Relations of Personality and Occupation with Alcohol Consumption

by

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Abstract

This study examines the relations between adult personality traits and alcohol use one decade later, and between concurrent occupation and alcohol use. Participants were approximately 700 males from the Terman Life Cycle Study started in 1921 (Terman, 1926). Alcohol consumption was reported in 1950, when the participants were about 40 years old. We coded occupations of the participants using the Standard Occupational Classification (U.S. Bureau of Labor Statistics, 2000). Agreeableness and conscientiousness (measured in 1940) correlated negatively with later alcohol consumption, whereas extraversion and neuroticism correlated positively with later alcohol consumption. Using logistic regression, Arts and Entertainment occupations significantly predicted alcohol consumption overall, but failed to reach statistical significance once personality was controlled, thus suggesting that personality partially explains (or mediates) this link. Professional occupations (such as engineering), however, predicted lower alcohol consumption even after controlling for personality. These results suggest personality and occupation play unique roles in alcohol use, but also partially overlap.

Relations of Personality and Occupation with Alcohol Consumption

Alcohol consumption has been studied in myriad ways for decades, and alcohol may be considered one of the oldest drugs. Alcohol is also a widely available drug in most countries. It is important to note that the majority of people who drink alcohol do so in moderation and do not suffer deleterious effects. Some research has suggested that there may be protective health effects from consuming small quantities of alcohol. It is the minority of alcohol drinkers who experience problems related to their drinking and could be thought of as "alcoholics" or abusing alcohol.

Before reviewing the literature on alcohol research, several points in research design should be highlighted. One difficulty in conducting research on alcohol is in defining what is an appropriate behavioral measure or outcome. Broadly speaking, researchers consider three dimensions: actual alcohol consumption, problems related to alcohol (e.g., arrests, job loss, social problems), and health outcomes (e.g., liver cirrhosis, mortality, mental health problems). Many measures use a combination of these for assessment (e.g., Cahalan, 1970; DSM–IV–TR, 2000). Although these multidimensional methods of assessment provide a more complete picture of alcohol use, similar terms (e.g., "alcohol abuse" or "alcoholic") have been operationalized very differently. Consequently, caution must be taken when comparing results across studies. For the sake of the present discussion, alcohol consumption will refer specifically to drinking any alcohol, whereas alcohol abuse will refer to heavy consumption, abuse, dependence, and other related problems. Another note is that many studies on alcohol use surveys and other self-reports that may be biased. It is generally believed that self-reported alcohol

assessment underestimates actual consumption or problems related to alcohol, possibly due to its low social desirability; however, Vaillant (1995) found that in some cases, participants initially overestimated how much they consumed as a means of bragging. A final point to keep in mind is that many studies take place once participants already have a history of alcohol abuse. This confounds whether observed differences were antecedents or results of alcohol abuse.

Personality and Alcohol Use

Numerous dimensions of personality have been theorized to influence alcohol use. For instance, people high in novelty seeking (NS) are thought to be drawn toward using alcohol. Those high in harm avoidance (HA) are thought to avoid consuming alcohol due to strong inhibitions, but if they start they will use it more severely, once their inhibitions are numbed. Neuroticism can be characterized as emotional instability and anxiety, and as such was thought to be linked with alcohol abuse. Extraversion, or sociability, has been theorized to relate to alcohol abuse because of increased social drinking and peer pressure. Recent research has addressed many of these questions, and has given us a more nuanced view of the risk factors and predictors of alcohol abuse.

Alcohol is popularly thought to be the result of an anxious, dependent, unstable personality, and many studies have retrospectively confirmed this; however, results from a large, prospective, longitudinal study paint a different picture of alcohol use than many of the prior, retrospective studies. Vaillant (1995) reports that many of the variables associated with alcohol actually occur *after* alcohol use has started and frequently become more pronounced as the level of abuse increases. Following two samples of

males across several decades, Vaillant found that alcohol use predated anxiety and instability (neuroticism). Vaillant also found increased anxiety and neuroticism after alcohol abuse. Additionally, during periods when alcoholics did not drink, levels of anxiety and neuroticism decreased over time often returning to a normal range. One limitation of this study is that it only followed males limiting the generalizability.

In one influential study, Cloninger, Sigvardsson, and Bohman (1988) examined three dimensions of personality in childhood as predictors of alcohol abuse in adulthood. Personality measures were taken at approximately age 11, before any alcohol use was likely to have occurred. From the measures, three factors were extracted—novelty seeking (NS), harm avoidance (HA), and reward dependence (RD). They posited two types of alcoholism—Type 1 characterized by low NS and high HA and RD and Type 2 characterized by high NS and low in HA and RD. Alcohol abuse was assessed at age 27 from a combination of diagnoses or treatments of alcoholism and other problems related to alcohol consumption. They found that all three dimensions were significant childhood predictors of early adult alcohol abuse. Additionally, risk of alcohol abuse increased exponentially as personality scores deviated from the mean, which supported their theory that being either high or low on any of the dimensions increased one's risk of alcohol abuse. Further work by Cloninger, Sigvardsson, Przybeck, and Svrakic (1995) suggests that the relations between NS, HA, RD, and alcohol use may be more complex, interacting with gender, age, and level of alcohol use (i.e., consumption, abuse, dependence, etc.). Using retrospective data, they found that high NS and low RD were related to ever consuming alcohol and more severe alcohol use. However, ever

consuming alcohol was related to low HA while more severe alcohol use was related to high HA.

Research has long noted that alcohol use runs in families. More recently, studies have looked specifically at genetic risk and the heritability of alcohol use (e.g., Cloninger, 1987). Although the heritability estimates vary, there does seem to be a robust relationship between genes and alcohol use. Slutske et al. (2002) studied both personality and genes as predictors of alcohol dependence in a large sample of twins. They found that genes and the personality dimension of behavior undercontrol (a combination of the NS dimension of the Tridimensional Personality Questionnaire (TDP; Cloninger, Przybeck, & Švrakić, 1991) and aspects of the Eysenck Personality Questionnaire (Eysenck, Eysenck, & Barrett, 1985) that involve novelty seeking, impulsivity, thrill seeking, and irresponsibility) were significantly related to alcohol dependence. Specifically, alcohol dependence and behavioral undercontrol shared genetic risk, and behavioral undercontrol explained approximately 40% of the variation in genetic risk for alcohol dependence. This research suggests that psychological factors partially mediate the genetic influence on alcohol use. Slutske et al. posited that different physiological responses to alcohol (such as ease of intoxication or severity of withdrawal symptoms) may explain the remaining variation in genetic risk.

Another study using the TDP found that NS was positively related to alcohol consumption and HA was negatively related to alcohol consumption in college students (Skeel, Pilarski, Pytlak, & Neudecker, 2008). They also tested a behavioral measure of risk taking, but did not find a significant relationship between the behavioral measure and

alcohol consumption. When they tested both personality and the behavioral measure in a hierarchical regression model, personality was a significant predictor and the personality x behavioral measure interaction was a significant predictor such that the behavioral measure of risk taking was more important for participants who were low on NS and high on HA (this is actually similar to Cloninger's 1988 conception of Type 1 alcoholism). In sum, there are at least some established links between personality and alcohol use.

Environment, Demographics and Alcohol Use

Research on alcohol consumption has found many relations to environmental variables. Environment includes factors such as social relationships (e.g., family, friends, and romantic partners), culture, socioeconomic status (SES), geography, and occupation. Numerous studies have researched all of these factors and have revealed several robust findings. Also considered in this section are two demographic variables—age and sex.

In a famous study based on a probability sampled national survey, Cahalan and Room (1972) noted that males ages 21–59 had particularly high rates of alcohol use. In this group (males ages 21–59), those with high SES were more likely to have ever consumed alcohol; however those with low SES were more likely to have experienced more problems (e.g., heavy intake or binge drinking, health, social, financial, and legal) as a result of alcohol use. Cahalan and Room purposefully used a broad definition for alcohol related problems to paint the fullest picture. Splitting age into 8 subgroups, 40% of those who were 21–24 had 7 or more alcohol related problems versus only 20% for all ages (21–59). Looking at regions that were traditionally "wet" (i.e., consumed more alcohol) or "dry" (i.e., consumed less alcohol), more people consumed alcohol in the

"wet" regions; however, more people suffered consequences from alcohol use in the "dry" regions (despite lower overall use). In a multivariate regression analysis of demographic variables, the top predictors of alcohol use were low SES, living in a central city, youth, and childhood disjunction. When psychosocial variables were included, the top predictors of alcohol use were drinking by significant others, tolerance of deviance, one's own attitude toward drinking, and low SES. Cahalan and Room concluded that environmental factors are more influential than most psychosocial factors. Although they did not expressly analyze interaction effects, there does appear to be the general trend that when the culture (whether it is regional, religious, racial, etc.) discourages drinking, the overall rates of alcohol consumption are lower, but people who do drink have disproportionately high rates of problems related to drinking.

Using data from a longitudinal, nationally representative, probability sample of young adults, Mossakowski (2008) studied whether duration of poverty and duration of involuntary unemployment were related to heavy drinking. Controlling for demographic variables, prior alcohol use, present unemployment, and present poverty, the duration of poverty and involuntary unemployment were significantly related to the number of participants who were heavy drinkers. Controlling for the same variables but looking at poverty and involuntary unemployment in groups—1 to 2 years, 3 to 4 years, and 5 or more years—poverty or involuntary unemployment for 3–4 or 5+ years were significant predictors of the frequency of heavy drinking. This suggests that it may be the cumulative effects of low SES rather than current SES that influence alcohol use and that there may be a minimum threshold.

Vaillant (1995) examined childhood variables and adult alcohol use. Boyhood competence, childhood environmental strengths, and education were negatively correlated with alcohol use, whereas having alcoholic parents or relatives was positively correlated. Several demographic variables were also important. In a regression analysis, parental social class did not predict alcohol use, but ethnicity did, even after partialing out other predictors such as familial alcohol use and childhood environment variable. This suggests that different cultures may have differential influences on alcohol use. For example, Vaillant suggested that cultures that practice moderate alcohol consumption use may have lower rates of alcohol abuse than cultures where any consumption is frowned upon or where intoxication is broadly accepted.

Occupation and Alcohol Use

Looking at occupation and the work environment, three common paradigms present themselves. The *work-stress paradigm* (Frone, 1999) is the combination of alienation (e.g., low-skill jobs, boredom, or unsatisfying work) and work stress (e.g., social conflicts or demanding workload). The *social control paradigm* relates integration and regulation (e.g., setting one's own schedule and little or no regulation of work until the completed product such as a reporter or artist) to alcohol use. The *culture and availability paradigm* relates individual work cultures and degree of availability (physically or through social permission) to alcohol use (e.g., restaurant workers often have easy physical access to alcohol and permissive work cultures).

Research on the work-stress paradigm has yielded a variety of results (Frone, 1999). One reason for this, as previously mentioned, is that a variety of outcomes can be

assessed for alcohol. Frone theorized that different stressors might differentially influence the different outcomes. For instance, work stressors may increase heavy episodic consumption, but not overall consumption, or they may not significantly influence consumption but cause an increase in problems related to consumption. Frone also thought that mediating and moderating variables may differentially influence alcohol outcomes. To gain a more comprehensive view of work stressors and alcohol use, Frone suggested testing models including work stressors, mediators (such as anxiety, job dissatisfaction, or negative affect), moderators (e.g., sex or intrinsic motivation), and multiple alcohol outcomes (e.g., frequency and quantity of consumption and alcohol related problems).

Perhaps one of the most popular conceptions of alcohol consumption is that it is a way to "escape" from reality or unwind after a hard day. More technically, this could be viewed as anxiety or stress relieving. However as noted above, work stress and alcohol use are not consistently related. Grunberg, Moore, Anderson-Connolly, and Greenberg (1999) studied drinking motivation (particularly escapist reasoning) as a moderator of the work stress and alcohol use relationship in a cross-sectional sample of adult employees. They measured alcohol consumption and problems and three motivations for drinking—escape, enjoyment, and social. Work stress was neither significantly correlated with alcohol consumption nor with alcohol problems. Using regression analyses to predict alcohol consumption and alcohol problems individually, all three motivations for drinking were significant with enjoyment being the strongest predictor for alcohol consumption and escape being the strongest predictor for alcohol problems. Work stress

emerged as a significant, small, negative predictor of both alcohol consumption and problems (β = -.055 and β = -.041, respectively). However, the Work Stress x Escape interaction was both significant and positive for both consumption and problems; the effect of escapist reasons for drinking was higher for those high in stress and was lower for those low in stress. These findings lend support to the theory that work stress is related to alcohol use, but they also highlight the complexity of the relationship and the need to look for moderators between work stress and alcohol use.

Frone (1999) theorized that different types of work stressors would have differential relationships with alcohol outcomes. Wiesner, Windle, and Freeman (2005) examined five different work stressors (high workload, high cognitive demands, high job boredom, low skill variety, and low autonomy) and three alcohol outcomes (heavy consumption, binge episodes, and an index of the quantity and frequency of consumption). After adjusting for the control variables and including all work stressors in the model, low skill variety and low autonomy were significant predictors of heavy consumption. None of the other work stressors achieved significance after adjusting for control variables and including all stressors; however, in a univariate model, high job boredom was slightly predictive of binge episodes. This supports Frone's theory that different work stressors relate to different alcohol outcomes. The authors also concluded that many studies may overestimate the effects of work stress if they do not control for confounds such as stressful life events, prior mental health, and marital status.

More recently, Frone (2008) studied work stressors—work overload and job insecurity—and overall alcohol use and alcohol use before, during, and after work. Frone

hypothesized that if alcohol is consumed to relieve stress and anxiety (the tension reduction hypothesis), work stress effects should be most salient during or after the workday. Consistent with his hypotheses, work overload and job insecurity were not significant predictors of overall alcohol use or alcohol use before work; however, work overload was a significant predictor of alcohol use during and after the workday and job insecurity was a significant predictor of alcohol use during, but not after the workday. Additional tests comparing the strength of work overload and job insecurity as predictors of alcohol use during and after the workday to overall use, found that both were significantly higher for during or after workday than for overall alcohol use. These results not only suggest that work stressors may be important predictors of alcohol use during and after work, they also suggest that the temporal context is important. In particular, this may suggest that the effects of work stress are relatively temporary. One possible implication is that prior jobs may be irrelevant for current alcohol use.

In a broader study of alcohol use overall and during the workday in adolescents ages 16–19, Frone (2003) looked at predictors from all three of the paradigms in addition to personality, alcohol use outcome expectancies (degree to which participants expected alcohol use to help improve their moods or performance), and demographic variables. He studied low autonomy, job meaninglessness, distributive injustice, work demands, environmental hazards, and interpersonal conflict to test the work stress paradigm; job visibility for the social control paradigm; and physical and social availability of alcohol for the culture and availability paradigm. Outcome expectancy variables included affect

regulation and performance regulation, and the four personality variables were rebelliousness, impulsivity, risk taking, and negative affectivity.

Predicting overall alcohol use, only impulsivity, risk taking, affect regulation, and performance regulation were significant. The results were slightly different for alcohol use during the workday where rebelliousness, performance regulation, social availability, and job visibility were the significant predictors. These findings are consistent with prior literature on personality that impulsivity and risk taking are related to overall alcohol use. It is not overly surprising that rebelliousness is related to adolescent alcohol use during the workday. Participants who believed alcohol use would help cognitive or behavioral performance were more likely to drink both overall and on the job, although believing it would improve mood only appeared relevant for overall use. Additionally, these findings support the social control paradigm and the culture and availability paradigm for alcohol use during the workday, but not the work stress paradigm.

Reviewing literature on occupations and alcohol use, Plant (1979) noted that seamen, lawyers, military personnel, physicians, alcohol manufacturers, and bartenders and restaurant workers to a lesser extent, had particularly high rates. Most of these occupations also had disproportionately high rates of male mortality from liver cirrhosis, a disease related to heavy alcohol consumption. Summarizing prior literature, Plant suggested several occupational risk factors: availability, social pressure to drink, separation from normal relationships (e.g., military service or business travels), lack of supervision, affluence/poverty, collusion by colleagues, and stress. These can be grouped into two broad categories, increased risk—availability, social pressure, and stress—and

decreased inhibition—lack of supervision and collusion. Separation from normal relationships and affluence/poverty could be viewed as fitting into both categories. Especially at risk occupations should include elements from both categories. In a longitudinal study by Plant of newly hired alcohol brewery workers and workers from a control company, he found that the brewery workers had higher levels of alcohol consumption at the start of and over the course of employment increased more than the control workers did. This suggests both that there is a pre-selection bias and that the occupation had an effect. In surveys, the brewery workers were more likely to indicate that there were high rates of alcohol consumption amongst employees and that the workers and management often accepted alcohol consumption even on the job. There were even a few cases of management moving employees to positions where on the job alcohol consumption would have a less deleterious effect.

The present study examines the relations between personality, occupation, and alcohol consumption. Based on prior research it is hypothesized that:

1) Conscientiousness will predict lower levels of alcohol consumption ten years later.
2) Extraversion will be positively related to alcohol consumption; specifically, extraverted individuals will be more likely to be moderate or heavy drinkers.
3) Neuroticism will predict higher levels of alcohol consumption ten years later.
4) Arts and Entertainment occupations will be positively related to heavy alcohol consumption.

Method

Participants

Data came from male participants (N = 856) in the Terman Life Cycle study started in 1921 (see Terman, 1926 for detailed sampling methods and Terman & Oden, 1947 for details on the complete sample). Only males were examined because in the 1950s when occupation measures were collected, a limited sample of females worked outside of the home. The mean year of birth for participants was 1910 (SD = 3.78). Teachers from major metropolitan areas in California were asked to nominate their brightest and youngest students. Terman and his team administered IQ tests to these students and selected those with IQ scores 135 and above to participate in the study. The sample was predominantly middle class and of European ancestry. Participants have been followed at regular intervals through death. Participants were excluded if they were missing data on the 1950 alcohol consumption measure (whether due to dropping-out, death, or not responding in 1950; n = 143). Three additional participants were excluded who were missing data on both predictors (personality and occupation). This left a sample size of 710 participants who had data on alcohol consumption and at least one predictor. Comparing the means of alcohol and personality variables for participants who were included and excluded from the study yielded no significant differences. Analyses were performed on the 710 participants. The sample sizes for individual analyses vary somewhat due to missing data on one or the other predictor, and consequently are reported individually.

Measures

Adult Personality. Self-reported personality variables from archival measures collected by Terman and his team in the 1940 assessment were factor analyzed and

validated with a contemporary sample (Martin & Friedman, 2000). Martin and Friedman extracted five factors, four of which mapped onto the neuroticism, extraversion, conscientiousness, and agreeableness factors of the NEO-PI-R. The fifth factor did not match the fifth factor of the NEO-PI-R, openness. This study only used the neuroticism, extraversion, conscientiousness, and agreeableness factors. From the sample, 629 participants had complete personality data from the 1940 measurement for all four factors.

Alcohol Consumption. In the 1950s, Terman and his team collected self-report data on alcohol consumption. The data was recoded into a three-point scale. Participants that abstained from or rarely drank alcohol were coded as light drinkers, participants who drank moderately were coded as moderate drinkers, and participants who drank heavily or had problems related to alcohol consumption were coded as heavy drinkers (see Appendix A for the original questions and recoded levels). Since participants were excluded from the sample if they were missing data on alcohol consumption, there were 710 participants with complete data on alcohol consumption.

Occupation. In the 1950 assessment by Terman, participants filled out surveys that included the title(s) of their occupation(s), a brief description of their duties, and their income from 1946 to 1949. Six trained research assistants in our lab coded the participants' occupations from their titles and descriptions using the Standard Occupational Classification (SOC; U.S. Bureau of Labor Statistics, 2000). At least two separate coders coded each occupation. At the highest level of aggregation (23 unique occupations) given in the SOC, the overall reliability was $\alpha = .86$[1]. In cases of

disagreement, the researcher (Wiley) coded the occupations. If at least two coders still did not agree, a fourth coder was brought in and any remaining cases were discussed until a consensus was reached. For statistical analyses, the final codes based on the SOC were further aggregated into seven separate groups: Arts and Entertainment, Health Practitioner, Legal, Management and Business, Military, Non-professional, Professional (see Appendix B for details). To avoid analyzing temporary jobs, only occupations that were stable across the 1946 to 1949 period were used. Of the 710 participants in the sample, there were 674 with data on occupation (see Table 1 for the sample size of each aggregate group hereafter simply referred to as occupations).

Data Analysis

To test the predicted relationships between alcohol consumption and conscientiousness, extraversion, and neuroticism, contrast analyses were used[2]. Contrast *t* tests use λ weights to test how well specific theories fit the data. The *r*s reported with the *t* statistics are contrast *r*s, which are the correlations between groups and λ weights partialing out between-group variation except for the contrast. Because there were predictions, one-tailed *p*-values are reported unless otherwise specified. Two-sample *t* tests were used to test whether the means of certain occupations were significantly different from the other occupations.

Logistic regression was used to test the effects of personality and occupation controlling for one another. The dependent variable, alcohol consumption, was coded as a dichotomous outcome (heavy vs. light and moderate combined). The personality variables were also scaled such that the odds ratios for each variable represent a change

from the 25th percentile to the 75th percentile (interquartile odds ratios). Occupation variables were dummy coded with 1 assigned to participants in the occupation and 0 assigned to every other occupation. The sample size for the regression models (n = 593) was somewhat smaller than for the t tests because it only included participants who had complete data for 1950 alcohol consumption, occupation, and personality. All analyses were conducted using R version 2.11.0.

Results

Personality and Alcohol

Table 2 presents the descriptive statistics for the study variables. Table 3 is a contingency table of alcohol by personality by occupation. The table shows the number of participants, split by level of alcohol use (light, moderate, heavy) and tertile split personality (low, medium, high) for each occupation. The intercorrelations between personality traits and alcohol consumption are shown in Table 4. Based on past research and theory, conscientiousness was predicted to be negatively related to alcohol consumption[3] while extraversion and neuroticism were predicted to be positively related to alcohol consumption. No predictions were made for agreeableness because when effects are found, the direction frequently differs. The correlations followed these predictions. Interestingly, there was a small, negative correlation between agreeableness and alcohol consumption.

The predicted relationships were tested using contrast t-tests. For conscientiousness, a negative linear trend was predicted, with conscientious individuals drinking less alcohol (λs +1, 0, -1 for light, moderate, and heavy alcohol use,

respectively). As predicted, high conscientiousness was related to lower alcohol consumption, $t(626) = 6.66$, $p < .001$, $r = .26$. For extraversion, it was predicted that extraversion would predict moderate and heavy drinking equally (λs -2, +1, +1). The theory for extraversion fit well, although the effect was more modest than for conscientiousness, $t(626) = 4.35$, $p < .001$, $r = .17$. For neuroticism, a positive linear trend was predicted (λs -1, 0, +1). Surprisingly, this was the weakest relationship, $t(626) = 2.63$, $p = .004$, $r = .10$.

Occupation and Alcohol

The means of the personality variables and alcohol consumption by occupation are reported in Table 5. The hypothesis that Arts and Entertainment occupations would have higher rates of alcohol consumption than other occupations was tested using a two-sample t-test comparing the means. Additionally, due to prior suggestions (e.g., Plant, 1979) that lawyers and doctors drink more than average, those occupations were also tested. Contrary to past findings, Legal occupations did not have significantly higher levels of alcohol consumption $t(672) = 0.33$, $p = .37$, $r = .01$. In addition, Health Practitioner occupations did not differ significantly from other occupations, $t(672) = 1.34$, $p = .09$, $r = .05$. The hypothesis that Arts and Entertainment occupations would have higher rates of alcohol consumption was supported, $t(672) = 2.49$, $p = .007$, $r = .10$. As an exploratory measure, the remaining five occupations (including unemployed) were also tested. After using an ensemble adjustment, none of the remaining occupations approached significance except for Professional occupations, $t(672) = -4.07$, ensemble adjusted $p < .001$ two-tailed, $r = .16$.

In order to examine Arts and Entertainment and Professional occupations as predictors of alcohol consumption controlling for personality, logistic regression was used. The occupation predictors were dummy coded, with people in an occupation coded as 1 and all others coded as 0. The personality variables were mean centered prior to entering. Alcohol consumption was dummy coded as heavy vs. light and moderate drinking. Table 6 shows the interquartile odd ratios for each predictor. The first model in Table 6 predicts heavy alcohol use from the personality variables. Agreeableness and conscientiousness predict significantly lower risk (OR = 0.56, $p = .006$ and OR = 0.45, $p < .001$ respectively) of heavy alcohol use. In other words, someone in the 75th percentile of conscientiousness only has .45 times, or less than half, the odds of being a heavy drinker than someone in the 25th percentile of conscientiousness. Extraversion predicted increased risk (OR = 1.30, $p = .19$) of being a heavy drinker, although it was not significant. Neuroticism did not predict risk (OR = 1, $p = .98$) for heavy drinking.

Model 2 predicts heavy alcohol consumption from Arts and Entertainment occupations. Arts and Entertainment related to significantly higher risk of heavy drinking (OR = 2.36, $p = .03$) than all the other occupations. That is, men with Arts and Entertainment occupations had over twice the odds of being heavy drinkers than men in other occupations. In Model 3, personality variables are added into the Model 2 equation. Once the effects of personality are accounted for, the unique contribution of Arts and Entertainment is no longer significant (OR = 1.64, $p = .26$). The ORs for the personality variables remained relatively unchanged from Model 1.

In Model 4, alcohol consumption is predicted from Professional occupations. People in Professional occupations had less than half the odds of being heavy drinkers than those in other occupations (OR = .46, p = .02). As before, Model 5 adds the personality variables into the Model 4 equation. Again, the effects of personality variables stayed about the same as Model 1. However, Professional occupations remained a significant predictor of lower risk for heavy alcohol use (OR = .48, p = .04) even when controlling for personality.

Discussion

The present study found significant relationships between personality and alcohol consumption, with the strongest relation for conscientiousness. However, contrary to expectation and prior theory, neuroticism had the weakest relationship. In fact, when heavy vs. light and moderate alcohol consumption was being predicted and other personality variables were controlled for, there was no effect of neuroticism. Contrary to prior research, Legal and Health Practitioner occupations were not related to significantly higher alcohol consumption, although both were in the expected direction. The hypothesis that Arts and Entertainment occupations would be positively related to heavy alcohol use was supported in overall (zero-order) analyses. However, once personality was accounted for, these occupations were no longer a significant predictor of heavy drinking. In contrast, having a Professional occupation (e.g., Computer and Mathematical occupation, Architecture and Engineering occupation, or Education, Training, and Library occupation) predicted lower alcohol use even after controlling for personality.

Consistent with past research, conscientious individuals had a lower risk for heavy alcohol consumption. This finding is also consonant with the idea that conscientious individuals take better care of themselves and engage in fewer risky behaviors (e.g., Friedman et al., 1995) and with prior studies on the Terman sample (e.g., Tucker et al., 1995), which found that childhood conscientiousness predicted less alcohol use in adulthood. The effect of conscientiousness remained relatively unchanged when controlling for occupation, which suggests the effect may be due to more than just niche picking. Perhaps the most straightforward explanation for this is that conscientious individuals simply prefer or choose not to drink as much.

In this study, agreeableness predicted significantly lower risk of heavy alcohol consumption. This finding is especially interesting because past literature has been inconsistent on whether agreeableness was related to increased or decreased alcohol use. Amongst male alcoholics, Vaillant (1995) found that being married was related to better outcomes, and that marriage was often related to a return to asymptomatic drinking. Spouses may serve as a "wake up" call and may exert pressure to refrain from heavy drinking. One of the questions for agreeableness was, "Do you often ignore the feelings of others when doing something that is important to you?" (reverse coded; Martin & Friedman, 2000). Perhaps agreeableness was related to a decreased risk of heavy alcohol consumption in this sample because men who were highly agreeable would tend to be more responsive to the feelings and suggestions of their spouses (or other social contacts), which in turn may have regulated how much they drank.

Also noteworthy was the finding that neuroticism was not related to heavy drinking after controlling for other personality variables. This may be explained by the temporal measurements of personality and alcohol consumption. Most of the studies that have found neuroticism to be related to alcohol abuse have used a cross sectional design. In a prospective, longitudinal study, (Vaillant, 1995) alcohol abuse actually predated the neurotic characteristics. Vaillant suggested that alcohol abuse may actually lead to the neurotic characteristics. This may explain why there was no effect of neuroticism on alcohol consumption in the present study, since neuroticism was measured a decade before alcohol consumption. One note of caution with this interpretation is that it assumes that participants were not already heavy drinkers in 1940 when personality was measured.

The Arts and Entertainment occupations predicted significantly higher risk of heavy alcohol consumption when entered into a single predictor model but did not predict significantly higher risk when entered into a model with the personality variables. This indicates that Arts and Entertainment occupations and personality do not account for completely unique variance. There may be a selection bias in Arts and Entertainment occupations such that people with certain constellations of personality traits are more likely to choose those occupations and more likely to be heavy drinkers. This seems particularly plausible because personality measures were collected in the 1940s, a decade before the alcohol and occupation measures. Of course, this design does not permit direct causal inference. There were no hypotheses regarding Professional occupations; however, this category predicted significantly lower risk of being a heavy drinker. The

findings regarding occupations are also noteworthy because of the relative homogeneity of the sample. All participants were males, had IQ scores of at least 135, and the majority came from a middle class background. This makes it unlikely that these effects can be attributed to differences in class or educational opportunities. The lower risk in Professional occupations is consonant with the *work-stress paradigm*, which theorizes that low-skill jobs and job boredom relate to higher alcohol use. The increased risk in Arts and Entertainment occupations fits with the *social control paradigm*, which theorizes that jobs with less regulation (e.g., being able to set your own schedule) will have higher levels of alcohol use. Finally, according to the *culture and availability paradigm*, jobs have unique cultures that vary on how permissively they view alcohol use. It is possible that the cultures of Professional occupations are less permissive regarding alcohol use and those of Arts and Entertainment occupations are more permissive. Overall, the results suggest that both occupation and personality are important predictors of alcohol consumption, and both account for unique variance in alcohol consumption.

While the relative homogeneity of the sample is one of its strengths, it also curtails the generalizability of the findings. It is also important to recall that the data was collected in the 1940s and 1950s. The general results of this study are probably more relevant than trying to infer the odds ratios of people in professional occupations or in the upper tertile of extraversion today. These findings extend the current research by showing that occupation relates to alcohol consumption, and that this relationship cannot be explained by several major personality traits. Due to the high intelligence of the

sample and overall high levels of education, it is also likely that occupation is not just measuring the difference of individuals coming from a wealthy, educated background versus those coming from an uneducated or derelict background. This suggests that future research may be able to find predictors of alcohol use by examining differences in the workplace between high and low risk occupations. Questions such as "Why did some people in low risk occupations nevertheless experience alcohol problems?" and "Are there specific workplace variables that account for the overall occupation effect?" remain to be answered. Future research could benefit from focusing on finding factors that explain within occupation variation.

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Footnotes

[1] Cronbach's α was computed by first dummy coding each raters' occupation codes for each of the 23 major group occupations from the Standard Occupational Classification. Next, correlations were calculated between these dummy codes for each of the 6 rater sets. That is, the degree of agreement for each pair of raters for each major occupation group. Using these correlations, it was possible to compute an overall reliability using the formula for Cronbach's α.

[2] Contrast analyses allow focused testing of specific theories. Contrast t tests apply predicted weights to the means prior to calculation. This allows for more than two groups and theories that are not linear to be tested. If the actual pattern of means fits the predicted pattern well, then there will be a large, significant t statistic. Contrast correlations are effect size estimates for the contrast t statistics. Rosenthal, Rosnow, and Rubin (2000) describe contrast analyses in detail and provide formulas to calculate them.

[3] Research relating light or moderate levels of alcohol consumption with decreased risk for cardiovascular disease had not occurred when the participants filled out the surveys so there is no reason to assume that conscientious individuals would have made a point to drink moderately as opposed to abstaining.

Table 1

Number of Participants per Occupation

Occupation	*n*
Unemployed	8
Management and Business	171
Professional	197
Legal	71
Arts and Entertainment	49
Health Practitioner	36
Non-professional	121
Military	21
Total	674

Note. Occupations come from the aggregate groups found in Appendix B.

Table 2

Descriptive Statistics for Study Variables

Variable	*n*	*M* [95% CI]	*SD*	Median	Min	Max
Agreeableness	629	9.90 [9.86, 9.95]	0.57	9.95	8.31	11.12
Conscientiousness	629	10.07 [10.02, 10.12]	0.64	10.17	8.07	11.68
Extraversion	629	9.97 [9.92, 10.02]	0.65	9.95	8.39	11.61
Neuroticism	629	9.92 [9.87, 9.97]	0.61	9.83	8.76	11.89
Alcohol 1950	710	1.94 [1.9, 1.98]	0.55	2	1	3

Table 3

Contingency Table of Alcohol Use by Occupation and Personality

		Agreeableness			Conscientiousness			Extraversion			Neuroticism			
Occupation	Alcohol	Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High	Total
Unemployed	Light	1	0	0	0	0	1	0	1	0	0	1	0	1
	Moderate	1	3	1	2	3	0	1	3	1	1	2	2	5
	Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0
Management and Business	Light	4	8	9	3	11	7	9	8	4	11	3	7	21
	Moderate	34	48	34	30	40	46	24	49	43	50	35	31	116
	Heavy	10	4	2	6	8	2	4	6	6	3	7	6	16
Professional	Light	12	16	18	11	17	18	24	14	8	15	17	14	46
	Moderate	42	36	44	42	47	33	49	35	38	35	46	41	122
	Heavy	5	4	2	7	0	4	4	2	5	5	2	4	11
Legal	Light	4	5	3	1	3	8	5	2	5	8	1	3	12
	Moderate	12	13	19	8	15	21	16	13	15	14	19	11	44
	Heavy	4	3	2	5	3	1	3	1	5	2	3	4	9
Arts and Entertainment	Light	1	2	2	0	3	2	1	1	3	1	2	2	5
	Moderate	9	13	8	17	6	7	9	14	7	4	12	14	30
	Heavy	8	1	0	6	2	1	1	5	3	3	1	5	9
Health Practitioner	Light	0	0	2	1	0	1	0	1	1	0	1	1	2
	Moderate	9	7	9	7	8	10	11	7	7	7	10	8	25
	Heavy	1	2	0	2	0	1	1	1	1	0	2	1	3
Non-professional	Light	5	1	11	4	6	7	7	5	5	7	6	4	17
	Moderate	20	26	20	27	21	18	22	23	21	32	16	18	66
	Heavy	5	7	3	8	5	2	2	9	4	5	6	4	15
Military	Light	0	0	1	0	0	1	1	0	0	1	0	0	1
	Moderate	8	3	6	6	5	6	6	6	5	4	4	9	17
	Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0

Note. Tertiles were computed using the median unbiased estimator (definition 8) following the suggestion of Hyndman and Fan (1996)

Table 4

Personality and Alcohol Intercorrelations

Variable	*1*	*2*	*3*	*4*	*5*
1. Agreeableness	–	.13**	-.11**	-.20**	-.14**
2. Conscientiousness		–	-.11**	-.29**	-.25**
3. Extraversion			–	-.07	.17**
4. Neuroticism				–	.10*
5. Alcohol 1950					–

Note. $N = 629$ for all correlations.
* $p < .05$, two-tailed, ** $p < .01$, two-tailed.

Table 5

Mean Personality and Alcohol Use by Occupation

Occupation	Agreeableness	Conscientiousness	Extraversion	Neuroticism	Alcohol
Unemployed	9.88	10.07	9.76	10.00	1.88
Management and Business	9.89	10.14	10.05	9.83	1.97
Professional	9.92	10.09	9.84	9.95	1.81
Legal	9.94	10.26	9.97	9.84	1.96
Arts and Entertainment	9.75	9.82	10.01	10.22	2.12
Health Practitioner	9.87	10.11	10.03	9.96	2.06
Non-professional	9.97	9.98	9.99	9.82	1.98
Military	9.90	10.06	9.79	9.96	1.95

Note. $N = 593$.

Table 6

Personality and Occupation Predictors of Heavy Alcohol Use

	Self-reported heavy alcohol use									
	Model 1		Model 2		Model 3		Model 4		Model 5	
Predictor	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Intercept	0.09***	[0.07, 0.13]	0.11***	[0.08, 0.14]	0.09***	[0.06, 0.12]	0.14***	[0.11, 0.19]	0.11***	[0.08, 0.16]
Arts and Entertainmen			2.36*	[1.08, 5.17]	1.64	[0.70, 3.83]				
Professional							0.46*	[0.23, 0.90]	0.48*	[0.24, 0.96]
Agreeableness	0.56**	[0.37, 0.84]			0.56**	[0.37, 0.85]			0.55**	[0.36, 0.85]
Conscientiousnes s	0.45***	[0.31, 0.64]			0.45***	[0.31, 0.65]			0.45***	[0.31, 0.65]
Extraversion	1.30	[0.88, 1.93]			1.29	[0.87, 1.92]			1.23	[0.82, 1.85]
Neuroticism	1.00	[0.69, 1.47]			0.97	[0.66, 1.42]			1.00	[0.68, 1.47]

Note. $N = 593$. OR = odds ratio, CI = confidence interval. Personality variables were mean centered prior to entering. In addition, the ORs for the personality variables represent the change in risk for a move from the 25th to the 75th percentile (interquartile odds ratios).

Appendix A

The original Terman measures of alcohol consumption from the 1950 General Information blanks (self-report). The letters indicate what level (L = Light, M = Moderate, H = heavy) each question was coded as.

1950

Use of liquor (check the statement below that most nearly describes you)

L I never take a drink, or only on rare occasions.
M I am a moderate drinker. I have seldom or never been intoxicated.
H I am a fairly heavy drinker; I drink to excess rather frequently but do not feel that it has interfered seriously with my work or relationships with others.
H Alcohol is a serious problem. I am frequently drunk and attempts to stop drinking have been unsuccessful.

Appendix B

Occupation categories (in bold) were aggregated from the major group level of the Standard Occupational Classification (U.S. Bureau of Labor Statistics, 2000) based on suggestions from the Bureau of Labor Statistics for higher level aggregation and prior research that found specific occupations to have higher levels of alcohol consumption.

Management and Business

Management Occupations
Business and Financial Operations Occupations

Professional (excluding legal, art, and health)

Computer and Mathematical Occupations
Architecture and Engineering Occupations
Life, Physical, and Social Science Occupations
Community and Social Services Occupations
Education, Training, and Library Occupations

Legal

Legal Occupations

Arts and Entertainment

Arts, Design, Entertainment, Sports, and Media Occupations

Health Practitioner

Healthcare Practitioner and Technical Occupations

Non-professional

Healthcare Support Occupations
Protective Service Occupations
Food Preparation and Serving Related Occupations
Building and Grounds Cleaning and Maintenance Occupations
Personal Care and Service Occupations
Sales and Related Occupations
Office and Administrative Support Occupations
Farming, Fishing, and Forestry Occupations
Construction and Extraction Occupations
Installation, Maintenance, and Repair Occupations
Production Occupations
Transportation and Material Moving Occupations

Military

Military Specific Occupations