ALCOHOL CONSUMPTION: BIOCHEMICAL AND PERSONALITY CORRELATES IN A COLLEGE STUDENT POPULATION

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Abstract — The frequency of alcohol use among a subject population of 28 male and 60 female college students was assessed using the Student Alcohol and Drug Use Survey (STADUS). Data were also collected on personality traits as measured by the Sensation Seeking Scale V (SSSV) and the Eysenck Personality Questionnaire (EPQ). Finally, three biochemical variables were assessed: monoamine oxidase (MAO) activity, dopamine beta hydroxylase (DBH) activity, and testosterone levels. Among males, high SSSV scores, high testosterone levels, and low MAO activity contributed to the variance in alcohol use. Where among females, a significant proportion of the variability in alcohol use was accounted for by high SSSV scores, high DBH activity, and younger age.

A number of investigators have attempted to identify specific personality traits and biochemical abnormalities associated with alcoholism. This has proved to be a difficult undertaking, in part because there is no single etiology underlying the process that begins with an individual’s first experience with alcohol and ends in dependence upon alcohol. Despite the developmental complexities of alcoholism, certain behavioral and biological patterns have been noted in conjunction with the process of alcohol addiction. One etiological pattern of alcoholism is seen in both genders, appears in adulthood accompanied by few social complications, and is not thought to be under strong genetic influence (Cloninger, Bohman, & Sigvardsson, 1981). A second type of alcoholism is characterized by early onset, numerous negative social consequences, a strong heritable component, and seems to affect males more than females (Cloninger, Boham, & Sigvardsson, 1981; Fulker, Eysenck, & Zuckerman, 1980). In a review by Oreland et al. (1985), certain personality characteristics such as sensation seeking (SS), impulsivity (Imp), aggressivity (Ag), and extraversion (E) are associated with the second form of alcoholism. More recently, these personality characteristics, especially SS and Imp, were also identified among heavy-drinking females (Hallman et al., 1990, 1991). Even though these two patterns are not always distinct and individual etiologies may contain elements of both, the aforementioned personality characteristics remain consistently and positively associated with increased levels of alcohol consumption.

With regard to biological patterns associated with alcohol abuse, one of the most consistent biochemical correlates of alcoholism to date is that of decreased platelet monoamine oxidase (MAO) activity (Faraj et al., 1987). MAO, a genetically controlled enzyme found in the mitochondria (Pandey et al., 1979), is an essential enzyme in the metabolic pathway of the monoamines: norepinephrine (NE), dopamine...
(DA), and serotonin (5-HT). In addition to its correlation with heavy alcohol consumption, low platelet MAO activity is also associated with the same personality traits found to be correlated with heavy alcohol consumption (Sullivan et al., 1979, 1990; von Knorring et al., 1985).

A second biochemical examined in this study is dopamine-beta-hydroxylase (DBH), which is the synthesizing enzyme that converts DA to NE. Norepinephrine and DBH are both released from the synaptic vesicles during exocytosis; thus DBH activity is taken as an indirect measure of NE. Although there are individual differences in DBH activity, it is a relatively stable enzyme and is under genetic influence (Weinshilboum, 1978). Of two studies that included measures of plasma DBH in association with alcohol abuse (Lykouras, Moussas, & Markianos, 1987; Sullivan et al., 1979), only in the Lykouras et al. study, in which they noted a negative correlation between alcoholism with dementia and DBH activity, was there any evidence of a link between alcoholism and DBH activity. Although the connection between DBH and alcohol abuse is tenuous, the negative correlations between DBH and the personality traits associated with alcoholism, such as SS, E, and Imp, have been observed in a number of studies (Ballenger et al., 1983; Daitzman & Zuckerman, 1980; Zuckerman et al., 1983).

Testosterone is the third biochemical assessed in the current study. Both physical and psychological variables can influence levels of testosterone (Bernstein, Gordon, & Rose, 1983; Kreuz, Rose, & Jennings, 1972; Schalling, 1987). Testosterone does not seem to be as heritable as MAO or DBH activity, yet some researchers have noted correlations between identical twins as high as 0.86 (Fox et al., 1970). Testosterone also appears to vary inversely with MAO activity (Briggs & Briggs, 1972; Redmond et al., 1975) This gonadal hormone has been found to correlate positively and significantly with Disinhibition (DIS), E, and sociability (Daitzman et al., 1978). In fact, the strongest link between the biochemical variables, MAO, DBH, and testosterone, is the sensation-seeking construct, DIS (Daitzman & Zuckerman, 1980; Zuckerman, 1984).

According to Zuckerman’s psychobiological model for personality (Zuckerman, 1991), as based on Gray (1987), noradrenergic and dopaminergic systems are implicated in a number of clinical disorders and personality traits. It is Zuckerman’s contention that sensation-seeking behavior and sociability are based on an optimum level of catecholamine (CA) system activity (Zuckerman, 1984). Further, he asserts that enzymes, rather than the neurotransmitters themselves, may determine the individual’s functional level of CA activity. Testosterone, too, is implicated in this regulatory role because of its influence over MAO activity. Therefore, any abnormality in regulatory biochemicals may reflect a reduced capacity of the individual to modulate endogenous neurotransmitter activity. Consequently, a person with such an abnormality might resort to exogenous forms of stimulation or inhibition. It may be the case that sensation seeking and heavy alcohol consumption are both behaviors that contribute to a positive change in CA activity.

To summarize,

1. MAO and, to a lesser extent, DBH are correlated negatively with sensation seeking and alcohol consumption;
2. Testosterone is correlated negatively with MAO and positively with sensation seeking and social activity; and
3. Sensation seeking is positively correlated with alcohol consumption.
Based on these associations, and in keeping with the theory that sensation-seeking behaviors and consumption of psychoactive substances may be an attempt to achieve optimum levels of CA system activity, one would expect heavy alcohol consumption to be associated with low MAO activity, low DBH activity, high levels of testosterone, and high levels of sensation seeking.

**METHOD**

**Participants**

Participants (28 males, 60 females) in this study were recruited from university psychology courses. Extra credit was offered as an incentive to volunteer for the study. The mean age for the 88 participants was 24.1 years, with a range from 18 to 46 years. The study's ethnic/racial distribution was representative of that of the institution in that approximately 72% of the participants were Hispanic, 21% Anglo, and the remaining 7% were black, Native American, or Asian. In additional studies of subjects drawn from this particular student population, the rate of alcohol consumption was found to average 14 g per day for males and 6 g per day for females, and the incidence of heavy alcohol consumption (>16 kg per year) was 11% for males and 2% for females (La Grange et al., in press).

**Questionnaires**

*Sensation Seeking Scale Form V (SSSV).* This scale is divided into four subscales (Zuckerman, 1979):

1. Thrill and Adventure Seeking (TAS) is defined by Zuckerman as the desire for risky and physically challenging activities.
2. Disinhibition (DIS) is a behavior that is characterized by indulgence in sexual activity, gambling, and consumption of mood-altering substances.
3. Experience Seeking (ES) reflects a quest for new and unusual intellectual and sensory forms of stimulation.
4. Boredom Susceptibility (BS) is an indication that the subject cannot tolerate repetitive situations or unexciting people.

*Eysenck Personality Questionnaire (EPQ).* The EPQ consists of three personality dimensions that are identified as higher-order personality factors, each of which is composed of a number of primary traits (Eysenck & Eysenck, 1977). The three personality factors include extraversion (E), neuroticism (N), and psychoticism (P). A fourth scale, the lie scale (L), is used to measure the tendency to dissimulate.

*Student Alcohol and Drug Use Survey (STADUS).* The STADUS is a three-page questionnaire designed to be used to determine the patterns of alcohol/drug use among students. As an example of the STADUS format, the students were to choose one of six responses that best described their experience with alcohol: (1) never used (score = 0), (2) did use but quit (score = 0), (3) less than once per month (score = 1), (4) one to four times per month (score = 2), (5) one to four times per week (score = 3), and (6) one or more times per day (score = 4). The questionnaire does not include questions about quantity or length of drug/alcohol use.
Physical Fitness Survey. The following researcher-developed statements illustrate the low and high ranges of the five statements describing the type of physical exercise typically engaged in by the participant:

1. I rarely exercise. In fact, I avoid all forms of exercise if possible.
5. I exercise on a daily basis. Each time I exercise, I maintain an elevated heart and respiration rate for at least 30 minutes.

A choice of the first statement was scored as 1 point, and the second example was scored as 5 points.

Procedure
The testing procedure was reviewed and approved by the university Human Subjects Internal Review Board. Students were scheduled for testing between 8:30 a.m. and 11:30 a.m. They were provided with a brief verbal explanation of the research and then asked to read and sign an informed consent document. Those who consented to participate were then asked to complete the following questionnaires: (1) Eysenck Personality Questionnaire (EPQ), (2) Sensation Seeking Scale Form V (SSSV), and (3) The Student Tobacco, Alcohol, and Drug Use Survey (STADUS).

Because there is a possibility that physical exercise may influence endogenous biochemical levels (Bove, Dewey, & Tyce, 1984), the five-statement physical fitness survey was administered in which students were asked to rate their level of physical conditioning by choosing one of a series of statements describing the frequency and intensity of exercise that best reflected their own exercise habits. Finally, female participants were asked to record the number of days elapsed since the onset of their last menstrual period, again because the results of previous studies have indicated that MAO activity may be altered over the course of the menstrual cycle (Baron, Levitt, & Perlman, 1980; Belmaker et al., 1974). After completing the questionnaires, the participants were taken to the lab, where they were asked by the lab technician to allow 10 ml of blood to be drawn by venipuncture. All participants were seated during the blood draw.

Biochemical assays
After MAO platelet preparation, as described by Corash, Shafer, and Perlow (1979), samples were frozen at -70°C. The assay was performed approximately 60 days after sample collection following the procedure as reported by Reyes and Lisansky (1984). After thawing, protein concentration was determined on DU-40 spectrophotometer by the method of Lowry et al. (1951). Estimation of the enzyme activity was performed using 14C-benzylamine as the substrate. One milliliter of the platelet suspension was incubated with 0.2 M phosphate buffer (pH 7.2) and 1.2 μmol benzylamine. After a 1-hour incubation, the reaction was stopped by adding 0.15 ml of 70% perchloric acid. The resulting mixture was centrifuged 5 minutes at 1400 g and the 2 ml supernatant poured off into a counting vial into which 15 ml Aquasol was added. Samples were counted in a Packard Tr-Carb liquid scintillation spectrometer. All analyses were performed in duplicate with coded samples, and the results expressed in μmol/h/mg of protein.

The DBH assay is based on the enzymatic conversion of tyramine to octopamine and has been described in detail by Nagatsu and Udenfried (1972). The octopamine is oxidized by the addition of sodium periodate to p-hydroxybenzaldehyde, which can
then be measured photometrically. Assay chemicals include catalase, N-ethylmaleimide, octopamine, tyramine, disodium fumarate, and pargyline, all of which were obtained from Sigma Chemical Co. (St. Louis, MO). A 24-nmol amount of octopamine in 1.0 ml of 4 M NH₄OH was oxidized as a standard and an absorbance of 0.677 nm was obtained at a wavelength of 330 nm. The absorbance was linear with octopamine concentrations from 8 to 80 nmol. After completion of the assay procedure, the observed absorbance readings were plotted against the known values of the octopamine standard. The results are stated in μmol/min/l of plasma (U/l, at 37°C). All samples were coded and analysis was performed in duplicate.

Blood samples for the testosterone assay were obtained in heparinized tubes, centrifuged at 2500 rpm for 20 minutes, and the plasma was removed for storage at −70°C. The assay was performed using a kit marketed by Diagnostic Products Corporation (Los Angeles, CA), which is a solid-phase ¹²⁵I radioimmunoassay. The assay is based on the competition between a radioactive and nonradioactive antigen for a fixed number of antibody binding sites. Samples were read on a Packard Instrument Company 5400 Series crystal gamma counter and were analyzed in duplicate with coded samples. The results are reported in ng/ml.

**Data analysis**

The BMDP Statistical Software Package was used to perform the data analysis. The descriptive statistics program was applied to all data to determine distribution characteristics. An analysis of variance using program 7D was run to determine if MAO values taken from discrete time periods during the menstrual period differed significantly from each other. Program 2R was used to establish a stepwise regression to assess the relative contribution of each of the independent variables to the amount of alcohol consumed by each subject, and program 4F provided the Kendall Tau correlational matrix.

**RESULTS**

As indicated in Table 1, the mean values for all three biochemical measures were within the normal ranges as reported in the literature. Also within normal ranges were the means for the SSSV and EPQ. Evident in the figures contained in Table 1 are the gender differences commonly encountered in studies on sensation seeking and drug/alcohol use, although in many cases the differences were not significant.

To determine if the number of days elapsed since the onset of the last menstrual period was associated with MAO activity, female data were divided into groups based on the following menstrual date cutoffs: days 1–6.9; days 7–13.9; days 14–20.9; and days 21 and up. An analysis of variance was performed on the mean MAO value for each group. Although the means varied somewhat, wherein the lowest level of MAO activity occurred during days 7–13.9, the variation was not statistically significant. Thus, even though hormonal fluctuations associated with the menstrual cycle may influence MAO activity (Baron, Levitt, Perlman, 1980; Belmaker et al., 1974), the effects were not readily apparent in this type of cross-sectional study.

A Kendall Tau correlation matrix, as derived from the log-linear analysis BMDP 4F program, was constructed to determine the pattern of relationships between all of the variables (see Tables 2 and 3). The positive correlation between DBH and alcohol consumption was not predicted. Among males, however, the negative correlation between MAO and sensation seeking, alcohol consumption, and testos-
Table 1. Means and standard deviations for males and females with t-tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>Males (n = 28)</th>
<th>Females (n = 60)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>SSSV</td>
<td>7.50</td>
<td>2.21</td>
<td>5.56</td>
</tr>
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<td>TAS</td>
<td>5.35</td>
<td>1.87</td>
<td>5.00</td>
</tr>
<tr>
<td>ES</td>
<td>4.71</td>
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<td>3.78</td>
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<tr>
<td>DIS</td>
<td>2.71</td>
<td>1.71</td>
<td>2.38</td>
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<tr>
<td>BS</td>
<td>20.28</td>
<td>5.22</td>
<td>16.72</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4.71</td>
<td>2.30</td>
<td>3.78</td>
</tr>
<tr>
<td>EPQ</td>
<td>2.71</td>
<td>1.71</td>
<td>2.38</td>
</tr>
<tr>
<td>Drug Use</td>
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<td>5.22</td>
<td>16.72</td>
</tr>
<tr>
<td>Alcohol</td>
<td>14.67</td>
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<td>15.27</td>
</tr>
<tr>
<td>Tobacco</td>
<td>4.71</td>
<td>2.91</td>
<td>4.43</td>
</tr>
<tr>
<td>Marijuana</td>
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<td>5.71</td>
<td>14.47</td>
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<tr>
<td>Physical fitness</td>
<td>7.88</td>
<td>4.20</td>
<td>8.58</td>
</tr>
<tr>
<td>Biochemicals</td>
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<td>11.80</td>
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</tr>
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<td>MAO</td>
<td>2.60</td>
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<td>2.47</td>
</tr>
<tr>
<td>DBH</td>
<td>2.94</td>
<td>2.49</td>
<td>3.21</td>
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<tr>
<td>Testosterone</td>
<td>5.57</td>
<td>1.93</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Note. SSSV, Sensation Seeking scale V; TAS, Thrill and Adventure Seeking; ES, Experience Seeking; DIS, Disinhibition; BS, Boredom Susceptibility; TOTAL, Total Score; EPQ, Eysenck Personality Questionnaire; E, Extraversion; P, Psychoticism; N, Neuroticism; L, Lie; MAO, monoamine oxidase (μmol/hr/mg); DBH, dopamine beta hydroxylase (U/l); testosterone (ng/ml).

Testosterone was as anticipated. No significance tests were run on the correlations because of the high number of variables and consequent risk of a Type I error.

Finally, a stepwise regression was run for each gender to determine which of the independent variables in this study contributed most to the degree of alcohol consumption as reported in the STADUS. Interestingly, as illustrated in Tables 4 and 5,

Table 2. Kendall correlations for males (n = 28)

<table>
<thead>
<tr>
<th>Age</th>
<th>TAS</th>
<th>ES</th>
<th>DIS</th>
<th>BS</th>
<th>TOTAL</th>
<th>E</th>
<th>P</th>
<th>N</th>
<th>T</th>
<th>AL</th>
<th>TES</th>
<th>MAO</th>
<th>DBH</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>TAS</td>
<td>0.025</td>
<td>1.000</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>ES</td>
<td>0.110</td>
<td>0.065</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIS</td>
<td>0.188</td>
<td>0.042</td>
<td>0.371</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>BS</td>
<td>-0.018</td>
<td>0.029</td>
<td>0.383</td>
<td>0.201</td>
<td>1.000</td>
<td></td>
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</tr>
<tr>
<td>TOTAL</td>
<td>0.188</td>
<td>0.391</td>
<td>0.613</td>
<td>0.396</td>
<td>0.519</td>
<td>1.000</td>
<td></td>
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</tr>
<tr>
<td>E</td>
<td>-0.224</td>
<td>0.228</td>
<td>0.153</td>
<td>0.155</td>
<td>-0.177</td>
<td>0.177</td>
<td>1.000</td>
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<td></td>
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</tr>
<tr>
<td>P</td>
<td>-0.018</td>
<td>-0.111</td>
<td>0.098</td>
<td>0.201</td>
<td>0.310</td>
<td>-0.033</td>
<td>-0.380</td>
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</tr>
<tr>
<td>N</td>
<td>-0.083</td>
<td>-0.449</td>
<td>0.044</td>
<td>0.247</td>
<td>0.105</td>
<td>-0.105</td>
<td>-0.378</td>
<td>-0.038</td>
<td>1.000</td>
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<tr>
<td>T</td>
<td>0.224</td>
<td>0.053</td>
<td>-0.010</td>
<td>0.295</td>
<td>0.038</td>
<td>0.100</td>
<td>0.115</td>
<td>0.316</td>
<td>-0.038</td>
<td>1.000</td>
<td></td>
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<tr>
<td>AL</td>
<td>-0.088</td>
<td>-0.102</td>
<td>0.099</td>
<td>0.470</td>
<td>0.033</td>
<td>0.188</td>
<td>0.298</td>
<td>0.276</td>
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<td>0.479</td>
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<tr>
<td>TES</td>
<td>0.153</td>
<td>0.169</td>
<td>0.044</td>
<td>0.051</td>
<td>0.243</td>
<td>-0.105</td>
<td>0.038</td>
<td>0.243</td>
<td>0.033</td>
<td>0.100</td>
<td>0.343</td>
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<tr>
<td>MAO</td>
<td>-0.224</td>
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<td>-0.414</td>
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<td>-0.471</td>
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<tr>
<td>DBH</td>
<td>0.236</td>
<td>0.043</td>
<td>-0.011</td>
<td>0.189</td>
<td>0.000</td>
<td>0.053</td>
<td>0.096</td>
<td>0.000</td>
<td>0.149</td>
<td>0.409</td>
<td>0.071</td>
<td>-0.395</td>
<td>-0.294</td>
</tr>
</tbody>
</table>

Note. TAS, Thrill and Adventure Seeking; ES, Experience Seeking; DIS, Disinhibition; BS, Boredom Susceptibility; TOTAL, Total Score; E, Extraversion; P, Psychoticism; N, Neuroticism; T, tobacco; AL, alcohol; TES, Testosterone; MAO, monoamine oxidase; DBH, dopamine beta hydroxylase.
the best predictor variable of alcohol consumption for both genders was the positive contribution of the SSSV subscale, disinhibition (DIS). In addition to DIS, the three biochemical variables, DBH, MAO, and testosterone, were included in the regression analysis. Among females there was a positive association between DBH and alcohol consumption, whereas among males, MAO contributed negatively and testosterone positively to the variance in self-reported alcohol consumption.

### DISCUSSION

To summarize in terms of the expectations as stated earlier, increased alcohol consumption was negatively correlated with MAO activity and positively correlated with DBH, testosterone, and sensation seeking. All relationships were in the predicted direction, with the exception of the positive relationship between DBH and alcohol consumption.

MAO, as has been the case in previous studies (Faraj et al., 1987; Hallman et al., 1990), correlated negatively with alcohol use, especially among males. It contributed to approximately 9% of the variance in alcohol consumption, which is not particularly impressive in terms of predictive value. Among females, there was an ex-
Table 5. Stepwise regression with alcohol as the dependent variable and personality traits, age, and biochemical measures as independent variables among females (n = 60)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Independent variables</th>
<th>$R^2$ change</th>
<th>$F$ to enter</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol use</td>
<td>Step 1: DIS</td>
<td>0.244</td>
<td>17.13</td>
<td>&lt; .01</td>
</tr>
<tr>
<td></td>
<td>Step 2: TAS</td>
<td>0.346</td>
<td>8.15</td>
<td>&lt; .05</td>
</tr>
<tr>
<td></td>
<td>Step 3: DBH</td>
<td>0.402</td>
<td>4.74</td>
<td>&lt; .10</td>
</tr>
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<td></td>
<td>Step 4: AGE</td>
<td>0.462</td>
<td>5.63</td>
<td>&lt; .05</td>
</tr>
</tbody>
</table>

Note: DIS, Disinhibition; ES, Experience Seeking; MAO, monoamine oxidase; TES, testosterone.

Tremendously weak negative correlation between alcohol consumption and MAO activity. It is possible that the relationship between MAO and alcohol consumption may have been more accurately revealed had we determined the $V_{max}$ of MAO as suggested by Faraj et al. (1987). At the time the MAO assay was performed, this was not possible and the data were not obtained.

The positive association of DBH activity with alcohol consumption among females is difficult to explain. The results of the few studies conducted on the relationship between DBH activity and alcohol consumption have either indicated no association (Sullivan et al., 1979) or a slight negative association (Lykouras, Moussas, & Markianos, 1987). Elevated DBH activity concomitant with an increased level of alcohol consumption among the young females in this study might be attributable to stress (Silberfeld et al., 1975), state anxiety (Ballenger et al., 1983), or hypertension (Wetterberg et al., 1972).

Also appearing in the regression analysis was the positive correlation of testosterone with alcohol consumption among males. The suppression of gonadal function typical of chronic male alcoholics is not yet likely to be manifested in a nonalcoholic subject population of young adult males. It has been noted that there is an inverse relationship between MAO activity and testosterone levels (Stenn, Klaiber, & Vogel, 1972), wherein testosterone inhibits brain MAO activity. Therefore, it is to be expected that high testosterone levels correlate with both increased alcohol consumption and decreased MAO activity, as indicated in Table 2.

However, the most powerful correlation and probably the most useful in terms of predictive value was that of the DIS subscale with alcohol use. Indeed, as indicated by the regression tables, DIS scores were, for both genders, the best predictors of alcohol use. These results are remarkably consistent with the data from Pedersen’s (1991) recent longitudinal study. Pedersen also noted that the sensation-seeking personality traits identified early in the study were stable as well as reliable longitudinal predictors of subsequent drug use. In an earlier study, Pedersen, Clausen, and Lavik (1989) identified, via canonical correlational analysis, DIS as being strongly associated with the use of legal drugs. Further, Earleywine and Finn (1991) found that there was a strong relationship between behavioral disinhibition and alcohol consumption that, via LISREL modeling, could be accounted for by a third variable, sensation seeking. Finally, Jaffe and Archer (1987) observed that when subjected to a linear discriminant function analysis, sensation seeking was the most powerful predictor of alcohol use among a group of college-age males and females. DIS scores, as an expression of the dimension of sensation seeking, therefore, seem to be consist-
ently associated with self-reported levels of alcohol consumption, particularly within a young adult subject population.

To summarize in terms of the intentions stated earlier, the results of this study are as follows:

1. MAO activity was negatively correlated with alcohol consumption among males but not among females.
2. DBH activity was positively associated with alcohol consumption in females but not among males.
3. There was a positive correlation between alcohol consumption and testosterone for both males and females; however, the relationship was stronger among males.
4. The SSSV subscale, DIS, was positively correlated with alcohol consumption. In fact, this subscale contributed most to the variability in alcohol consumption in both genders. Even though the frequency of alcohol consumption was similar for males and females, the results of the stepwise regression indicated that, with the exception of the DIS subscale, the various factors associated with alcohol use differed according to gender.

Zuckerman (1987) described the prealcoholic as impulsive, extroverted, and sensation-seeking— all behaviors that, theoretically, generate CA activity. Consistent with the behavioral assessments, the results of two of the three biochemical assessments also suggest a need for CA activity enhancement. Even the unexpected positive association between DBH activity and alcohol consumption may be indicative of aberrant CA activity.

Taken in isolation, MAO, DBH, and testosterone are not particularly reliable or useful as markers of alcohol abuse in young adults. The personality characteristics, although more consistently associated with alcohol consumption than the biochemicals, accounted for only 33% of the variability in alcohol consumption. It may be more useful, when investigating biochemical variables associated with developing alcohol abuse among young adults, to identify a combination of variables that have more predictive power than any single variable. For example, researchers could, using discriminant function analysis, formulate a predictive model that could, when applied to the results of any individual’s scores on all possible variables in the model, provide a probability estimate of that individual’s abuse of alcohol.

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