

RUNNING HEAD: Sober and Smarter

Sober and Smarter?

A Correlational Study on Intelligence and Alcohol Consumption Habits

Abstract

As the prevalence of drinking on college campuses continues to rise, it is important to determine possible factors that might limit students' rates of alcohol consumption. In this study, the relationship between intelligence, measured by one's intelligence quotient (IQ), and alcohol consumption as well as alcohol-related problem behaviors was investigated. It was hypothesized that people with higher IQ's would be less likely to consume alcohol and be involved with problem alcohol-related behaviors. Thirty-eight participants from Elizabethtown College completed a survey relating to their weekly amounts of alcohol use as well as behaviors that arise as a result of their drinking patterns. The Cattell & Cattell (1963) Culture Fair IQ test was administered to participants after completion of the survey. The results failed to support our hypothesis, as no significant correlations were found between IQ and weekly alcohol consumption or alcohol-related behaviors. A more complex design using multiple factors to predict alcohol consumption patterns is suggested for future research, as well as continuing alcohol education for students of all intelligence levels.

Sober and smarter?

A correlational study on intelligence and alcohol consumption habits

It is well-known that collegiate drinking has been an area of concern for many years. School administrations, parents and fellow students often worry about the implications of college students' drinking patterns and their resulting behaviors. Data shows that most drinking problems either begin or gain momentum quickly during the college years (Lall & Schandler, 1991). Multiple national studies have found that four out of five college students consumed alcohol at least once in the past year, and that nearly 50% have engaged in heavy alcohol consumption (Prendergast, 1994). Alcohol is particularly a problem among first-year college students because they are adjusting to their new environment and freedoms, as well as dealing with academic, peer and social pressures (Lall & Schandler, 1991; Prendergast, 1994). Many problems exist as a result of alcohol consumption, such as drinking and driving, destruction of property, loss of friends, academic problems, problems with authorities and student judiciary problems (Prendergast, 1994).

Impaired academic performance is a particular area of concern for college students dealing with the effects of alcohol. Reports indicate that 29% of students admitted to some form of academic problems as a result of their drinking habits, and that alcohol was a factor in 21% of cases of dropping out of college (Roth, 1986 as cited in Prendergast, 1994). There is also evidence that these problems are on the rise, with significantly more students reporting missing class or getting lower grades because of drinking too much in 1991 than in 1982 (Hanson & Engs, 1992). Specifically, several studies have shown that grade point average (GPA) tends to be negatively correlated with

alcohol consumption (Maney, 1990; Lall & Schandler, 1991; Musgrave-Marquart, Bromley & Dalley, 1997). Maney (1990) found that the majority of students with lower than a 2.0 GPA were classified as heavier (37.5%) or heaviest (25%) drinkers. In this study, heavy drinking was determined by high scores on the *Annual Absolute Alcohol Intake (AAAI)*, which asked participants about their usual and maximum alcohol consumption patterns. Similarly, a significant negative correlation has been found between GPA and alcohol use by Lall & Schandler (1991) and Musgrave-Marquart, Bromley, & Dalley (1997), who used frequency of drinking, as well as average and maximum weekly consumption as measures of alcohol-use-behavior. In all of these studies, the directionality of the correlation was mainly ignored; therefore, the question of whether alcohol consumption causes lower GPA or lower levels of academic achievement increase the likelihood of drinking remains largely unanswered.

One possible explanation for this relationship may lie with the relationship between GPA and intelligence, suggesting that drinking behaviors and intelligence may be related. However, one's grade point average is a highly situational measure of intelligence with extraneous variables, such as college major and difficulty of classes, that can influence the variability of resulting GPAs. General intelligence, as measured by one's Intelligence Quotient (IQ), helps to more accurately evaluate students' true intelligence level. Therefore, IQ may be a better measure to correlate with alcohol consumption in order to determine the likelihood of students to drink. However, relatively little research has examined this relationship. As a notable exception, Windle and Blane (1989) concluded that lower intelligence was significantly correlated to alcohol-related problems. Among drinkers, those with lower intelligence experienced

more alcohol-related problems than participants of higher IQ. In this study, alcohol problems were determined by self-reports of aggressive behaviors, job problems and dependency symptoms (Windle & Blane, 1989). Windle and Blane thus show that intelligence can be seen as a predictive measure of alcohol-related problems. A possible explanation for Windle and Blane's finding is that people with higher intelligence are said to be more resistant to the influence of social pressures than are those of lower intelligence (Rhodes & Wood, 1992). It may therefore be argued that those with higher intelligence are less likely to drink because of their ability to see the possible consequences of their actions.

Because alcohol has become such a ubiquitous issue on college campuses, it is increasingly important to determine possible factors that would limit students' drinking. The purpose of the present study was to look at the relationship between intelligence and alcohol consumption and related behaviors more closely. We used the Cattell and Cattell (1963) Test of "g": Culture Fair Scale of reasoning ability to measure IQ and an alcohol survey to assess students' frequency and amount of alcohol consumption, as well as situational problems that arise as a result of drinking. In our study, alcohol-related problems were defined as performance hindrances, relationship challenges, habits relating to obtaining and consuming alcohol, behaviors occurring while under the influence, and the use of alcohol as an emotional escape. We used these scales to examine the relationship between IQ and alcohol consumption as well as between IQ and alcohol-related problem behaviors. It is hypothesized that people with higher intelligence will be less likely to be involved with alcohol consumption and related behaviors. Because IQ is seen as a better predictor of intellectual ability than GPA, we predict that

using this measure will help us to closer approximate the true relationship between intelligence and problem levels of alcohol consumption and related-behaviors. Based on the results of this study, implications for future research and alcohol-education programs will be discussed.

Method

Participants

Thirty-eight participants from Elizabethtown College were included in this study. The participants' ages ranged from 18 to 23 with a mean age of 19.42, and included 22 females and 16 males. The majority of the participants were first-year students (52.6%), but several sophomores (34.3%) and juniors (13.1%) were represented as well. Participants were chosen as a convenience sample of general psychology students as well as friends of the researchers.

Materials and Procedure

We ran a correlational study to examine the relationship between intelligence and alcohol consumption and related behaviors. To do this, we provided participants with an alcohol survey concerning their total levels of alcohol consumption as well as potential alcohol-related problems and decisions. Additionally, we provided participants with a pattern-recognition reasoning ability test to measure IQ.

Researchers made sure that participants were given unique subject numbers and this number was placed on both the survey and the answer sheet for the reasoning task. Subjects were asked to complete the alcohol survey first and return it to a box at the front of the room to further ensure confidentiality. While participants completed the survey, researchers waited out in the hallway to be available for questions without pressuring them to complete the task faster.

The alcohol survey was adapted from California Polytechnic State University's "Are You a Problem Drinker?" survey. The original survey included thirty yes or no questions relating to drinking behaviors. The revised survey began with three questions relating to participants' amount of alcohol consumption, starting simply with "Do you drink alcohol?—yes or no." Participants were then asked an average of how many drinks they consume at a time and an average of how many days a week they consume alcohol. In accordance with previous research, one drink was defined as a 12-ounce beer, 5-ounce glass of wine, 1.5 ounce "shot" or mixed drink (O'Hare, 1990). Participants who answered that they never consume alcohol were asked to skip ahead to the end of the survey to complete the demographic information.

The next part of the survey included fifteen of the questions from the original survey that helped answer our research questions. Questions were divided into five sections—performance, relationships, habits, behaviors and escape—relating to alcohol-related decisions and consequences of drinking. Participants were asked to rate their perceived occurrence of performance hindrances, relationship challenges, habits relating to obtaining and consuming alcohol, behaviors occurring while under the influence, and the use of alcohol as an emotional escape. Most of the items were reformatted into four-point Likert-type scales using never, sometimes, frequently, and always. Demographic questions were included at the end in hopes of receiving more honest answers from participants (*full survey in Appendix A; coding method included in Appendix B*).

After completing the alcohol survey, participants returned to their seats to complete the reasoning ability task, the Cattell and Cattell Test of "g": Culture Fair Scale 3, FORM A (1963 edition). Scale 3 was designed with higher difficulty questions

appropriate for college students; form A was administered as a shorter alternative to the whole test (A+B). We chose to use Cattell and Cattell's test for its high reliability and validity ratings. A split-half reliability rating of $r=0.74$ and a test-retest correlation of $r=0.69$ were found using a sample of over 1,000 high school and college students.

Additionally, concept validity was rated at $r=0.85$ and concrete validity, which compared Cattell and Cattell's test to the Otis, SAT and Intelligence Structure Test, was rated as $r=0.66$ using a sample of over 600 students.

The Cattell and Cattell (1963) test included four sections (series, classifications, matrices and conditions) with fifty questions total (*sample questions included in Appendix C*). In each section, participants were given a time limit to complete as many of the questions as they could. In the first section, incomplete series were presented; the participants chose which of the six choices best continued the series. Participants had three minutes to complete these thirteen questions, and were asked to not look ahead until time was up. The second section presented five figures in each example and participants chose which two differed from the other three in some way. This section totaled fourteen problems and participants were allotted four minutes to complete it. In the third section, designs or matrices presented were to be completed with the best of the six options given. Participants had three minutes to complete these thirteen examples. The final section required participants to choose from the five options given which one correctly duplicated the conditions of the example. Two and a half minutes were allotted for participants to complete these ten examples. Participants recorded their answers on an answer sheet for easy scoring by the researchers. Their raw scores out of 50 on the were

then transformed into standard IQ scores ($M=100$, $SD=16$) using a chart formulated by Cattell and Cattell.

Results

The purpose of our study was to look at the relationship between intelligence and alcohol consumption and related behaviors. We hypothesized that people with higher intelligence (IQ) would have lower levels of alcohol consumption and alcohol-related behaviors, thus indicating a significant negative correlation.

Of the 39 total participants, 38 were included in the results. The one omitted failed to read instructions on the alcohol survey and thus did not complete it fully. Of the remaining 38 participants, only 63.2% reported that they consumed alcoholic beverages. Using a chi-square goodness of fit test, this was found to be significantly lower than percentages found in previous research, which stated that 80% of college students consume alcohol (Prendergast, 1994), $\chi^2(1, N=38)=6.74$, $p<0.01$. Our participants also varied significantly from the general population on IQ, as their mean IQ score was an entire standard deviation higher ($M=116.87$, $SD=13.27$).

Significant correlations were not found between IQ and alcohol consumption or alcohol-related behaviors. IQ showed a small negative correlation to alcohol consumption, but this relationship was not significant, $r(36)= -0.147$, $p>0.05$ (*see figure 1*). We can therefore not verify the claim that higher intelligence is associated with lower levels of alcohol consumption.

In addition, alcohol-related behavior (including arguments, sexual encounters, arrest, and drunk driving) was found to be negatively correlated to IQ, but this was also judged as a non-statistically significant relationship, $r(36)= -0.103$, $p>0.05$. Performance,

habits, relationship and escape variables showed no significant relationships to IQ, $r(36) < 0.07$ (in each case; *see Table 1 for full results*).

-Insert Figure 1 and Table 1 here-

When looking at the results, we realized that non-drinkers had a very large range of IQs. We were therefore interested to see if any significant correlations could be found excluding non-drinkers from the sample. The correlations between IQ and weekly alcohol consumption as well as IQ and alcohol-related problems— performance, relationships, habits, behaviors and escape—all became stronger without the non-drinkers included, $r(21) < \pm 0.5$ (in each case). This means that among those who drink, IQ decreases as alcohol usage and related behaviors increase (*see table 2 for full results*). The correlation between IQ and alcohol-related behavior turned out to be a significant negative correlation, $r(21) = -0.427, p = 0.042$, meaning that among drinkers, those with lower intelligence levels (IQ) are more likely to be involved with negative alcohol-related behaviors, such as getting into arguments, experiencing regrettable sexual encounters, being arrested, and driving under the influence (*see figure 2*).

-Insert Table 2 and Figure 2 here-

We also looked at gender differences in weekly alcohol consumption and IQ. Using an independent-measures t-test, we found that females drank more alcohol on average than males, but this was not statistically significant, $t(36) = 0.298, p > 0.05$. We also found that males had a mean IQ of 119.56 ($SD = 15.22$), while females had a lower average IQ of 114.91 ($SD = 11.63$); however, this too was not found to be a significant difference, $t(36) = -1.07, p > 0.05$.

Finally, we looked at participants' residence to see if this impacted their average weekly alcohol consumption rates. Using a one-way ANOVA, we found no significant differences in weekly drinking patterns between those who lived in dorms, off-campus or at home, $F(2, 35)=0.576, p=0.05$.

Our hypothesis that higher IQ leads to lower rates of alcohol consumption was not supported. Our findings also failed to validate our hypothesis that higher intelligence protects against risky-alcohol related problems.

Discussion

We found no significant correlations between intelligence and alcohol consumption or alcohol-related problems. Our results can be interpreted in two ways; either that no correlation exists between the two factors at all or that more factors than just intelligence influence the likelihood of college students to consume alcohol.

Previous research is inconsistent in helping to determine which interpretation to choose. Many studies are consistent with our present findings, showing that intelligence and drinking level are not correlated (O'Hare, 1990; Mortensen, Sorensen, & Gronbaek, 2005). O'Hare (1990) found a non-significant correlation between GPA and alcohol consumption, while Mortensen, Sorensen & Gronbaek (2005) found no significant correlation between IQ and heavy drinking. These studies negate our hypothesis that IQ would be a more accurate and consistent predictor of alcohol consumption over GPA, as both failed to find significant results.

In opposition to the aforementioned studies, the findings of Maney (1990) and Lall and Schandler (1991) conflict with our findings, reporting significant negative correlations between GPA and alcohol use. However, in both cases, the results were

more pronounced with drinkers with a GPA below 2.5. If GPA and IQ are in fact correlated, this could explain our lack of significant findings. Since our participant sample had a high average IQ, we can account for part of the difficulty in detecting a significant relationship with alcohol consumption.

In addition to intelligence, there are many other factors that our study did not control for which can help to predict alcohol consumption and related behavioral patterns. Maney (1990) concluded that college students with lower self-esteem and lower general well-being are more likely to consume alcohol. Personality factors such as conscientiousness, openness and neuroticism were better predictors of alcohol use than intelligence (measured by GPA) in Musgrave-Marquart, Bromley & Dalley's (1997) study. A variety of factors, including race, religion, gender, personality type, campus residence, and other substance use, were discussed by Prendergast (1994) in regards to their predictive effects on alcohol consumption. In a study by Greenfield, Guydish and Temple (1989), college students completed a survey involving their reasons for limiting drinking; the most popular answers included desire for self-control, desire to please external authorities such as religion or parents, performance goals, and limited availability. Similarly, Presley, Meilman and Leichliter (2002) concluded that environmental factors played a large role in college drinking patterns.

Although many studies have shown a negative correlation between intelligence and alcohol consumption, this plethora of research on multiple factor influence leads to an important direction for future research. A multiple regression analysis including factors other than intelligence would be a logical next step. In this way, researchers

could conclude the relative predictive power of several factors in forecasting alcohol consumption rates and patterns.

If attempted again in the future, several weaknesses from the present study would need to be addressed. First, the Cattell and Cattell (1963) IQ test used was a very outdated copy, which may help to explain our participants' overall high IQ scores. According to the "Flynn Effect", IQ scores tend to rise about three points every decade across most countries in the world; therefore, IQ tests must be recalibrated with the mean score reset to 100 about every 20 years (Flynn, 1987). Using a test from more than 40 years ago, our results were skewed almost an entire standard deviation above the expected population mean. Another problem in design regards the honesty of answers on the alcohol survey. It may have been the case that participants were not willing to honestly evaluate their alcohol-related problem behaviors, as only a few participants chose responses other than "no" or "never". As an alternate explanation, Lall and Schandler (1991) point out that at such a young age, people may not have developed consistent drinking patterns. This lack of consistency could have influenced the strength of the correlations between alcohol-related behaviors and IQ. A final weakness relates to our small sample size. Since so many factors do have an impact on drinking patterns, effect size for any one variable will be small. Therefore, larger sample sizes are needed to achieve good statistical power. In most of the previous studies mentioned, a minimum of 100 participants were involved, with extreme cases using over 5,000 participants over decades of time. In order to achieve statistical power of 80%, our study would have required 358 participants; however, this was not at all practical with our limited resources.

Although we did not find a significant relationship between IQ and alcohol consumption, two important implications exist. Campus alcohol education should continue to focus on informing students of the risks involved with heavy drinking and minimizing damaging drinking patterns for students of *all* intelligence levels. However, campus programs should also focus on helping those who have decided not to drink network together. With such a high abstainer rate in this study, it is important to inform our fellow students that they are not alone in their decision to abstain from drinking.

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Appendix A. *Alcohol Survey*

Please circle the best answer for each question. Your answers will not be linked to your identity in any way, so be as honest as possible.

1. Do you drink alcohol?

Yes No

2. On average, how many drinks (defined as a 12-ounce beer, 5-ounce glass of wine, 1.5 ounce "shot" or mixed drink) do you consume in one sitting?

None <1 1-2 3-4 5-6 7 or more

3. On average, how many days in a week do you consume alcohol?

None <1 1-2 3-4 5-7

**** If you have answered no to all three questions, please skip to #19.
All others please read the following statements and circle the best answer.**

4. You have gotten into a fist fight or argument while you were drinking.

Yes No

5. You've done something sexual that you later regretted while you were under the influence of alcohol.

Yes No

6. When you're sober, you regret things you said or did while you were drinking.

Never Sometimes Frequently Always

7. You have been arrested for intoxicated behavior or driving under the influence of alcohol.

Yes No

8. Drinking has caused you to miss class or work.

Never Sometimes Frequently Always

9. Your performance at school or work has suffered because of your drinking.

Never Sometimes Frequently Always

10. You have neglected your classes, job, family or other obligations because you were drinking.

Never Sometimes Frequently Always

11. When you drink, you wind up drunk.

Never Sometimes Frequently Always

12. It is difficult for you to stop drinking after you've had one or two drinks.

Never Sometimes Frequently Always

13. The day after drinking, you have trouble remembering what you did while you were under the influence.

Never Sometimes Frequently Always

14. A significant part of your day is spent obtaining, consuming, or recovering from the effects of alcohol.

Yes No

15. You sometimes stay drunk for several days at a time.

Yes No

16. You use alcohol as an escape when you're angry, disappointed, or otherwise upset.

Never Sometimes Frequently Always

17. You've promised yourself to slow down or stop drinking, but you can only keep the promise for a few days or weeks at a time.

Yes No

18. Your family or friends have expressed concern about your drinking.

Yes No

19. Sex: Female Male 20. Age: _____ 21. Major: _____

22. Year in college: First-year Sophomore Junior Senior

23. Residence: Dorm On-campus apartment Off-campus At Home

Appendix B. *Coding method for our Alcohol Survey*

Survey coding

Question 1= do you drink alcohol?

Yes =2; no=1

Question 2= how many drinks in one sitting (on avg.)?

None =1; <1 =2; 1-2 = 3; 3-4 = 4; 5-6 = 5; 7 or more = 6

Question 3= how many days a week (on avg.) drink alcohol?

None = 1; <1 = 2; 1-2 = 3; 3-4 = 4; 5-7 = 5

Weekly consumption = number in a sitting multiplied by how many days per week

(one sitting) None (0); <1 (.5), 1-2 (1.5); 3-4 (3.5); 5-6 (5.5); 7+ (7)

(week days) None (0); <1 (.5), 1-2 (1.5); 3-4 (3.5); 5-7 (6)

Questions 4-7 = behavior

(4, 5, 7) Yes =2; no =1

(6) Never = .5; Sometimes =1; Frequently = 1.5; Always = 2

Questions 8-10 = performance

(8, 9, 10) Never = .5; Sometimes = 1; Frequently = 1.5; Always = 2

Questions 11-15, 17= habits

(14, 15, 17) Yes =2; no =1

(11, 12, 13) Never = .5; Sometimes = 1; Frequently = 1.5; Always = 2

Question 16 = escape

(16) Never =.5; Sometimes =1; Frequently =1.5; Always =2

Questions 10 & 18= relationships

(18) Yes =2; no =1

(10) Never = .5; Sometimes =1; Frequently = 1.5; Always =2

Question 19 = Gender

Female =1; Male =2

Question 22 = year in college

First year =1; Sophomore = 2; Junior =3; Senior =4

Question 23 = Residence

Dorm = 1; On-campus apartment =2; Off Campus =3; At home = 4

Appendix B. *Sample Questions from Cattell & Cattell Culture Fair Test.*

ANSWERS

SERIES

1

CLASSIFICATION

4

MATRICES

1

CONDITIONS

3

Table 1

Correlations between IQ and alcohol consumption as well as IQ and alcohol-related behaviors and consequences (entire sample N=38)

	r-value (correlation coefficient)	Significance level
IQ—alcohol consumption	-0.147	0.378
IQ—behavior	-0.103	0.538
IQ—performance	-0.065	0.696
IQ—relationships	-0.030	0.859
IQ—habits	-0.018	0.913
IQ—escape	+0.020	0.906

Table 2

Correlations between IQ and alcohol consumption as well as IQ and alcohol-related behaviors and consequences (only drinkers included N=23)

	r-value (correlation coefficient)	Significance level
IQ—alcohol consumption	-0.141	0.522
IQ—behavior	-0.427	0.042*
IQ—performance	-0.199	0.363
IQ—relationships	-0.146	0.507
IQ—habits	+0.075	0.732
IQ—escape	+0.154	0.482

Figure Captions

Figure 1. Correlation between weekly alcohol consumption and IQ.

Figure 2. Correlation between IQ and alcohol-related behavior among drinkers.



