

Wine preference and related health determinants in a U.S. national sample of young adults

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Abstract

This study examined relationships between wine preference and selected health determinants in a U.S. national sample of young adults to improve understanding of the association between light-moderate wine consumption and long-term morbidity and mortality risk. Interview data collected from 12,958 young adults who participated in the National Longitudinal Study of Adolescent Health were analyzed to determine whether wine preference was related to educational, health and lifestyle characteristics that are predictive of long-term morbidity and mortality. Wine drinkers generally had more formal education, better dietary and exercise habits, and more favorable health status indicators (e.g., normal body mass) than other drinkers and non-drinkers. A larger proportion of wine drinkers were light-moderate drinkers compared to beer or liquor drinkers, and wine drinkers were less likely to report smoking or problem drinking than beer or liquor drinkers. These findings indicate that wine preference in young adulthood is related to educational, health and lifestyle characteristics that may help to explain the association between light-moderate wine consumption and morbidity, and mortality risk in later adulthood.

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1. Introduction

The J-shaped relationship between level of alcohol use and health is well documented, with the lowest morbidity and mortality risk occurring among light or moderate drinkers relative to abstainers and heavier drinkers (Gunzerath et al., 2004; Klatsy, 1999). Light-moderate drinking is defined in the U.S. as no more than one standard alcoholic drink per day for healthy non-pregnant women and no more than two drinks per day for healthy men (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2000). A number of prospective epidemiological studies also suggest that light-moderate wine consumption may confer greater health benefits than light-moderate consumption of other types of alcoholic beverages or abstinence from drinking (Grønbaek et al., 1995, 2000; Klatsky et al., 2003; Prescott

et al., 1999; Truelsen et al., 1998). These studies are supported by evidence for biological mechanisms (e.g., elevated levels of high density lipoprotein or “good cholesterol”) through which wine may reduce risk for coronary disease and other health problems (Booyse and Parks, 2001; Fitzpatrick et al., 1993; Frankel et al., 1993; Hertog et al., 1993; Jang et al., 1997; Maxwell et al., 1994; Pace-Asciak et al., 1995; Rimm, 1999). However, the notion that light-moderate wine consumption per se has a beneficial effect on health remains controversial due to possible confounding effects of socio-demographic, educational, health, and lifestyle factors that may affect level of alcohol use, alcoholic beverage preference, and mortality risk (Grønbaek, 2001, 2004; Gunzerath et al., 2004; Klatsy, 1999).

In a recent prospective study of over 12,000 northern Californians, Klatsky et al. (2003) found that light-moderate wine drinking was associated with the lowest risk for all-cause and coronary disease mortality, though lower mortality risks also were observed for light-moderate drinkers of beer and spirits

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relative to lifetime abstainers. The relative risk ratios were adjusted for a number of potential confounders, including age, sex, race, education, marital status, body mass index (BMI), smoking, and coronary disease risk/symptoms. The authors interpreted their results with caution however, acknowledging the possibility that other health-related lifestyle characteristics (e.g., exercise, diet) not examined in their study may have attenuated the association between light-moderate wine consumption and mortality. Their cautionary interpretation is supported by a recent study of University of North Carolina (UNC) alumni, which found that adults who preferred wine had healthier diets (more servings of fruit and vegetables, fewer servings of red or fried meats, less cholesterol and saturated fat, more fiber) than those who preferred beer or spirits or had no alcoholic beverage preference (Barefoot et al., 2002). Wine drinkers in the UNC alumni study also were less likely to smoke and more likely to exercise regularly than other drinkers and non-drinkers. Additionally, wine drinkers had a lower mean body mass index than non-drinkers, but were similar to other drinkers in body mass. Several studies based in Europe have identified other health-related factors (e.g., subjective health and well-being, intelligence, and social class) that are associated with wine preference and therefore may confound the association between wine consumption and morbidity or mortality (Grønbaek, 2001, 2004; Grønbaek et al., 1999; Mortensen et al., 2001).

Although prior studies have identified a number of potential confounding factors, most have been limited to Caucasian samples in the U.S. and elsewhere. Thus, little is known about whether and to what extent findings of prior studies may generalize to a more representative population sample. Prior studies also have typically been based on older adult samples so that conclusions could be drawn about the association between light-moderate wine consumption and mortality risk. However, reliance on older adult samples limits our understanding of the developmental pattern of alcoholic beverage preference, level of alcohol use, and related health determinants. Some prior studies have also been limited by not distinguishing between lifetime abstainers and ex-drinkers, which may lead to erroneous conclusions about the beneficial health effects of light-moderate wine consumption (or alcohol use in general) relative to abstinence. These limitations have been noted in recent review articles (Grønbaek, 2001, 2004; Gunzerath et al., 2004; Peele and Brodsky, 2000), indicating the need for additional research with representative samples to better understand the association between light-moderate alcohol use in general, and wine consumption in particular, and morbidity and mortality risk.

The present study examines relationships between wine and other types of alcohol preference (or non-preference), abstinence (lifetime and past year), and long-term health determinants (i.e., socio-demographic, educational, health and lifestyle factors) with a national sample of young adults in the U.S. who participated in the National Longitudinal Study of Adolescent Health (Add Health) (Harris et al., 2003). The Add Health study is being conducted to better understand how

social contextual and individual factors influence a variety of health behaviors in a large nationally representative sample, and provides an excellent opportunity to determine whether relationships between alcoholic beverage preference, level of alcohol use, and other health determinants are observable in young adulthood. Specific health determinants examined in this study include socio-demographic characteristics (age, sex, race/ethnicity, marital status), educational attainment and verbal ability, subjective health, body mass index, exercise and dietary habits, depressive symptoms, smoking history, light-moderate alcohol use and problem drinking. These potential confounders (or conceptually similar constructs) were identified in previous studies and review articles on the association between light-moderate wine consumption (or general alcohol use) and morbidity/mortality risk (e.g., Barefoot et al., 2002; Grønbaek, 2001, 2004; Gunzerath et al., 2004; Klatsy, 1999; Peele and Brodsky, 2000).

2. Methods

2.1. Sample

This study uses computer-based in-home interview data collected in 1995 and 2002 from individuals who participated in the National Longitudinal Study of Adolescent Health (Add Health) in the U.S. (Udry, 2003). Add Health participants ($N = 15,197$) were first interviewed in 1995 as middle or high school students and then in 2002 as young adults. The 1995 Add Health sample was based on a stratified random sample of 134 middle and high schools in 80 communities in 33 states. Sample weights were available for 14,322 (94%) of the sample, of which 12,958 (90%) provided complete data for all study variables. More detail regarding the Add Health study design is provided elsewhere (Harris et al., 2003; Chantala et al., 2003). Permission for use of the Add Health restricted public use dataset was obtained through a contract with the Add Health Project, which included a data security plan that was also approved by the Institutional Review Board of the Pacific Institute for Research and Evaluation.

2.2. Measures

2.2.1. Alcoholic beverage preference

Respondents were asked whether they had one or more alcoholic beverages since 1995 when the first wave of Add Health data were collected, and whether they had one or more alcoholic beverages during the prior 12 months. Respondents who reported drinking at least one alcoholic beverage in the prior 12 months were also asked what type of alcoholic beverage they drank most often. Possible responses included “beer,” “wine,” “wine coolers,” “hard cider,” “straight liquor,” “mixed drinks,” and “whatever is available.” Wine coolers and hard cider were collapsed into a single category as were straight liquor and mixed drinks. Respondents who did not report any alcohol use prior to or after 1995 were classified

as lifetime abstainers, while respondents who reported any alcohol use after 1995 but not in the prior 12 months were classified as ex-drinkers.

2.2.2. Educational attainment and verbal ability

Respondents reported the number of years of formal education they had completed. They also participated in the Add Health Picture Vocabulary Test (AHPVT), which is a measure of receptive (hearing) vocabulary or verbal cognitive ability. The AHPVT included a subset of 87 items from the Peabody Picture Vocabulary Test—Revised (Dunn and Dunn, 1981). All interviewers received training in administration of the AHPVT and were required to pass a pronunciation certification test for all words in the AHPVT. An interviewer read a word aloud and the respondent selected the illustration that best fit its meaning. Each word has four simple black-and-white illustrations arranged in a multiple-choice format. For example, the word “furry” has illustrations of a parrot, dolphin, frog, and cat from which to choose. Raw AHPVT scores were standardized by age (mean = 100, S.D. = 15).

2.2.3. Subjective health

Respondents were asked, “In general, how is your health?” with five response options: “poor,” “fair,” “good,” “very good,” “excellent” that were coded from 1 to 5.

2.2.4. Body mass index

Young adults provided information about their height and weight, which was used to calculate their body mass index (BMI). Respondents were then classified as having a BMI in the normal range (18.5–24.9) or out of the normal range.

2.2.5. Dietary habits

Respondents were asked, “On how many of the past 7 days did you eat food from a fast food place, McDonalds, Kentucky Fried Chicken, Pizza Hut, Taco Bell, or a local fast food restaurant?” with responses ranging from 0 to 7. Young adults were also asked whether they considered themselves to be vegetarians (yes/no).

2.2.6. Exercise habits

Young adults were asked how often in the past 7 days they engaged in a variety of physical activities such as going to a fitness center, riding a bicycle, roller blading or roller skating, and participating in team or individual sports (e.g., football, soccer, swimming, gymnastics), with response values ranging from 0 to 7. An exercise frequency measure was created for each respondent by summing response values.

2.2.7. Depressive symptoms

Young adults responded to nine items from the Center for Epidemiological Studies–Depression Scale (CES-D), which was developed to assess depressive symptomatology in the general population, but is not a measure of clinical depression (Radloff, 1977). Respondents were asked how often in the past 7 days they experienced depressive symptoms such

as not being able to shake off the blues, being too tired to do things, and feeling depressed. Four possible responses to each question were “never or rarely,” “sometimes,” “a lot of the time,” and “most of the time or all of the time,” with corresponding values from 0 to 3. Response values were summed to create a depressive symptoms score for each respondent.

2.2.8. Smoking history

Respondents were asked, “Have you ever smoked cigarettes regularly—that is, at least one cigarette every day for at least 30 days?” (yes/no).

2.2.9. Light-moderate drinking

Respondents were asked how often in the prior 12 months they drank alcohol (none, 1 or 2 days, once a month or less, 2 or 3 days a month, 1 or 2 days a week, 3–5 days a week) and how many drinks they usually had each time. They were also asked how frequently they were drunk in the prior 12 months and how often they had consumed five or more consecutive alcoholic drinks in the past 2 weeks. Respondents were classified as light-moderate drinkers if they reported having no more than 1–2 drinks per occasion and did not report any intoxication in the prior 12 months or heavy drinking in past 2 weeks.

2.2.10. Alcohol-related problems

Young adults were asked how often in the past 12 months they had experienced eight alcohol-related problems, including having a hangover, vomiting, having a regrettable sexual experience, and getting into a physical fight. Five possible responses ranged from “never” to “five or more times” and were coded 0–4. An alcohol-related problems frequency measure was created by summing response values for each respondent.

2.2.11. Socio-demographic characteristics

Young adults reported their age, sex, race/ethnicity, and marital status. Race/ethnicity was treated as a dichotomy (non-Hispanic White versus non-White) as the majority of respondents (66%) were non-Hispanic white.

2.3. Analysis

Preliminary analyses were conducted to compare respondents with and without complete data for all study variables with respect to socio-demographic characteristics and alcohol use. Unadjusted bivariate analyses (*t*-tests and chi-square tests) were then conducted to compare socio-demographic characteristics (age, sex, race/ethnicity, marital status) of wine drinkers versus other subgroups of drinkers and non-drinkers. Socio-demographic variables were then included as covariates in subsequent analyses of covariance comparing levels of health determinants (e.g., educational attainment, dietary and exercise habits) among wine drinkers versus other subgroups of drinkers and non-drinkers. Separate analyses were initially conducted for males and females, but very few sex differences were observed; hence, only detailed analysis

results for the full sample are reported. All analyses were conducted with SUDAAN statistical software (Research Triangle Institute, 2002) to accommodate the unequal weighting of the Add Health sample and to adjust for clustering effects that are attributable to the stratified probability sampling design (Harris et al., 2003; Chantala et al., 2003). The weights for analyses with 1995 and 2002 data provided in the Add Health restricted public use dataset were applied to all of the statistical procedures used for this study.

3. Results

3.1. Non-response attrition

Preliminary analyses indicated that respondents with and without complete data for all study variables were similar with respect to age, sex and marital status. However, respondents with incomplete data were more likely to be non-White and non-drinkers than respondents with complete data. Only respondents with complete data for all study variables ($N = 12,958$) were included in the analyses so that all results would be based on the same group of respondents.

3.2. Wine preference and related health determinants

Results of analyses comparing young adults who preferred wine and other subgroups of drinkers and non-drinkers are provided in Table 1. Unadjusted socio-demographic comparisons at the top of Table 1 indicate that wine drinkers were older and more likely to be female than all of the other subgroups. Wine drinkers also differed from at least some of the other subgroups in their race/ethnicity and marital status. Age, sex, race, and marital status were therefore included as covariates in subsequent analyses.

Wine drinkers had a significantly higher mean level of formal education than young adults in all of the other subgroups, and had a significantly higher mean picture vocabulary test score than all other subgroups except drinkers who had no alcoholic beverage preference. The mean level of subjective health was significantly higher among wine drinkers compared to young adults who preferred wine coolers/hard cider or liquor/mixed drinks and ex-drinkers. A larger percentage of wine drinkers had a normal body mass index than all other subgroups except drinkers with no alcoholic beverage preference. Wine drinkers had a significantly lower frequency of fast food consumption than all of the other subgroups. A larger percentage of wine drinkers considered themselves to be vegetarians compared to all of the other subgroups, but none of the observed differences were statistically significant. Exercise frequency was significantly higher among wine drinkers compared to all of the other subgroups except young adults with no alcoholic beverage preference. Although depressive symptoms were lower among wine drinkers compared to all other subgroups except lifetime abstainers, only drinkers with no alcoholic beverage prefer-

Table 1
Sample characteristics and results of analyses to examine relationships between wine preference and selected health determinants^a

Variable	Alcoholic beverage preference				Non-drinkers			
	Total sample ($N = 12,958$)	Beer ($n = 4348$)	Wine ($n = 584$)	Wine cooler/hard cider ($n = 847$)	Liquor/mixed drinks ($n = 3407$)	No preference ($n = 347$)	Ex-drinker ($n = 1601$)	Lifetime abstainer ($n = 1824$)
Age, mean (S.D.)	21.8 (1.9)	21.9 (1.8)*	22.5 (1.7)	21.4 (1.9)*	21.8 (1.8)*	20.9 (1.7)*	22.0 (1.9)*	21.5 (2.0)*
Male (%)	51.2	69.3*	23.1	19.2	39.1*	55.4*	47.9*	48.3
White (%)	65.8	75.6	71.2	63.7 ^b	65.7	71.3	52.5*	49.1*
Married (%)	16.5	13.0*	18.0	21.4	16.0	3.6*	25.5*	19.0
Adjusted for age, sex, race, and marital status								
Education, mean (S.D.)	13.1 (2.0)	13.2 (2.0)*	14.0 (2.0)	13.0 (1.8)*	13.3 (2.0)*	13.4 (1.8)*	12.5 (1.9)*	12.8 (1.8)*
Vocabulary test score, mean (S.D.)	100.1 (15.0)	100.9 (12.5)*	105.3 (12.0)	99.7 (13.6)*	102.7 (12.9)*	105.1 (12.4)	95.8 (17.6)*	94.5 (19.4)*
Subjective health, mean (S.D.)	4.0 (0.9)	4.0 (0.8)	4.1 (0.9)	3.9 (0.9) ^b	3.9 (0.9) ^b	4.0 (0.9)	3.9 (0.9) ^b	4.1 (0.9)
Normal body mass (%)	48.6	49.9*	58.0	42.5*	46.7*	59.6	47.6*	46.9*
Fast food, mean (S.D.)	2.4 (2.1)	2.4 (2.1)*	1.8 (1.7)	2.4 (1.8)*	2.5 (2.1)*	2.3 (2.0) ^b	2.6 (2.1)*	2.5 (2.1)*
Vegetarian (%)	2.8	2.8	4.5	2.9	2.4	3.8	2.3	3.0
Exercise, mean (S.D.)	7.0 (7.1)	7.0 (7.3)*	8.3 (7.1)	6.6 (5.9)*	7.0 (6.9)*	7.2 (7.5)	6.4 (7.1)*	6.9 (7.5)*
Depressive symptoms, mean (S.D.)	4.4 (4.0)	4.3 (3.7)	4.4 (4.0)	4.6 (4.0)	4.5 (4.1)	5.4 (4.3) ^b	4.8 (4.6)	4.1 (3.9)
Ever a regular smoker (%)	43.1	53.7*	35.6	32.1	43.9*	43.9	42.6 ^b	19.9*
Light-moderate drinker (%)	10.4	8.5*	32.3	39.3	14.8*	7.6*	—	—
Alcohol-related problems, mean (S.D.)	2.7 (3.8)	4.2 (4.3)*	2.4 (2.9)	1.6 (2.7)*	3.1 (3.7)*	4.1 (4.7)*	—	—

^a Wine drinkers are the referent group for all significance tests.

^b $p < 0.05$.

* $p < 0.01$.

ence had a significantly higher level of depressive symptoms. A smaller percentage of wine drinkers had ever been regular smokers compared to young adults who preferred beer or liquor/mixed drinks and ex-drinkers. A larger percentage of wine drinkers were light-moderate drinkers compared to young adults who preferred beer or liquor/mixed drinks and drinkers who had no alcoholic beverage preference. Wine drinkers also reported fewer alcohol-related problems in the past year compared to young adults who preferred beer or liquor/mixed drinks and drinkers who had no alcoholic beverage preference. However, the number of alcohol-related problems among wine drinkers was significantly higher than the number of problems reported by young adults who preferred wine coolers/hard cider.

3.3. Sex differences

Analysis results were generally very similar for males and females, but two exceptions are noteworthy. The percentage of female wine drinkers with a normal body mass index (68%) was significantly higher than all of the other subgroups, while those differences were less prominent and consistent for males. Female wine drinkers reported significantly fewer depressive symptoms than all of the other subgroups, while male wine drinkers were similar or somewhat higher than other subgroups in depressive symptoms. Thus, observed differences in normal body mass and depressive symptoms for the entire Add Health young adult sample are primarily driven by significant differences in these health indicators among female wine drinkers versus other subgroups.

4. Discussion

This study provides further evidence that light-moderate wine consumption is more likely among adults who have more formal education, better health status indicators, and healthier lifestyle habits than adults who prefer other types of alcoholic beverages and non-drinkers. Finding this pattern of relationships between wine preference and various health determinants in a young adult sample raises more questions about prospective studies that have found beneficial effects of light-moderate wine consumption on long-term health and life expectancy, given the importance of other health determinants (e.g., education, diet, exercise, body mass, smoking) examined in this study (Klatsky et al., 2003; Grønbaek, 2001; Gunzerath et al., 2004; Mortensen et al., 2001). Our findings are compelling because such a large proportion of healthy young adults prefer other types of alcoholic beverages (e.g., beer) and engage in occasional heavy drinking—a phenomenon that is most prevalent among college students (Windle, 2003). Thus, it would not have been surprising to find no differences in educational, health and lifestyle characteristics between young adults who preferred wine versus those who preferred other types of alcoholic beverages and non-drinkers.

Our reliance on cross-sectional data for most of the analyses leaves to question the temporal ordering of relationships between alcoholic beverage preference and other health determinants examined in this study. However, additional analyses conducted with 1995 measures of family SES (parent education, household income), academic achievement, college intentions, and subjective health also indicated that wine preference in young adulthood was positively associated with higher levels of these potential long-term health determinants. These results suggest that light-moderate wine consumption in adulthood is influenced by social class, academic achievement, and good health habits that are established in childhood and adolescence. It is also possible that parents' wine preference has an influence on alcoholic beverage preference among their children, but this could not be determined with Add Health data.

Study findings should be considered in light of several other potential limitations. Non-response attrition may have influenced analysis results in unknown ways as respondents who did not provide complete data for all study variables were more likely to be non-White and non-drinkers than respondents who provided complete data. Self-report data are subject to social desirability and recall bias, which also may have influenced our results in unknown ways. Finally, there may be other long-term health determinants (e.g., medical conditions) not examined in this study that are associated with wine preference and may therefore help to explain the association between light-moderate wine consumption and mortality in later adulthood.

In conclusion, this study points to the importance of socio-demographic, educational, health and lifestyle factors that may act as confounders of the relationship between light-moderate wine consumption, morbidity and mortality. Future studies on the health effects of light-moderate alcohol use and wine consumption should include a more comprehensive set of potential confounders such as those identified in this study to determine whether these types of alcohol use actually have beneficial long-term health effects.

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