. & Schroth, G. (1992) Do women develop brain damage more readily than men? *Alcoholism: Clinical and Experimental Research*, 16, 1052–1056.
- McGue, M., Iacono, W. G., Legrand, L. N., Malone, S. & Elkins, I. (2001) Origins and consequences of age at first drink. I. Associations with substance-use disorders, disinhibitory behavior, and psychopathology, and P3 amplitude. *Alcoholism: Clinical and Experimental Research*, 25, 1156–1165.
- Midanik, L. T. (1999) Drunkenness, feeling the effects, and 5+ measures. *Addiction*, 94, 887–897.
- Miller, R. B. & Glass, J. (1989) Parent-child attitude similarity across the life course. *Journal of Marriage and the Family*, 51, 991–997.
- Moen, P. (1992) *Women's Two Roles: a Contemporary Dilemma*. New York: Auburn House.
- Moen, P., Erickson, M. A. & Dempster-McClain, D. (1997) Their mother's daughters? The intergenerational transmission of gender attitudes in a world of changing roles. *Journal of Marriage and the Family*, 59, 281–293.
- Morgan, W. H. (1981) *Drugs in America: A Social History, 1800–1980*. Syracuse: Syracuse University Press.
- Moskowitz, J. M. (1989) The primary prevention of alcohol problems: A critical review of the research literature. *Journal of Studies on Alcohol*, 50, 54–88.

- Musto, D. F. (1997) Historical perspectives. In: Lowinson, J. H., Ruiz, P., Millman, R. B. & Langrod, J. G., eds. *Substance Abuse: a Comprehensive Textbook*, 3rd edn, pp. 1–10. Baltimore, MD: Williams & Wilkins.
- National Institute of Alcohol Abuse and Alcoholism (NIAAA) (2000) *Tenth Special Report to the U.S. Congress on Alcohol and Health: Highlights from Current Research*. DHHS Publication no. 00–1583. Washington, DC: US Government Printing Office.
- National Institute of Alcohol Abuse and Alcoholism (NIAAA) (1997) *U.S. Apparent Consumption of Alcoholic Beverages. U.S. Alcohol Epidemiologic Data Reference Manual, Vol. 1*, 3rd edn. Washington, DC: US Government Printing Office.
- Nelson, C. B., Heath, A. C. & Kessler, R. C. (1998) Temporal progression of alcohol dependence symptoms in the U.S. household population: results from the National Comorbidity Survey. *Journal of Consulting and Clinical Psychology*, 66, 474–483.
- Orford, J. & Keddle, A. (1985) Gender differences in the functions and effects of excessive drinking. *British Journal of Clinical Psychology*, 24, 265–279.
- Ornstein, S. I. & Hanssens, D. M. (1985) Alcohol control laws and the consumption of distilled spirits and beer. *Journal of Consumer Research*, 12, 200–213.
- Parker, D. A., Parker, E. S., Wolz, M. W. & Harford, T. C. (1980) Sex roles and alcohol consumption: a research note. *Journal of Health and Social Behavior*, 21, 43–48.
- Randall, C. L., Roberts, J. S., Del Boca, F. K., Carroll, K. M., Connors, G. J. & Mattson, M. E. (1999) Telescoping of landmark events associated with drinking: a gender comparison. *Journal of Studies on Alcohol*, 60, 252–260.
- Reich, T., Cloninger, R., Van Eerdewegh, P., Rice, J. P. & Mullaney, J. (1988) Secular trends in the familial transmission of alcoholism. *Alcoholism: Clinical and Experimental Research*, 12, 458–464.
- Report of the Panel on Alternative Policies Affecting the Prevention of Alcohol Abuse and Alcoholism (1981) Regulating the supply of alcoholic beverages. In: Moore, M. H. & Gerstein, D. R., eds. *Alcohol and Public Policy: Beyond the Shadow of Prohibition*, pp. 255–285. Washington, DC: National Academy Press.
- Robins, L. N., Wing, J., Wittchen, H. U., Helzer, J. E., Babor, T. F., Burke, J., Farmer, A., Jablenski, A., Pickens, R., Regier, D. A., Sartorius, N. & Towle, L. H. (1988) The Composite International Diagnostic Interview: an epidemiologic instrument suitable for use in conjunction with different diagnostic systems and different cultures. *Archives of General Psychiatry*, 45, 1068–1077.
- Ross, H. E. (1989) Alcohol and drug use in treated alcoholics: a comparison of men and women. *Alcoholism: Clinical and Experimental Research*, 13, 810–816.
- Rounsaville, B. J., Dolinsky, Z. S., Babor, T. F. & Meyer, R. E. (1987) Psychopathology as a predictor of treatment outcome in alcoholics. *Archives of General Psychiatry*, 44, 503–513.
- Sales, J., Duffy, J., Plant, M. & Peck, D. (1989) Alcohol consumption, cigarette sales and mortality in the United Kingdom: an analysis of the period 1970–85. *Drug and Alcohol Dependence*, 24, 155–160.
- Schmidt, C., Klee, L. & Ames, G. (1990) Review and analysis of literature on indicators of women's drinking problems. *British Journal of Addiction*, 85, 179–192.
- Shore, E. R. (1992) Drinking patterns and problems among women in paid employment. *Alcohol Health and Research World*, 16, 160–164.
- Spitzer, R. L., Endicott, J. & Robins, E. (1975) *Research Diagnostic Criteria*. New York: Biometrics Research Division, New York State Psychiatric Institute.
- Spitzer, R. L., Williams, J. B., Gibbon, M. & First, M. B. (1987) *Structured Clinical Interview for DSM-III-R (SCID, Nonpatient Version)*. New York: Biometrics Research Division, New York State Psychiatric Institute.
- Stabenau, J. R. (1984) Implications of family history of alcoholism, antisocial personality, and sex differences in alcohol dependence. *American Journal of Psychiatry*, 141, 1178–1182.
- Substance Abuse and Mental Health Services Administration (SAMHSA) (1993) *National Drug and Alcoholism Treatment Unit Survey (NDATUS): 1991 Main Findings Report*. DHHS Publication no. SMA. 93–2007. Washington, DC: US Government Printing Office.
- Substance Abuse and Mental Health Services Administration (SAMHSA) (1995) *National Household Survey on Drug Abuse: Main Findings 1995*. DHHS Publication no. SMA. 97–3127. Washington, DC: US Government Printing Office.
- Substance Abuse and Mental Health Services Administration (SAMHSA) (1997) *Substance Use Among Women in the United States*. DHHS Publication no. SMA. 97–3162. Washington, DC: US Government Printing Office.
- Turner, W., Cutter, H., Worobec, T., O'Farrell, T., Bayog, R. & Tsuag, M. (1993) Family history models of alcoholism: age of onset, consequences, and dependence. *Journal of Studies on Alcohol*, 54, 164–171.
- Wechsler, H. & Sands, E. S. (1980) Minimum-age laws and youthful drinking: An introduction. In: Wechsler, H., ed. *Minimum-Drinking-Age Laws: an Evaluation*, pp. 1–10. Lexington, MA: Lexington Books.
- Wilkinson, P. (1980) Sex differences in morbidity of alcoholics. In: Kalant, O. J., ed. *Research Advances in Alcohol and Drug Problems in Women*, pp. 331–364. New York: Plenum Publishing Corporation.
- Wilsnack, S. C. & Wilsnack, R. W. (1991) Epidemiology of women's drinking. *Journal of Substance Abuse*, 3, 133–157.
- Wilsnack, S. C. & Wilsnack, R. W. (1993) Epidemiological research in women's drinking: recent progress and directions for the 1990s. In: Lisansky Gombert, E. S. & Nirenberg, T. D., eds. *Women and Substance Abuse*, pp. 62–99. Norwood, NJ: Ablex Publishing Co.