

**Clinical Research and Methods**

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## Beliefs, Motivations, and Opinions about Moderate Drinking: A Cross-Sectional Survey

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**Background:** *The relationship of moderate alcohol use and health remains controversial and uncertain. How physicians and patients react to this uncertainty is unknown.* **Methods:** *We surveyed outpatients at a single urban medical center that provides primary and tertiary care. Participants completed a self-administered anonymous survey regarding their medical history, usual alcohol consumption, and preferences and opinions regarding moderate drinking, defined as a drink every 1 to 2 days. All English-speaking individuals ages 21 years and older were eligible.* **Results:** *A total of 878 outpatients participated, with a response rate of 79%. The median age was 47 years, and 57% were women. Approximately 60% of drinkers and 35% of abstainers agreed with the statement that moderate drinking is a healthy activity and that it is safe for most people. About one third of participants cited possible health benefits as part of their motivation for drinking alcohol. Those who cited health benefits tended to be older, consumed alcohol more frequently but with a lower quantity per drinking day, and were more likely to have a history of coronary heart disease. Only about 10% of participants identified breast cancer as a possible risk of moderate drinking. When asked whether they would be willing to consume one drink every 1–2 days if their doctor so recommended, 41% of abstainers and 72% of all drinkers were willing to do so.* **Conclusions:** *A substantial number of medical outpatients cite health benefits as a motivation for drinking alcohol and a willingness to drink alcohol regularly if so recommended by a physician, although few recognize health risks from drinking alcohol.*

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The relationship between moderate alcohol use and health is complex. Over the last 30 years, a series of observational studies have suggested a U- or L-shaped relationship between alcohol use and coronary heart disease (CHD), with the lowest risk among people who drink approximately one drink daily.<sup>1,2</sup> In many of these studies, all-cause mortality was also found to be lowest among moderate drinkers.<sup>3-5</sup> Moderate alcohol use has also been associated with a lower incidence of peripheral vascular disease,<sup>6,7</sup> cholelithiasis,<sup>8</sup> and type II diabetes mellitus.<sup>9</sup>

Several concerns have been raised about the studies that link moderate alcohol use and CHD.<sup>10-14</sup> Most importantly, all of these studies have been observational, raising the possibility that an unmeasured confounding factor explains the association, and no long-term con-

trolled trial of the issue is apt to be completed in the near future. Recent examples highlight the difficulty that can occur in attempts to interpret the results of observational evidence.<sup>15</sup>

In addition, even moderate alcohol consumption can have risk. A pooled analysis of 322,647 women demonstrated a dose-dependent increase in breast cancer risk associated with moderate alcohol use.<sup>16</sup> Alcohol use also potentiates the hepatocellular injury of hepatitis C, which could explain the increase in cirrhosis attributable to even moderate alcohol intake.<sup>4,17</sup> Accidental injuries are also associated with moderate drinking,<sup>18</sup> and some investigators have found that moderate alcohol consumption may increase the risk of osteoporotic fractures.<sup>19</sup> Finally, concern has been raised that, because of the habituating effect of alcohol, moderate consumption could rise to an excessive level.<sup>20</sup> At this time, it is not known whether alcohol abuse is likely to develop after a recommendation for increased alcohol intake is made to a given individual.

Despite these controversies, we know little about how patients view these concerns or whether they

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would follow any proposed guideline that recommended moderate alcohol use. To explore patient preferences and understanding regarding moderate alcohol, we surveyed outpatients at a large urban medical center that provides both primary and tertiary care to a diverse sample of adults.

### Methods

The Moderate Alcohol Use: Preferences and Outcomes (MAHPO) survey queried a convenience sample of outpatients at a large, private, nonprofit hospital in Boston with approximately 530 licensed beds. The hospital serves as a source of primary care for residents of eastern Massachusetts and as a tertiary care center for patients throughout eastern Massachusetts and surrounding regions. To maximize the clinical heterogeneity and geographic distribution of participants, we included outpatients from multiple clinical units, including three primary care practices and two cardiology practices located at the hospital. The primary care practices see more than 34,000 patients annually, accounting for more than 70,000 visits. Of the 79% of primary care patients who self-report their ethnicity, 66% are white, 20% are black, 5% are Hispanic, and 4% are Asian.

For this project, research assistants approached patients in waiting areas and distributed and collected surveys, which were completed entirely by participants. Only one research assistant distributed surveys at any one time. Surveys were anonymous, with no identifying information. Exclusion criteria included age younger than 21 years and inability to speak English. The survey was approved by the hospital's institutional review board with a waiver of written informed consent.

### Survey Instrument

A signed introductory letter accompanied each survey. It described the survey as "for research about how people feel about alcoholic beverages and how drinking alcohol affects health."

The survey assessed the following domains: demographics, medical history, current alcohol consumption, beliefs regarding alcohol consumption, motivations regarding drinking (ie, positive and negative features of drinking alcohol), knowledge of medical consequences of drinking, and willingness to change current alcohol consumption. Medical history questions included items about cardiovascular and liver disease and cardiovascular risk factors. Family history of CHD was defined as a myocardial infarction in a first-degree relative before age 60.

Current alcohol intake was assessed in three ways. First, we defined current drinkers by affirmative responses to the question "Do you drink alcoholic beverages?" with no specific time prompt. Second, participants reported their usual quantity and frequency

of alcohol consumption, again with no specific time prompt. Third, respondents completed the "high" version of the TWEAK questionnaire (Tolerance, Worried, Eye-openers, Amnesia, Kut down);<sup>21,22</sup> the standard TWEAK cutpoint for problem drinking is 3 points, although 2 points has been used extensively.<sup>22,23</sup>

Beliefs regarding alcohol consumption and positive and negative features of drinking alcohol were assessed as a series of items in closed format without filtering. Response options were formatted in Likert scales with four categories ranging from strongly agree to strongly disagree. The Cronbach  $\alpha$  coefficients for these three scales were 0.68, 0.77, and 0.85, respectively. Eleven closed-format items regarding specific medical consequences of having one drink every 1–2 days followed; this level of intake was not labeled with any adjective, such as "moderate." Finally, willingness to change was assessed with six items with yes/no response options regarding personal willingness to drink regularly or to abstain. The full instrument was pilot tested and hand timed among otherwise eligible individuals prior to formal administration to ensure its feasibility in its administered setting.

### Statistical Analyses

We present categorical variables with counts and frequencies, symmetric continuous variables with means and standard deviations, and skewed continuous variables with medians and interquartile ranges. We performed univariate comparisons of binary variables with Fisher exact tests, normally distributed continuous variables with ANOVA, and skewed continuous variables with Wilcoxon rank-sum scores.

## Results

### Characteristics of Participants

Between 2002 and 2004, a total of 1,116 outpatients were asked to participate in the survey. A total of 238 individuals declined to participate, for a response rate of 79%. Characteristics of participants are shown in Table 1. The median age was 47 years, with a range from 21 to 90. Approximately 95% of respondents lived in Massachusetts, their educational level was generally high, and few were smokers. Cardiovascular risk factors were relatively prevalent, but established cardiovascular or liver disease was not. Sociodemographic characteristics appeared to be representative of the medical center's primary care practice; 60.4% of the practice's population is female, and the median age is between 45 and 54 years.

### Current Alcohol Intake

Approximately two thirds of respondents reported current alcohol consumption (Table 1). Among current drinkers, 267 (50%) drank less than weekly, 134 (25%) drank 1–2 days per week, 90 (17%) drank 3–6 days

Table 1

## Characteristics of MAHPO Survey Respondents

Characteristic	Number of Respondents (total n=878)
Age in years	47.5 ±15.5
Female	489 (57%)
Live alone	174 (20%)
Education	
Less than high school	32 (4%)
High school	196 (23%)
College	414 (48%)
Some graduate school	228 (26%)
Cardiovascular risk factors	
Current smoker	144 (17%)
Family history of premature MI	204 (24%)
High blood pressure	262 (31%)
Diabetes	91 (11%)
Hypercholesterolemia	240 (28%)
Medical history	
MI or angina	146 (17%)
CABG or PTCA	92 (11%)
Liver disease	25 (3%)
Stroke	22 (3%)
Any cardiovascular disease	160 (18%)
Current drinker	551 (64%)

MAHPO—Moderate Alcohol Use: Preferences and Outcomes survey

MI indicates myocardial infarction, CABG or PTCA indicates coronary artery bypass surgery or angioplasty, and any cardiovascular disease includes any of these and stroke. Current drinkers were defined by the question “Do you drink alcoholic beverages?” with no specific time prompt.

per week, and 45 (8%) drank daily. Median intake per drinking day among current drinkers was two drinks (interquartile range, 1–2.5). A total of 172 respondents (20%), including similar proportions of drinkers and abstainers, reported that an immediate family member had been treated for alcoholism. TWEAK scores ranged from 0 to 6, with 62 participants scoring 3 or higher and another 118 scoring 2 points. A total of 29% of current drinkers with TWEAK scores of 3 or higher reported that a physician had told them not to drink any alcohol, compared with 5% of other current drinkers ( $P<.001$ ).

### Beliefs Regarding Alcohol Consumption

Table 2 shows the responses of participants to the series of questions regarding alcohol consumption, stratified by whether participants currently consumed alcohol. Although abstainers and drinkers differed significantly in their responses to all eight statements,

the patterns of response were most distinct for four of the statements. As expected, 89% of the drinkers agreed that they enjoyed drinking alcoholic beverages, while 82% of the abstainers did not. Responses to statements regarding whether moderate drinking is a healthy activity and whether it is safe for most people tended to track together (age- and sex-partial Spearman  $r$  0.54;  $P<.001$ ); approximately 60% of drinkers and 35% of abstainers agreed with each statement, while approximately 25% of abstainers strongly disagreed with each. Finally, 18% of abstainers but only 5% of drinkers strongly agreed that drinking alcohol in moderation can lead to alcoholism. Men were significantly more likely than women to agree with the “healthy” and “safe” statements, but these differences were less pronounced than noted for the comparison of drinkers and abstainers.

### Motivations to Drink Alcohol

Table 3 shows the responses of current drinkers to four statements regarding their motivations to drink alcohol. Respondents most commonly cited enjoyment of the taste of alcoholic beverages as a reason to drink alcohol, although relaxation and its role in social activities appeared nearly as common. About one third of participants cited possible health benefits as part of their motivation to drink alcohol.

We next compared the characteristics of the 188 drinkers who cited health benefits as a motivating factor to the 334 who did not. Those who cited health benefits tended to be older (mean age  $49.9 \pm 15.3$  versus  $42.6 \pm 14.1$  years,  $P<.001$ ) and consumed alcohol more frequently ( $2.3 \pm 2.3$  versus  $1.6 \pm 2.1$  days per week,  $P=.001$ ) but with a lower quantity per drinking day (median and interquartile range 1.5 (1.0–2.0) versus 2.0 (1.0–3.0) drinks per day,  $P<.001$ ). They were somewhat more likely to be male (51% versus 42%,  $P=.05$ ) but much more likely to have a history of coronary heart disease (19% versus 9%,  $P=.003$ ).

Table 4 presents respondents' level of agreement to specific motivations to limit their alcohol intake, stratified by current consumption. In general, 50%–70% of abstainers endorsed each statement with varying levels of agreement; health problems, hangovers, and driving were cited most often. Drinkers also commonly cited health problems, hangovers, and driving as limiting factors in their alcohol intake, along with sedation, but were less likely to cite such factors as taste, gastrointestinal upset, medication interactions, or fear of escalation.

### Perceived Health Effects of Alcohol

Respondents reported whether they felt red wine, white wine, beer, liquor, or no single beverage was healthier than other alcoholic beverages. Among abstainers, 92 (39%) endorsed no beverage as healthiest,

Table 2

## Responses of Abstainers and Drinkers to Statements Regarding Their Beliefs About Alcohol

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>	<i>P Value**</i>
	# (%)*	# (%)*	# (%)*	# (%)*	
I would drink more if it were safe for me to do so.					<.001
Abstainers	16 (6)	28 (11)	79 (30)	142 (54)	
Drinkers	15 (3)	73 (13)	320 (59)	137 (25)	
I do not drink alcohol because of religious reasons.					.005
Abstainers	22 (8)	10 (4)	93 (36)	137 (52)	
Drinkers	15 (3)	25 (5)	218 (42)	262 (50)	
I enjoy drinking alcoholic beverages.					<.001
Abstainers	9 (4)	37 (15)	76 (31)	125 (51)	
Drinkers	63 (12)	408 (77)	45 (9)	13 (2)	
Drinking alcohol in moderation can lead to alcoholism.					<.001
Abstainers	47 (18)	70 (27)	89 (35)	51 (20)	
Drinkers	29 (5)	131 (25)	293 (55)	79 (15)	
I believe that drinking is safe for most people.					<.001
Abstainers	9 (3)	86 (33)	90 (35)	74 (29)	
Drinkers	14 (3)	309 (59)	164 (31)	34 (7)	
Drinking alcohol in moderation is a healthy activity.					<.001
Abstainers	4 (2)	86 (34)	99 (39)	66 (26)	
Drinkers	20 (4)	295 (57)	181 (35)	23 (4)	
Drinking alcohol, even in moderation, is a sign of weakness in a person.					<.001
Abstainers	17 (6)	26 (10)	126 (48)	95 (36)	
Drinkers	9 (2)	22 (4)	291 (54)	216 (40)	
Drinking any alcohol is a sin.					<.001
Abstainers	15 (6)	16 (6)	88 (34)	142 (54)	
Drinkers	7 (1)	9 (2)	164 (31)	356 (66)	

\* Total numbers vary due to nonresponse to selected questions.

\*\* P values derive from exact tests

Table 3

## Responses of Drinkers to Statements Regarding Their Motivations to Drink Alcohol

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
	# (%)*	# (%)*	# (%)*	# (%)*
I drink alcohol in part because . . .				
I enjoy the taste.	62 (12)	390 (75)	58 (11)	11 (2)
It helps me to relax.	41 (8)	373 (71)	101 (19)	14 (3)
Drinking is part of having fun with friends and family.	45 (9)	353 (67)	105 (20)	25 (5)
It may prevent health problems.	7 (1)	181 (35)	240 (46)	94 (18)

\* Total numbers vary due to nonresponse

Table 4  
Responses of Abstainers and Drinkers to Statements  
Regarding Their Motivations to Limit Their Alcohol Intake

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>	P Value
	# (%)*	# (%)*	# (%)*	# (%)*	
<i>I don't drink more alcohol than I do because . . .</i>					
I dislike the taste.					<.001
Abstainers	56 (26)	55 (26)	70 (33)	31 (15)	
Drinkers	14 (3)	55 (11)	348 (68)	94 (18)	
It gives me an upset stomach or heartburn.					<.001
Abstainers	33 (17)	45 (23)	77 (39)	45 (23)	
Drinkers	26 (5)	126 (25)	295 (57)	67 (13)	
It costs too much.					<.001
Abstainers	35 (18)	46 (23)	71 (36)	46 (23)	
Drinkers	16 (3)	97 (19)	312 (61)	87 (17)	
It makes me lose concentration or become sleepy.					<.001
Abstainers	51 (26)	57 (29)	53 (27)	33 (17)	
Drinkers	23 (5)	237 (46)	201 (39)	50 (10)	
It interacts with medicines that I take.					<.001
Abstainers	59 (30)	62 (31)	41 (21)	35 (18)	
Drinkers	33 (7)	152 (30)	247 (49)	69 (14)	
It affects my ability to drive.					<.001
Abstainers	71 (36)	72 (37)	28 (14)	24 (12)	
Drinkers	108 (21)	274 (54)	99 (20)	25 (5)	
It causes health problems.					<.001
Abstainers	72 (36)	69 (35)	37 (19)	22 (11)	
Drinkers	55 (11)	226 (45)	187 (37)	35 (7)	
I fear losing control of my drinking habit.					<.001
Abstainers	48 (26)	37 (20)	55 (29)	48 (26)	
Drinkers	23 (5)	78 (15)	296 (58)	112 (22)	
It causes "hangovers."					<.001
Abstainers	62 (33)	67 (36)	31 (16)	28 (15)	
Drinkers	66 (13)	259 (51)	140 (28)	42 (8)	

\* Total numbers vary due to nonresponse

130 (56%) endorsed red wine, and 11 (5%) endorsed another option. In contrast, among drinkers, 102 (20%) endorsed no single beverage, 392 (76%) endorsed red wine, and 21 (4%) endorsed another option ( $P<.001$ ). Men and women did not differ in their responses ( $P>.99$ ).

Respondents were asked whether they felt consumers of one drink every 1–2 days had shorter or longer lives than abstainers. A total of 43% of abstainers and 62% of current drinkers indicated that moderate drinkers lived longer lives ( $P<.001$ ); the corresponding proportions of men and women were 63% and 51%, respectively ( $P=.002$ ).

Table 5 describes respondents' beliefs regarding the associations of moderate drinking with specific health conditions. Only a minority of participants reported that

they perceived that moderate drinking prevented any health condition, even myocardial infarction. Slightly more than half of both abstainers and drinkers believed that one drink every 1–2 days could cause liver damage and birth defects. Abstainers were approximately twice as likely to believe that that level of intake caused myocardial infarction, stroke, gallstones, and diabetes, although the proportions varied somewhat. Only about 10% of all participants identified breast cancer as a possible risk of moderate drinking; among women, 14% of abstainers and 11% of drinkers identified this risk.

#### *Willingness to Change Alcohol Intake*

Lastly, respondents reported their willingness to change alcohol consumption under various scenarios. Among 127 individuals who reported alcohol con-

Table 5

## Beliefs of Abstainers and Drinkers Regarding the Health Effects of Intake of One Drink Every 1–2 Days

	<i>Causes the Condition</i> # (%)*	<i>Prevents the Condition</i> # (%)*	<i>Neither</i> # (%)*	P Value
Myocardial infarction				.002
Abstainers	44 (19)	63 (27)	126 (54)	
Drinkers	49 (10)	160 (32)	290 (58)	
Stroke				<.001
Abstainers	49 (21)	44 (19)	137 (60)	
Drinkers	55 (11)	97 (19)	346 (69)	
Cirrhosis or liver damage				.16
Abstainers	135 (57)	5 (2)	96 (41)	
Drinkers	258 (52)	5 (1)	233 (47)	
Gallstones				.02
Abstainers	45 (21)	4 (2)	168 (77)	
Drinkers	60 (13)	9 (2)	409 (86)	
Diabetes				.008
Abstainers	62 (28)	3 (1)	154 (70)	
Drinkers	88 (18)	11 (2)	386 (80)	
High blood pressure				.02
Abstainers	73 (32)	15 (7)	142 (62)	
Drinkers	113 (23)	52 (11)	327 (66)	
Breast cancer				.32
Abstainers	24 (11)	4 (2)	184 (87)	
Drinkers	38 (8)	12 (2)	431 (90)	
Liver cancer				.13
Abstainers	82 (36)	3 (1)	141 (62)	
Drinkers	141 (29)	10 (2)	335 (69)	
Birth defects				.63
Abstainers	124 (55)	6 (3)	95 (42)	
Drinkers	277 (56)	8 (2)	212 (43)	

\*Total numbers vary due to non-response

sumption at least 3 days per week, 43 (34%) reported willingness to discontinue alcohol altogether if they could be certain that abstainers lived longer than moderate drinkers. Likewise, among 244 abstainers, only 64 (26%) reported willingness to consume one drink every 1–2 days if such intake was certain to prolong life. However, when asked whether they would be willing to consume one drink every 1–2 days if their doctor so recommended, 41% of abstainers and 72% of all drinkers were willing to do so ( $P<.001$ ); 4% of abstainers reported having actually been told to drink more by their doctor. Those willing to consume one drink every 1–2 days at the recommendation of their doctor also tended to be older (48 versus 44 years,  $P<.001$ ) and more likely to have attended college (80% versus 69%,  $P=.002$ ).

## Discussion

Little is known about how patients view and understand the association of moderate alcohol intake with lower risk of coronary heart disease. A New Zealand telephone survey conducted in 1989 and repeated in 1994 asked a single question about the health benefits of alcohol use: “Do you think there are any benefits to a person’s health from drinking alcohol?” In the 1994 survey, about one sixth of the 3,273 respondents identified cardiovascular benefits of alcohol use, although none had identified such benefits in 1989.<sup>24</sup> Similarly, a 1992 Gallup telephone poll asked 1,001 US adults two questions about health benefits of alcohol: “Have you heard or read about the scientific study that found moderate drinkers to have lower rates of heart disease than those who do not drink alcohol beverages?” and “As a result of what you have heard or read about the study (that found moderate drinkers to have lower rates of heart disease than those who do not drink alcoholic beverages), are you more likely to have one or two drinks on a daily basis, or not?” Of the 58% of respondents who responded yes to the first question, only 50 respondents said they were more likely to drink daily as a result.<sup>25</sup>

The ongoing need of clinicians to make recommendations regarding alcohol consumption underscores the importance of understanding patients’ opinions and preferences on this issue.<sup>26</sup> In the absence of randomized trial data on clinical endpoints, many clinicians explicitly suggest that some subgroups of patients be counseled about benefits of moderate drinking,<sup>27–29</sup> while others believe they should not receive such counseling.<sup>10,14</sup> Because unequivocal evidence on which to base recommendations is unlikely to be available for years to come, and given the contradictory advice that various clinicians currently offer, patients are left with difficult decisions to make regarding the relative risks and benefits of moderate drinking.

Several features of our results might be considered relevant to this debate. First, about one third of drinkers reported doing so for health benefits. Perhaps more importantly, those who did so tended to be the type

of individuals for whom the evidence for a net benefit of limited drinking is strongest—adults at highest cardiovascular risk on the basis of age, sex, and previous history and those who reported a pattern of more frequent but less intensive drinking. This observation suggests that the ongoing debate about moderate drinking has been relatively successful in tailoring messages regarding alleged health benefits to the most appropriate recipients. Second, more than half of both drinkers and abstainers viewed red wine as being healthier than other alcoholic beverages. Although most evidence suggests that this is not the case for the association of moderate alcohol consumption with risk of coronary heart disease,<sup>30,31</sup> at least some studies suggest that red wine may differ from other beverages in their relationships with stroke,<sup>32-34</sup> cancer,<sup>35-37</sup> and possibly even alcohol abuse per se.<sup>38</sup> Third, relatively few respondents recognized breast cancer as a possible risk of even moderate drinking, despite strong indications of a link from cohort studies<sup>16</sup> and a plausible candidate mechanism (via sex steroid hormone levels<sup>39</sup>). This suggests one promising area for better public education in the future.

Regarding beliefs about alcohol intake, 45% of abstainers and 30% of drinkers agreed to some extent with the statement that moderate drinking can lead to alcoholism; correspondingly, 45% of abstainers cited fear of losing control of their alcohol use as at least one factor in not drinking. Current scientific evidence is somewhat mixed in this regard. A return to controlled drinking appears to occur in only 1%–10% of alcoholic men,<sup>40</sup> suggesting that moderate drinking may not be a stable condition in predisposed individuals. On the other hand, in a German community study, less than 30% of individuals with a history of alcoholism in both parents developed hazardous drinking habits over time,<sup>41</sup> confirming that even individuals in this very high-risk group can maintain controlled drinking in most cases.

Our results may have implications for practicing primary care clinicians. First, understanding of the potential risks and benefits of moderate alcohol intake appears to be low, and this offers a particular opportunity for education and counseling. For example, respondents tended to mistakenly cite liver cirrhosis rather than breast cancer as a consequence of moderate drinking, presumably because of the relationship of heavy drinking to cirrhosis. Second, patients express considerable willingness to change their alcohol intake in response to counseling, which also should encourage physicians to offer alcohol counseling and education. Third, drinkers and abstainers tend to report multiple, relatively complex rationales for their drinking behavior, and physician recognition of these factors may lead to more patient-centered, better-accepted counseling.

### Limitations

Several limitations of our study warrant discussion. All of the information in the MAHPO survey was self-reported; although self-reported alcohol intake generally appears valid,<sup>42</sup> we know of no way to determine the validity of the beliefs and opinions expressed by participants. We examined a convenience sample of outpatients at a single medical center in Massachusetts, and we cannot determine the degree to which our findings would differ from those conducted with a nationally representative sample of adults, especially in populations with lesser degrees of education, although many of our findings have strong face validity. Likewise, we excluded individuals who could not complete the survey in English, and their responses may have differed from those who were included. We did not have a formal mechanism to exclude abstainers with a previous history of alcoholism, although only 7–25 abstainers reported positive responses on the five individual TWEAK questions, and exclusion of the 42 abstainers with any positive response did not substantially change our results.

### Conclusions

A substantial number of medical outpatients cite health benefits as a motivation to drink alcohol, particularly those at higher cardiovascular risk. Even many abstainers express a willingness to drink alcohol regularly if so recommended by a physician, although few drinkers or abstainers recognize some of the major health risks of moderate drinking. These results highlight the ongoing uncertainty about the existing observational evidence regarding alcohol consumption and emphasize the importance of randomized clinical trials to determine whether moderate drinking truly prevents coronary heart disease.

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### REFERENCES

1. Corrao G, Rubbiati L, Bagnardi V, Zambon A, Poikolainen K. Alcohol and coronary heart disease: a meta-analysis. *Addiction* 2000;95(10):1505-23.
2. Maclure M. Demonstration of deductive meta-analysis: ethanol intake and risk of myocardial infarction. *Epidemiol Rev* 1993;15(2):328-51.
3. Thun MJ, Peto R, Lopez AD, et al. Alcohol consumption and mortality among middle-aged and elderly US adults. *N Engl J Med* 1997;337(24):1705-14.
4. Boffetta P, Garfinkel L. Alcohol drinking and mortality among men enrolled in a American Cancer Society prospective study. *Epidemiology* 1990;1:342-8.
5. Fuchs CS, Stampfer MJ, Colditz GA, et al. Alcohol consumption and mortality among women. *N Engl J Med* 1995;332:1245-50.

6. Camargo CA Jr, Stampfer MJ, Glynn RJ, et al. Prospective study of moderate alcohol consumption and risk of peripheral arterial disease in US male physicians. *Circulation* 1997;95(3):577-80.
7. Djousse L, Levy D, Murabito JM, Cupples LA, Ellison RC. Alcohol consumption and risk of intermittent claudication in the Framingham Heart Study. *Circulation* 2000;102(25):3092-7.
8. Leitzmann MF, Giovannucci EL, Stampfer MJ, et al. Prospective study of alcohol consumption patterns in relation to symptomatic gallstone disease in men. *Alcohol Clin Exp Res* 1999;23(5):835-41.
9. Koppes LL, Dekker JM, Hendriks HF, Bouter LM, Heine RJ. Moderate alcohol consumption lowers the risk of type 2 diabetes: a meta-analysis of prospective observational studies. *Diabetes Care* 2005;28(3):719-25.
10. Goldberg IJ. To drink or not to drink? *N Engl J Med* 2003;348(2):163-4.
11. Freiberg MS, Samet JH. Alcohol and coronary heart disease: the answer awaits a randomized controlled trial. *Circulation* 2005;112(10):1379-81.
12. Jackson R, Broad J, Connor J, Wells S. Alcohol and ischaemic heart disease: probably no free lunch. *Lancet* 2005;366(9501):1911-2.
13. Naimi TS, Brown DW, Brewer RD, et al. Cardiovascular risk factors and confounders among nondrinking and moderate-drinking US adults. *Am J Prev Med* 2005;28(4):369-73.
14. Lieber CS. Alcohol and health: a drink a day won't keep the doctor away. *Cleve Clin J Med* 2003;70(11):945-6, 948, 951-3.
15. Ioannidis JP, Haidich AB, Pappa M, et al. Comparison of evidence of treatment effects in randomized and nonrandomized studies. *JAMA* 2001;286(7):821-30.
16. Smith-Warner SA, Spiegelman D, Yaun S-S, et al. Alcohol and breast cancer in women: a pooled analysis of cohort studies. *J Am Med Assoc* 1998;279:535-40.
17. Ohta S, Watanabe Y, Nakajima T. Consumption of alcohol in the presence of hepatitis C virus is an additive risk for liver damage. *Prev Med* 1998;27(3):461-9.
18. Cherpitel CJ, Tam T, Midanik L, Caetano R, Greenfield T. Alcohol and non-fatal injury in the US general population: a risk function analysis. *Accid Anal Prev* 1995;27(5):651-61.
19. Hernandez-Avila M, Colditz GA, Stampfer MJ, Rosner B, Speizer FE, Willett WC. Caffeine, moderate alcohol intake, and risk of fractures of the hip and forearm among middle-aged women. *Am J Clin Nutr* 1991;54:157-63.
20. Hamer J. Foreword. In: Toffler OB, ed. *The heart of the social drinker*. London: LLOYD-Luke, 1985:vii-viii.
21. Chan AW, Pristach EA, Welte JW, Russell M. Use of the TWEAK test in screening for alcoholism/heavy drinking in three populations. *Alcohol Clin Exp Res* 1993;17(6):1188-92.
22. Bradley KA, Boyd-Wickizer J, Powell SH, Burman ML. Alcohol screening questionnaires in women: a critical review. *JAMA* 1998;280(2):166-71.
23. Cherpitel CJ. Analysis of cut points for screening instruments for alcohol problems in the emergency room. *J Stud Alcohol* 1995;56(6):695-700.
24. Hall W. Changes in the public perceptions of the health benefits of alcohol use, 1989 to 1994. *Aust N Z J Public Health* 1996;20(1):93-5.
25. Gallup Poll News Service. Princeton, NJ: Gallup, February 7, 1992.
26. Pearson TA, Terry P. What to advise patients about drinking alcohol. The clinician's conundrum (editorial). *JAMA* 1994;272:967-8.
27. Zoler ML. Triple antihypertensive tx urged for diabetics. *Internal Medicine News* 2003 September 1;Sect. 58.
28. Ellison RC. Balancing the risks and benefits of moderate drinking. *Ann N Y Acad Sci* 2002;957:1-6.
29. Dixon AF, Dixon JB, O'Brien PE. Cardiovascular benefit of light to moderate alcohol consumption. *Aust Fam Physician* 2003;32(8):649-52.
30. Rimm EB, Klatsky A, Grobbee D, Stampfer MJ. Review of moderate alcohol consumption and reduced risk of coronary heart disease: is the effect due to beer, wine, or spirits. *BMJ* 1996;312(7033):731-6.
31. Cleophas TJ. Wine, beer and spirits and the risk of myocardial infarction: a systematic review. *Biomed Pharmacother* 1999;53(9):417-23.
32. Di Castelnuovo A, Rotondo S, Iacoviello L, Donati MB, De Gaetano G. Meta-analysis of wine and beer consumption in relation to vascular risk. *Circulation* 2002;105(24):2836-44.
33. Mukamal KJ, Ascherio A, Mittleman MA, et al. Alcohol and risk for ischemic stroke in men: the role of drinking patterns and usual beverage. *Ann Intern Med* 2005;142(1):11-9.
34. Truelsen T, Gronbaek M, Schnohr P, Boysen G. Intake of beer, wine, and spirits and risk of stroke: the Copenhagen City Heart Study. *Stroke* 1998;29(12):2467-72.
35. 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):411-9.
36. Prescott E, Gronbaek M, Becker U, Sorensen TI. Alcohol intake and the risk of lung cancer: influence of type of alcoholic beverage. *Am J Epidemiol* 1999;149(5):463-70.
37. Gronbaek M, Becker U, Johansen D, Tonnesen H, Jensen G, Sorensen TI. Population-based cohort study of the association between alcohol intake and cancer of the upper digestive tract. *BMJ* 1998;317(7162):844-7.
38. Jensen MK, Andersen AT, Sorensen TI, Becker U, Thorsen T, Gronbaek M. Alcoholic beverage preference and risk of becoming a heavy drinker. *Epidemiology* 2002;13(2):127-32.
39. Hankinson SE, Willett WC, Manson JE, et al. Alcohol, height, and adiposity in relation to estrogen and prolactin levels in postmenopausal women. *J Natl Cancer Inst* 1995;87(17):1297-302.
40. Vaillant GE. A 60-year follow-up of alcoholic men. *Addiction* 2003;98(8):1043-51.
41. Lieb R, Merikangas KR, Hofler M, Pfister H, Isensee B, Wittchen HU. Parental alcohol use disorders and alcohol use and disorders in offspring: a community study. *Psychol Med* 2002;32(1):63-78.
42. Giovannucci E, Colditz G, Stampfer MJ, et al. The assessment of alcohol consumption by a simple self-administered questionnaire. *Am J Epidemiol* 1991;133(8):810-7.