Published in final edited form as:

Am J Med. 2008 March ; 121(3): 201–206.

Adopting Moderate Alcohol Consumption in Middle-age: Subsequent Cardiovascular Events

Dana E. King, MD MS, Arch G. Mainous III, PhD, and Mark E. Geesey, MS

Department of Family Medicine, Medical University of South Carolina, Charleston, SC, USA

Abstract

Purpose—Moderate alcohol use is part of a healthy lifestyle, yet current guidelines caution non-drinkers against starting to drink alcohol in middle-age. The purpose of this study was to evaluate whether adopting moderate alcohol consumption in middle-age would result in subsequent lower cardiovascular risk.

Methods—This study examined a cohort of adults age 45-64 participating in the Atherosclerosis Risk in Communities (ARIC) study over a 10 year period. The primary outcome was fatal or non-fatal cardiovascular events.

Results—Of 7,697 participants who had no history of cardiovascular disease and were non-drinkers at baseline, within a 6 year follow-up period 6.0% began moderate alcohol consumption (2 drinks per day or fewer for men, 1 drink per day or fewer for women) and 0.4% began heavier drinking. After 4 years of follow up, new moderate drinkers had a 38% lower chance of developing cardiovascular disease than did their persistently non-drinking counterparts. This difference persisted after adjustment for demographic and cardiovascular risk factors (OR 0.62, 95% confidence interval [CI] 0.40-0.95). There was no difference in all-cause mortality between the new drinkers and persistent non-drinkers (OR 0.71, CI 0.31-1.64).

Conclusion—People who newly begin consuming alcohol in middle-age rarely do so beyond recommended amounts. Those who begin drinking moderately experience a relatively prompt benefit of lower rates of cardiovascular disease morbidity with no change in mortality rates after 4 years.

Introduction

Several epidemiologic studies have concluded that moderate alcohol intake is associated with reduced cardiovascular risk¹⁻⁵ and have demonstrated lower mortality in drinkers with moderate intake.⁶⁻⁸ Whether such findings should be used to modify health care recommendations regarding initiation of alcohol use in middle age remains controversial.^{1,9} Current American guidelines (American Heart Association, [AHA]) state that moderate alcohol consumption is beneficial for cardiovascular health, but the AHA clearly states that non-drinkers should not begin drinking alcohol in middle age due to possible counter-balancing ill consequences of alcohol consumption. “Given these and other risks, the American Heart Association cautions people NOT to start drinking ... if they do not already drink alcohol.”¹⁰ For example, alcohol intake has been associated with an increased risk of hypertension, motor vehicle crashes, certain types of cancer, liver disease, and other problems.¹¹

Send correspondence to: Dana E. King MD MS, Department of Family Medicine, Medical University of South Carolina, 295 Calhoun Street, Charleston, SC, 29425, Email: kingde@musc.edu, Telephone: 843-792-8112, Fax: 843-792-3598.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Recommendations about initiating moderate alcohol consumption in middle age should be made cautiously on a case-by-case basis in consultation with a personal physician, but the strength of such recommendations may be altered if more research supports the idea that initiating moderate alcohol consumption is beneficial.

However, evidence is accumulating to support the cardiovascular benefits of initiating moderate alcohol intake in middle aged non-drinkers. Beulens et al¹² recently found that moderate alcohol consumption is inversely associated with cardiovascular disease events among men with pre-existing hypertension, without a rise in total or cardiovascular mortality. Further, Friesema and colleagues¹³ have demonstrated that the improved cardiovascular outcomes found in moderate drinkers are not explained by baseline differences in health status. In a study of non-drinkers initiating moderate alcohol consumption, research using the Physicians Health Study of middle age men demonstrated a 29% reduction in cardiovascular disease risk among men consuming <1 drink/week at baseline who increased their alcohol consumption to 1-6 drinks/week ($p=0.05$).⁴ The authors concluded that a moderate increase in alcohol consumption may lower cardiovascular risk. In recent research in a cohort of over 8,000 men, moderate drinking was associated with 62% lower risk compared to non-drinkers, and was maintained even among men already at low risk on the basis of other healthy lifestyle factors.¹⁴ Replication of these findings in a more diverse population of both sexes would have important implications for healthy lifestyle recommendations.

To further examine the impact of initiating moderate drinking in middle age on subsequent cardiovascular disease, we analyzed participants in the Atherosclerosis Risk in Communities (ARIC) study, a prospective epidemiologic study of men and women ages 45 to 64 years at enrollment in four communities across the United States.

Methods

Study Population

The Atherosclerosis Risk in Communities Study (ARIC) is a prospective epidemiologic study of 15,792 men and women ages 45 to 64 years at enrollment in four communities across the United States that was designed to investigate the origin and progression of various atherosclerotic diseases.¹⁵

The first set of interviews and examinations (Visit 1) during which baseline information was collected were conducted from years 1987 to 1989. The full interview and exam methodology can be found on the ARIC web site.¹⁶ The public use data set also contains data from annual telephone interviews and three visits (Visits 2-4) which follow the cohort through the end of 1998. Follow up visits every 3 years include an interval medical history, weight, height, diet questionnaire, updated smoking history, and current participation in sports and leisure exercise. Our analysis focused on alcohol use changes during the baseline 6-year observation period assessed at Visit 3 among individuals without cardiovascular disease, and then on subsequent cardiovascular disease during the 4 year follow up period starting at Visit 3.

Alcohol Use

Daily alcohol consumption was determined from a series of questions asking whether an individual consumed alcoholic beverages, and, if so, how many drinks per week of beer, wine, or spirits. According to the American Heart Association¹⁷ and the American Diabetes Association¹⁸ moderate alcohol consumption is defined no more than 1 drink per day for women and 2 drinks per day for men. Thus, we used 1-14 drinks per week for men and 1-7 drinks per week for women as “moderate” drinking for this study. We also evaluated type of

alcohol, due to recent research indicating that alcohol type is a factor in development of cardiovascular disease^{1,19}

Covariates

For assessment of physical activity, the ARIC data set includes information about the top four sports and leisure-time activities in which an individual participates. We summed the average minutes per week for these four activities. To this sum we added the average number of minutes per week of walking or riding a bicycle to and from work or shopping. Individuals with a total of 150 minutes per week or more were classified as getting sufficient exercise. This standard is based on the longstanding recommendation of several groups including the President's Fitness Council and the American College of Sports Medicine.^{20,21}

Body Mass Index (BMI) was available in the ARIC dataset and calculated from measurements taken during the ARIC exam. While a BMI of 18.5-24.9 kg/m² is considered optimal, too few individuals with BMIs <18.5 precluded our ability to separate them for analysis, thus they are included with all individuals with BMI <25 kg/m². We were able to separately categorize overweight (BMI 25-30 kg/m²) and obese (BMI >30 kg/m²) individuals.

Current smokers were identified by questionnaire during each visit. At each visit individuals were asked whether they took aspirin during the previous two weeks and, if so, for what purpose. Those who mentioned that they had taken aspirin for the purpose of avoiding a heart attack or stroke were considered regular aspirin users.

Demographic Variables

These variables include age, race, gender, and education, all from self-report at Visit 1. Race was defined as Black and non-Black according to the categorization used by the ARIC investigators. Education was categorized as less than high school versus more education (high school or trade school graduate, or at least some college education).

History of Disease Variables

Risk factor and cardiovascular disease history was determined for both Visits 1 and 3, as indicated below.

Disease History—Individuals who have a history of hypertension, diabetes, or hypercholesterolemia were identified. Individuals were considered to have a history of hypertension if their measured systolic blood pressure (SBP) was >139 mm Hg, diastolic blood pressure (DBP) was >89 mm Hg, they reported having been told by a doctor that they had hypertension, or they were taking hypertension medication. Blood pressure was determined in the sitting position after five minutes rest, and was taken three times over the next 10-15 minutes. The average of the second and third measures was used in the study. Mean blood pressure was calculated using the following formula²²:

$$\text{Mean BP} = \text{DBP} + 1/3 * (\text{SBP} - \text{DBP})$$

A history of diabetes came from participant self-report, having a fasting plasma glucose ≥ 126 mg/dl, or if they reported taking medicine for diabetes. Individuals were considered to have a history of high cholesterol if they reported a history of high cholesterol, were taking medicine for high cholesterol, or if their measured total cholesterol exceeded 200 mg/dl or LDL cholesterol exceeded 160 mg/dl.

Cardiovascular Disease—A single variable in the ARIC dataset (PRVCHD05) identified individuals who, prior to Visit 1, had a history of myocardial infarction (MI), have had heart

or arterial surgery (coronary bypass, balloon angioplasty, angioplasty of coronary artery), or were adjudicated to have an MI from the Visit 1 ECG data. A series of questions regarding a history of stroke, heart attack or revascularization were used in annual telephone interviews and in face-to-face interviews for 4 years after Visit 3 to determine the presence of subsequent cardiovascular disease events that occurred after Visit 3. People with a history of cardiovascular disease at Visit 1 or 3 were excluded from analyses.

Outcome Determination

Variables in the ARIC dataset described a participant's status at the end of the year 1998. Patients known to have died, as determined from state death certificates, are identified in the ARIC dataset along with their primary underlying cause of death. For the primary analysis, we identified participants who developed fatal or non-fatal cardiovascular disease from those whose underlying cause of death was coded as cardiovascular disease, or who had an MI, a silent MI, diagnosed coronary heart disease, a coronary heart disease procedure, or a definite or probable stroke since Visit 3 (1994). We compared new moderate drinkers of alcohol to persistent non-drinkers during the 4-year follow up period.

Statistical Analyses

The demographics of the ARIC population with regards to their alcohol consumption were examined using chi square statistics at the baseline of the 6-year observation period. Mean blood pressure and change in cholesterol were also examined, comparing new drinkers to persistent non-drinkers during the 6-year observation period.

The primary outcome of interest during was experiencing a cardiovascular event (fatal or non-fatal) during the 4 years subsequent to Visit 3. In unadjusted analyses and adjusted analyses using the control variables described above, we ran logistic regression models to examine the effect of initiation of alcohol consumption between Visit 1 and Visit 3, using persistent non-drinkers as the reference group. Demographic, lifestyle factors, and disease histories at the time of Visit 3 were used as control variables. Results also were stratified to evaluate wine vs. non-wine new drinkers.

Results

Alcohol consumption varied among study participants at baseline of the 6-year observation period according to demographic characteristics (Table 1). Women, Blacks, individuals with less than a high school education, obese individuals, non-smokers, people who exercise <2.5 hours/week, and those with a history of hypertension, diabetes, or hypercholesterolemia were among those people who were more likely to be non-drinkers of alcohol.

Of the individuals who did not consume alcohol at the time of Visit 1, 7359 were interviewed at Visit 3 and responded to the questions regarding alcohol consumption. These individuals were the focus of subsequent analyses during the 4-year follow up period. Of these people, 93.6% were still not drinking alcohol, 6.0% reported drinking in moderation, and 0.4% reported heavy alcohol use. Greater percentages of males, whites, smokers, and regular exercisers began moderate alcohol consumption (Table 2).

Among the 6075 study participants for whom an outcome could be determined at follow up at 4 years past Visit 3, a significantly lower percentage of new moderate drinkers (6.9%) suffered a cardiovascular event, compared to non-drinkers (10.7%) (χ^2 p=0.008).

Comparing new drinkers and non-drinkers at Visit 3, there were no significant differences (p<0.05) for mean levels of total cholesterol (205.4 vs. 208.1 mg/dl). LDL cholesterol was significantly lower among new drinkers (123.5 vs. 127.8 mg/dl), and HDL cholesterol was

significantly higher among new drinkers than non-drinkers (54.7 vs. 51.7 mg/dl, $p<0.05$). At Visit 3 mean blood pressure among new drinkers was significantly lower than among non-drinkers (90.2 vs. 91.9 mmHg, $p<0.05$).

New moderate drinkers were 38% less likely than non-drinkers to have a cardiovascular event during the 4-year follow-up period after Visit 3 (O.R. 0.62, 95% C.I. 0.41-0.94). After adjustment for demographic and cardiovascular risk factors, the association between adoption of moderate alcohol consumption and subsequent cardiovascular event remained significant (OR 0.62, 95% CI 0.40-0.95) (Table 3). In both unadjusted and adjusted analyses, heavy alcohol drinkers were not significantly more or less likely than non-drinkers of suffering a cardiovascular event during the follow-up period. There were no significant differences between new drinkers and non-drinkers in all-cause mortality at follow up 4 years after Visit 3 (OR 0.71, CI 0.31-1.64).

We identified a subset of new drinkers who consumed only wine in moderate amounts ($n=133$). We compared non-drinkers to the group of moderate wine-only drinkers, to those who drank other types of alcohol in moderation ($n=234$), and to those who drank heavily regardless of alcohol type ($n=21$). After adjustment for demographic and cardiovascular risk factors wine-only drinkers were significantly less likely to have had a subsequent cardiovascular event than non-drinkers (OR 0.32, 95% CI 0.12-0.87). Consumers of moderate amounts of beer/liquor/mixed (which includes some wine) tended to also be less likely to have had a subsequent cardiovascular event than non-drinkers (OR 0.79, 95% CI 0.49-1.26), but the difference was not significant.

Discussion

In this study, we found that a midlife switch from no alcohol to moderate alcohol consumption resulted in a substantial reduction in cardiovascular events after 4 years. This benefit was independent of age, race, gender, BMI, and cardiovascular risk conditions (hypertension, hypercholesterolemia, diabetes). The study adds supporting evidence to the medical literature regarding the cardiovascular benefits of moderate alcohol consumption and adds new evidence in a diverse population sample regarding whether initiating alcohol consumption in middle age is beneficial. Some additional key findings from the study are that starting moderate alcohol consumption had modest improvement in HDL cholesterol levels. Further, new drinking in middle age had no effect on total mortality after 4 years of follow up.

The current study's findings are consistent with recent research indicating a benefit from moderate drinking on cardiovascular outcomes.²³⁻²⁶ The current study also adds evidence that moderate drinking of alcohol has a modest beneficial effect on the lipid profile.²⁷ Fortunately, the cardiovascular advantages observed in the current study came without an added detriment of increased mortality or increased hypertension. In addition, individuals who initiated alcohol use in the current study had higher HDL cholesterol at follow up, consistent with previous studies.²⁸ This study's finding that new wine drinkers experienced a significant reduction in cardiovascular events after four years, while new drinkers of other alcoholic beverages did not, is consistent with recent studies showing a slight advantage to wine drinkers.^{1,2,11,29} These data support the idea that initiating alcohol use in middle age may have an overall positive impact on cardiovascular health during middle age.

The implications of the current findings must be somewhat tempered due to some limitations. First, the study is limited by a relatively brief follow up period for observation of events, especially cancer. Recent research has documented an association between alcohol consumption and certain types of cancer.³⁰⁻³³ While the time period of the study was sufficient for a cardiovascular event benefit to become evident in new drinkers, it would likely take a

longer period of time to observe detrimental effects of new drinking on cancer rates. In the current study, the reduction in cardiovascular events was not reflected in reduction of overall mortality, which may also be a consequence of a fairly short follow up period. In addition, initiating alcohol consumption is not currently recommended to anyone with a personal history of problem drinking, cirrhosis, liver disease, depression, gastric or duodenal ulcers, and many other conditions that could be exacerbated by drinking alcohol (American Geriatrics Society Guidelines).³⁴ Further, many medications have interactions with alcohol, including aspirin, which could cause gastrointestinal bleeding or other adverse effects. Also, the possibility of measurement error, especially for self-report of alcohol intake, is possible, and no calibration study is available to correct for this possibility.^{35,36}

Conclusions

A substantial cardiovascular benefit from adopting moderate alcohol drinking in middle age appears supported by the current study. Any such benefit must be weighed with caution against the known ill consequences of alcohol consumption. While caution is clearly warranted, the current study demonstrated that new moderate drinking lowers the risk of cardiovascular disease without an increase in mortality in a four-year follow up period. The findings suggest that, for carefully selected individuals, a “heart healthy diet” may include limited alcohol consumption even among individuals who have not included alcohol previously. Further research using a prospective design may be warranted.

Acknowledgements

The Atherosclerosis Risk in Communities Study (ARIC) is conducted and supported by the NHLBI in collaboration with the ARIC Study Investigators. This manuscript was prepared using a limited access dataset obtained by the NHLBI and does not necessarily reflect the opinions or views of the ARIC Study or the NHLBI.

This research was supported by grant # R01 HL076271 from National Heart, Lung, and Blood Institute.

References

1. Gronbaek M. Factors influencing the relation between alcohol and cardiovascular disease. *Curr Opin Lipidol* 2006;17(1):17–21. [PubMed: 16407711]
2. Tolstrup J, Jensen MK, Tjønneland A, et al. Prospective study of alcohol drinking patterns and coronary heart disease in women and men. *BMJ* 2006;332(7552):1244–8. [PubMed: 16672312]
3. Booyse FM, Parks DA. Moderate wine and alcohol consumption: beneficial effects on cardiovascular disease. *Thromb Haemost* 2001;86:517–528. [PubMed: 11521997]
4. Sesso HD, Stampfer MJ, Rosner B, et al. Seven-year changes in alcohol consumption and subsequent risk of cardiovascular disease in men. *Arch Intern Med* 2000;160:2605–2612. [PubMed: 10999974]
5. Jackson R, Scragg R, Beaglehole R. Alcohol consumption and risk of coronary heart disease. *BMJ* 1991;303(6796):211–216. [PubMed: 1884056]
6. Gronbaek M. Alcohol, type of alcohol, and all-cause and coronary heart disease mortality. *Ann NY Acad Sci* 2002;957:16–20. [PubMed: 12074958]
7. Fuchs CS, Stampfer MJ, Colditz GA, et al. Alcohol consumption and mortality among women. *N Engl J Med* 1995;332:1245–1250. [PubMed: 7708067]
8. Gronbaek M, Becker U, Johansen D, et al. Type of alcohol consumed and mortality from all causes, coronary heart disease, and cancer. *Ann Intern Med* 2000;133(6):411–419. [PubMed: 10975958]
9. Heng K, Hargarten S, Layde P, Craven A, Zhu S. Moderate alcohol intake and motor vehicle crashes : the conflict between health advantage and at-risk use. *Alcohol Alcohol* 2006;41(4):451–4.
10. [August 16,2007]. <http://www.americanheart.org/presenter.jhtml?identifier=4422>
11. Klatsky AL. Alcohol, cardiovascular diseases and diabetes mellitus. *Pharmacol Res* 2007;55(3):237–247.
12. Beulens JW, Rimm EB, Ascherio A, et al. Alcohol consumption and risk for coronary heart disease among men with hypertension. *Ann Intern Med* 2007;146(1):10–9. [PubMed: 17200217]

13. Friesema IH, Zwietering PJ, Veenstra MY, et al. Alcohol intake and cardiovascular disease and mortality : the role of pre-existing disease. *J Epidemiol Community Health* 2007;61(5):441–6. [PubMed: 17435212]
14. Mukamal KJ, Chiuve SE, Rimm EB. Alcohol consumption and risk for coronary heart disease in men with healthy lifestyles. *Arch Intern Med* 2006;166(19):2145–50. [PubMed: 17060546]
15. ARIC Investigators. The atherosclerosis risk in communities (ARIC) study: design and objectives. *Am J Epidemiol* 1989;129:687–702. [PubMed: 2646917]
16. <http://www.csc.unc.edu/aric/pubuse/>.
17. American Heart Association (AHA) Guidelines. [8/22/06]. Available from <http://www.americanheart.org/presenter.jhtml?identifier=1045>
18. American Diabetes Association. Nutrition Recommendations and Interventions for Diabetes – 2006. A position statement of the American Diabetes Association. *Diabetes Care* 2006;29(9):2140–2157. [PubMed: 16936169]
19. Tolstrup J, Gronbaek M. Alcohol and atherosclerosis: recent insights. *Curr Atheroscler Rep* 2007;9(2):116–24. [PubMed: 17877920]
20. The Presidents Council on Fitness and Sports, Presidents Challenge. [8/22/06]. Available at http://www.fitness.gov/home_pres_chall.htm
21. Aerobic Exercise Guidelines, Specific Goals. [8/22/06]. Available at <http://www.exrx.net/Aerobic/AerobicGoals.html>
22. O'Callaghan CJ, Straznicki NE, Komersova K, Louis WJ. Systematic errors in estimating mean blood pressure from finger blood pressure measurements. *Blood Press* 1998;7(56):277–81. [PubMed: 10321439]
23. Knoops KT, de Groot LC, Kromhout D, et al. Mediterranean diet, lifestyle factors, and 10-year mortality in elderly European men and women: the HALE project. *JAMA* 2004;292(12):1433–1439. [PubMed: 15383513]
24. Chiuve SE, McCullough ML, Sacks FM, Rimm EB. Healthy lifestyle factors in the primary prevention of coronary heart disease among men. Benefits among users and nonusers of lipid-lowering and antihypertensive medications. *Circulation* 2006;114(2):160–167. [PubMed: 16818808]
25. Kurth T, Moore SC, Gaziano M, et al. Healthy lifestyle and the risk of stroke in women. *Arch Intern Med* 2006;166(13):1403–1409. [PubMed: 16832006]
26. Sesso HD. Alcohol and cardiovascular health: recent findings. *Am J Cardiovasc Drugs* 2001;1(3):167–72. [PubMed: 14728031]
27. Perret B, Ruidavets JB, Vieu C, et al. Alcohol consumption is associated with enrichment of high-density lipoprotein particles in polyunsaturated lipids and increased cholesterol esterification rate. *Alcohol Clin Exp Res* 2002;26(8):1134–1140. [PubMed: 12198387]
28. Kolovou GD, Salpea DK, Anagnostopoulou KK, Mikhailidis DP. Alcohol use, vascular disease, and lipid-lowering drugs. *J Pharmacol Exp Ther* 2006;318(1):1–7. [PubMed: 16627749]
29. Wallerath T, Poleo D, Li H, Forstermann U. Red wine increases the expression of human endothelial nitric oxide synthase: a mechanism that may contribute to its beneficial cardiovascular effects. *J Am Coll Cardiol* 2003;41(3):471–8. [PubMed: 12575978]
30. McPherson K. Moderate alcohol consumption and cancer. *Ann Epidemiol* 2007;17:S46–8.
31. Brown LM. Epidemiology of alcohol-associated cancers. *Alcohol* 2005;35(3):161–8. [PubMed: 16054977]
32. Zhang SM, Lee IM, Manson JE, Cook NR, Willett WC, Buring JE. Alcohol consumption and breast cancer risk in the Women's Health Study. *Am J Epidemiol* 2007;165(6):667–76. [PubMed: 17204515]
33. Mizoue T, Tanaka K, Tsuji T, et al. Alcohol drinking and colorectal cancer risk: an evaluation based on a systematic review of epidemiologic evidence among the Japanese population. *Jpn J Clin Oncol* 2006;36(9):582–97. [PubMed: 16870695]
34. [August 2007]. <http://www.americangeriatrics.org/products/positionpapers/alcohol.shtml>
35. Eigenbrodt ML, Mosley TH, Hutchinson RG, et al. Alcohol consumption with age: a cross-sectional and longitudinal study of the Atherosclerosis Risk in Communities (ARIC) Study, 1987–1995.

36. Thiebaut ACM, Freedman LS, Carroll RJ, Kipnis V. Is it necessary to correct for measurement error in nutritional epidemiology? *Ann Intern Med* 2007;146(1):65–67. [PubMed: 17200225]

Table 1

Baseline Characteristics

Demographic distribution of the ARIC population (percent) with no history of cardiovascular disease by alcohol consumption status at Visit 1 (baseline of the 6 year observation period) for each demographic group.

		Number	ARIC %	None	Moderate	Heavy	χ^2 p=
Demographics	Age	Mean	54.0 yrs	54.2 yrs	53.7 yrs	53.6 yrs	<0.001*
		Male	43.3	47.8	41.1	11.1	<0.001
Gender		Female	56.7	71.9	22.0	6.2	
		Non-Black	73.0	56.9	33.8	9.2	<0.001
Race		Black	27.0	73.8	20.6	5.7	
		<HS	23.2	74.5	19.0	6.5	<0.001
Education		HS or more	76.8	57.5	33.6	8.8	
		<25	33.6	56.8	32.3	10.9	<0.001
BMI		25-29.9	39.1	58.0	33.9	8.0	
		>30	27.3	72.0	22.5	5.5	
Smoker		Yes	28.5	50.6	34.6	14.7	<0.001
		No	71.5	65.8	28.5	5.7	
Exercise		<2.5 hrs/wk	46.1	66.1	25.7	8.2	<0.001
		>2.5 hrs/wk	53.9	57.5	34.1	8.3	
Disease History [†]		Yes	79.7	62.3	29.4	8.3	<0.001
		No	20.3	19.2	22.6	19.7	

* ANOVA

[†] Hypertension, Diabetes, or Hypercholesterolemia

Table 2**Characteristics of New Drinkers**

Demographic and cardiovascular risk characteristics of new, moderate alcohol drinkers who were non-drinkers at Visit 1 (baseline of the 6-year observation period) but who were drinking moderate amounts of alcohol by Visit 3 (start of the cardiovascular follow up period).

		Percent who Began Drinking Alcohol in Moderation	χ^2 p*
	Number	442 [*]	
Visit 3 Age	Mean	59.0 yrs	<0.001 [†]
Gender	Male	8.2	<0.001
	Female	4.9	
Race	Non-Black	6.7	<0.001
	Black	4.2	
Education	<HS	3.5	<0.001
	HS or more	6.0	
BMI	<25	3.3	0.031
	25-29.9	8.0	
	>30	6.3	
Smoker	Yes	7.3	0.068
	No	5.8	
Exercise	<2.5 hrs/wk	4.9	<0.001
	>2.5 hrs/wk	7.0	
Disease History [‡]	Yes	5.7	0.006
	No	8.1	

* Compared to 6917 individuals who were still non-drinkers at Visit 3

[†] t-test comparison of means

[‡] Hypertension, Diabetes, or Hypercholesterolemia at Visit 3

Table 3**Development of Cardiovascular Disease in New Drinkers**

Likelihood of developing cardiovascular disease (Odds Ratio and 95 percent Confidence Interval) during the 4-year follow-up after Visit 3 among new drinkers (who were non-drinkers at Visit 1).

		OR	95% CI
Alcohol Consumption at Visit 3	None (ref)	1	1
	Moderate	0.62	0.40-0.95
	Heavy	1.42	0.41-4.90
Age		1.05	1.03-1.06
Gender (ref: female)	Male	1.79	1.51-2.13
Race (reference non-black)	Black	1.09	0.90-1.32
Education (ref: <High School)	HS or more	0.87	0.72-1.06
BMI	<25 (ref)	1	1
	25-29.9	1.03	0.82-1.30
	>30	1.55	1.23-1.95
Smoking (ref: Non-smokers)	Yes	1.92	1.56-2.36
Exercise (ref: <2.5 hrs/wk)	>2.5 hrs/wk	0.86	0.72-1.02
Cardiovascular Disease Risk History * (ref: No)	Yes	1.77	1.36-2.32
Daily Aspirin (ref: No)	Yes	1.78	1.36-2.32

* History of hypertension, diabetes, or hypercholesterolemia at Visit 3.