

# Changes with Aging of the Association of Religiosity and Current Alcohol Use in Americans to age 90 in a National Survey

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## Abstract

There has been little investigation into whether aging modifies the often reported association between alcohol abstinence and attendance at religious services. Cross-sectional analysis was performed of survey data (N=18,782) on self-reported frequency of attendance at religious services, and alcohol consumption controlling for other variables. In logistic regression analyses with no alcohol use in the previous month as dependent variable, significant interactions of weekly attendance with age and gender were seen ( $p < 0.001$ ), the positive association of weekly attendance and abstinence being stronger in men than women and in persons under 60 than over 60 years of age.

## INTRODUCTION

Abstinence from alcohol and frequent attendance at religious services are both more prevalent in the U.S. than in other industrialized nations (Rehm J et al. 2004; Caetano and Clark 1998; Christiano, Swatos and Kivisto 2002; Gallup and Lindsay 1999; Kosmin and Lachman 1993). Although the relationships with health are complex, both behaviors may affect public health and safety and quality of life (Rimm and Tempel 2004; Koenig, McCullough, and Larson 2001; Strawbridge et al. 2001; Hummer et al. 1998). Religiousness has been positively associated with alcohol abstinence in the literature (Koenig et al 1994; Alexander and Duff 1992). National survey data in 1984 confirmed the lowest proportion of drinkers among Conservative Protestants compared to other Christians and Jews (Clark and Hilton 1991; Hilton 1986; Nusbaumer 1981). A more recent national interview study in elderly persons found affiliation with fundamentalist churches to be associated with more frequent abstinence from alcohol use (Krause N 2003). In another study, affiliation was a more important factor than attendance frequency in European Americans, while the reverse was true in African Americans (Ford and Kadushin 2002). Among drinkers, intrinsic religiosity was inversely associated with amount and frequency of use (Patock-Pecham et al. 1998).

Relatively few studies have addressed effect modification by

age and gender among adults and conflicting results have been reported. For example, frequent church attendance and private prayer were not associated with abstinence in one study of elders with a religious affiliation (Krause 2003), suggesting a lesser association among older than younger persons. A Virginia twin study concluded that genetic factors explained most of the negative association of religious attendance and alcohol use in men, while shared environmental factors explained most in women suggesting an interaction with gender (Maes et al. 1999). Thus the few of studies of adults have not consistently reported effect modification by age and gender of the positive associations of religiousness and alcohol abstinence (Koenig, McCullough, and Larson 2001; Cisin and Calahan 1968; Cahalan and Room 1972; Koenig, George, Meador, Blazer, and Ford 1994).

What mechanisms might lead one to expect variation in the association of abstinence with religiousness by age and gender? A number of contemporary religious groups in the US proscribe intake of alcoholic and certain other beverages that may influence health. Alcoholic beverages are strongly discouraged among many evangelical and fundamentalist Protestant denominations with grape juice being substituted for wine in ritual use. Such condemnations and prohibitions have historically may have been more stringently applied to women than men and to subadults than adults (Christiano,

Swatos and Kivisto 2002; Grivetti and Wilson 2004). Non-religious social support may more accessible to women than men to help frequent attenders maintain abstinence and cope with stress without chemicals (Gottlieb and Green 1984). Thus, religious support might be more important for retired men than older women (Spilka, Hood, Hunsberger B and Gorsuch 2003; Hackney and Sanders 2003). A strong negative association of religiousness and alcohol use in adolescents has been reported (Nonnemaker, McNeely, and Blum 2003; Koenig, McCollough and Larson 2001). Thus a stronger effect of religion on abstinence might be expected in the first decade of adulthood than in older persons. Religious institutions often host, support and make referrals to treatment groups for alcoholics such as Alcoholic Anonymous. Such programs often have a spiritual component. If men and older persons were more like to utilize such religion-related programs than women or younger persons, this might contribute to effect modification by age and gender (Wattis and Seymour 2001).

Why is further study needed? Contrary to secularization theories proposed in the 19th and 20th centuries, religious affiliation, attendance at religious services and other religious behaviors remain highly prevalent in the U.S., more so than in other industrialized nations (Christiano, Swatos and Kivisto 2002). Religion is especially important in the lives of American elders, especially women (Atchley 2005). Until recent decades, women and the elderly were often absent or underrepresented in epidemiologic studies, despite contributing a large share of the chronic disease burden in the U.S. Given the high prevalence and potential health effects of religious attendance and alcohol abstinence in women and the elderly, variation in the association of religiousness and alcohol use by age and gender is deserving of further study.

Data from a large, national sample that was population-based, the Third National Health and Nutrition Examination Survey (NHANES III), were used to test the following hypothesis: The positive associations of weekly attendance at religious services with an increased prevalence of alcohol abstinence and with low frequency of drinking among drinkers are modified by age and gender.

## **METHODS**

**Study sample.** The Third National Health and Nutrition Examination Survey (NHANES III) was conducted in 1988-1994 on a nationwide multi stage probability sample of individuals aged 2 months and over drawn from the civilian,

non-institutionalized population of the United States. Details of the design, sampling, operation and response have been published, as have questionnaires, procedures used to obtain informed consent and to maintain confidentiality of information obtained (National Center for Health Statistics 1994). Among 33,994 interviewed persons (85.6% of 39,695 sample persons), 20,050 were age 17 y and over. Of these, 775 persons reporting ethnicity other than non-Hispanic European American (EA), non-Hispanic African American (AA) or Mexican American (MA) were excluded. Complete data on frequency of attendance at religious services, and alcohol intake (beer, wine, and liquor) were available for 18,985 individuals. Complete data for these variables as well as potential confounders (education, region, metropolitan residence, marital status, smoking, and potential mediator non-religious social support index) were available for 18,782 persons, who formed the sample used for the present analysis.

**Religious attendance.** Household interviewers asked for the preceding year, "How often do you attend church or religious services?" Reported as times per week, month or year, all values were converted to times per year and ranged from 0 to 1,825. Values in excess of 365 (n=7) were coded missing, as were four "don't know" responses. Consistent with previous reports, the categories  $\geq$  weekly ( $\geq 52$ /year), and  $<$  weekly were formed for analysis.

**Alcohol use.** As part of a food frequency questionnaire, interviewers instructed, "Now I'm going to ask you how often you usually eat certain foods. When answering think about your usual diet over the past month. Tell me how often you usually ate or drank these foods per day, per week, per month or not at all." Beverages asked included "beer and lite beer," "wine, wine coolers, sangria, and champagne," "hard liquor such as tequila, gin, vodka, scotch, rum, whiskey, and liqueurs, either alone or mixed." The food frequency questionnaire did not obtain data on quantity consumed per drinking episode or per day. The NHANES questionnaire items ask for episodes of drinking, not number of drinks, in the past month. Hence a quantitative measure of drinks/month is lacking except for abstainers, since any number of drinks might be consumed in an episode. Therefore the main outcome of interest was alcohol abstinence in the past month (0 drinks of beer, wine, or hard liquor in past month), although uncategorized number of drinking episodes per month was used in an analysis of frequency of drinking among drinkers.

Potential confounding variables. Demographic data, years of education completed, self-assessed health status, and behavioral information including smoking were collected by household interview. A likely inverse correlate of both social drinking and religious attendance, mobility limitation was categorized based on participants' response to two questions asking difficulty experienced walking 2 or 3 blocks and walking up 10 steps without resting. Persons reporting no difficulty were considered not to have limited mobility, while others were considered to have limited mobility. This mobility limitation variable was available only the subset which excludes 6,020 persons under 60 years of age in Phase I of the study, 1988-1991, for whom physical functioning was not measured. A non-religious social support score was created as a linear combination of responses to five questions on frequency of telephone and in person contacts with family, friends, and neighbors and social club attendance. Marital status was also controlled for. Associated with attendance and alcohol intake in previous studies (Guallar-Castillon 2001), overall subjective health was self-rated as excellent, good, fair or poor.

Statistical analysis. Detailed descriptive statistics and measures of association were computed using the Statistical Analysis System (SAS), and variance estimation and testing were performed using the PROC LOGISTIC or PROC REGRESS procedure for regression models in the SUDAAN system (Research Triangle Institute 2004; National Center for Health Statistics 1996; Research Triangle Institute 2004; Kahn and Sempas 1989). Multivariate logistic regression analysis was used to develop models that controlled for factors that might confound the association of drinking status with frequency of attendance at religious services. Multivariate linear regression was used for models estimating drinking episodes per month as a continuous variable among drinkers. To test the hypothesis of effect modification, interaction terms were included for age, gender and ethnicity with attendance. Because these were significant, stratified analyses were conducted as indicated in results below. All models controlled for age in years. All variables used to control for confounding are indicated in Table 1. A mobility limitation variable was also controlled for in the subset of respondents with mobility data (excludes 6,020 persons under 60 years of age in Phase I of the study, 1988-1991, for whom physical functioning was not measured). Odds ratios (OR) are reported with 95% confidence intervals (CI) and two-tailed p values.

## RESULTS

Table 1 shows the prevalence of selected characteristics among alcohol non-users and others. In unadjusted comparisons, non-users were more likely to be frequent attenders of services, older, African American, Southerners, non-metropolitan, less educated, non-smokers, less healthy, and limited in mobility compared to non-abstainers.

**Figure 1**

Table 1: Prevalence of selected population characteristics by alcohol use category: NHANES III.(weighted)

Variable		Alcohol Drinking	
		Any	None
Attendance			
	>= weekly	26	43
Age, yr		100	100
	17-29	29	22
	30-59	56	47
	>=60	15	31
Female		44	62
Ethnicity		100	100
	EA	84	80
	AA	11	14
	MA	5	6
South		30	40
Metro		53	41
Education <12y		18	35
Not married		43	42
Low social support		55	44
Poor/fair health		10	21
Current smoker		34	22
Limited mobility*		6	17
N		8671	10105
*subset with functional data			

Logistic regression analyses were performed with >=weekly attendance (yes/no) as the independent variable and alcohol use in the past month (yes/no) as the outcome variable. Significant interactions of attendance with both age and gender were seen ( $p<0.001$ ), the association being stronger in men than women and in persons under 60 than over 60 years. Therefore age-, gender-specific results are shown in

Table 2. After controlling for multiple socio-demographic variables (Model 1), effect modification by age was clearly seen among men with the largest odds ratio (OR) at age 17-49 years and the smallest at 60+ years (Table 2). Effect modification by gender was likewise apparent below age 60, with OR much larger in men than women. Model 2 controlled in addition for smoking, self-reported health status and non-religious social support with little additional effect on OR estimates. Results were essentially unchanged (not shown) when a mobility limitation variable was added to the model in the subset of respondents with mobility data.

**Figure 2**

Table 2: Adjusted odds ratios (95% CI) for the outcome alcohol abstinence in the past month (yes/no) by exposure  $\geq$  weekly religious attendance with by age and gender in NHANES III (weighted).

		Adjusted OR	95% CI
Model 1			
Men			
17-29 y		3.3	2.4-4.5**
30-59 y		2.4	1.9-3.2**
60+ y		1.4	1.2-1.7**
Women			
17-29 y		1.6	1.2-2.1**
30-59 y		1.7	1.4-2.2**
60+ y		1.3	1.0-1.7
Model 2			
Men			
17-29 y		2.9	2.1-4.0**
30-59 y		2.3	1.8-3.1**
60+ y		1.5	1.2-1.8**
Women			
17-29 y		1.4	1.1-2.0+
30-59 y		1.7	1.3-2.2+
60+ y		1.4	1.0-1.9+

OR, odds ratio; CI, confidence interval:  
 \*Model 1 adjusted for age within strata (y), gender, ethnicity, education < 12 years (yes/no), marital status (married/single), region (South vs other), metropolitan residence (yes/no).  
 Model 2 adjusted for the above and smoking status (smoker/nonsmoker), poor self-reported health (yes/no) and social support index  
 \*\* p<0.01 Weighted \*p<0.05

Among alcohol users, linear regression was used to assess effect modification of the association of religious attendance frequency with alcohol drinking frequency. Significant interactions of weekly attendance (yes/no) with age ( $p=0.01$ ) but not gender ( $p=0.10$ ) were seen. Within each age group, the frequency of attendance was significantly inversely related to number of drinking episodes per month except in the 60+ age groups, both after controlling for socio-demographic variables and after adjusting for all confounding variables (Table 3).

**Figure 3**

Table 3: Linear regression coefficients for  $\geq$  weekly attendance at religious services (yes=0, no=1) with frequency of alcohol consumption (times/month) as dependent variable by age among alcohol users: NHANES III.(weighted)

		Beta	se	p
Model 1				
17-29 y		-0.08	0.04	0.034
30-59 y		-0.07	0.02	0.001
60+ y		-0.01	0.02	0.725
Model 2				
17-29 y		-0.07	0.04	0.053
30-59 y		-0.06	0.02	0.004
60+ y		-0.00	0.02	0.957

Model 1 variables:  $\geq$  weekly attendance, age within strata (y), <12 y education, Mexican American, African American, married, South region, metro residence. Model 2: above plus smoking, health status, and non-religious social support.

## DISCUSSION

This report describes one of the largest studies of effect modification of the association of religiousness and current alcohol use. NHANES III data show that among persons aged 17-90+, the positive association of self-reported weekly religious attendance and alcohol non-use as weaker in women than men and above than below age 60. Controlling for multiple socio-demographic variables, smoking, health status, and non-religious social support had little effect on the association or effect modification. Among alcohol users, the effect of attendance on frequency of drinking alcohol was modified by age but not gender.

Limitations and strengths. A cross-sectional study such as this cannot establish the temporal sequence of attendance and alcohol use, rendering causal inference impossible. Several other unavoidable limitations of the present study include possible bias arising from survey non-response and from missing values for some variables. Several special studies of NHANES III data have indicated little bias due to non-response (Mohadjer, Bell and Waksberg 1996). However, there is the possibility of selection – if persons who attend services frequently are also those who are less likely to drink in any case, a spurious association would be seen. Unfortunately, the NHANES data cannot exclude this.

At least 12 dimensions of religiousness have been defined (Hill and Pargament 2003; Idler et al 2003; Koenig, McCullough and Larson 2001, Yamane and Polzer 2001). Attendance at religious services is an indicator of organizational religiousness. Since data on multiple dimensions were unavailable in NHANES III, frequency of attendance was used because it is correlated with other dimensions of public and private religiousness and provided data that are directly comparable with a body of research data on this variable spanning many decades. Over-reporting of religious attendance is likely; however the NHANES III variable should serve well to separate frequent from infrequent attenders, the latter including never attenders. No data on the related construct of spirituality were available in NHANES. Different results may have been obtained with measures of private religiousness or spirituality.

Limitations of attempting to characterize usual beverage intake using a food frequency questionnaire have been described elsewhere (Willet 1998). Alcohol non-use in the reference period, the preceding month in NHANES III, is likely over-estimated by self-report data (Rimm, 2004; Room, 1991). Further, the past month might not be typical of the past year or recent years. Based on food frequency questions, neither former drinkers nor life-long abstainers could be distinguished from short-term abstainers; nor could binge or problem drinkers be identified. Further, over-reporting might be greater for members of denominations that proscribe alcohol and require more frequent attendance, biasing results away from the null. Confounding by variables not controlled for cannot be excluded. For example, no data were available on risk adverse personality type, which is more prevalent in women and the elderly and has been hypothesized to cause both frequent attendance and abstinence (Fontana 2003).

In conclusion, the strong positive association between frequent attendance at religious services and current alcohol non-use in the 1988-1994 NHANES III survey varied by age and gender, being strongest among young men.

## CORRESPONDENCE TO

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