

# Ratings of Intoxication and Driving Impairment, by Gender and Drinking Category

Burns, M.; Fiorentino, D.

Southern California Research Institute  
Los Angeles, California, USA

11914 W. Washington Boulevard  
Los Angeles, CA 90066, USA

Keywords: Alcohol, intoxication, driving, drinking category, gender

## Abstract

The relationships of drinkers' ratings of intoxication and driving impairment were examined in an alcohol experiment with 48 men and women, ages 21 - 54 years, who were light, moderate, and heavy drinkers. At 0.00% to 0.125% blood alcohol concentrations, subjects rated their intoxication and ability to drive with 100 mm rating scales. An additional measure, a ratings index, was created to adjust each measurement by the BAC associated with it. The ratings differed by gender and drinking category.

## Introduction

A driver's decision about whether to drive following alcohol consumption is likely to be marred by the impaired judgement associated with intoxication. The magnitude of alcohol effects on judgement may be affected, however, by a driver's drinking practices (duration, frequency, amount); that is, by tolerance or lack thereof to alcohol effects. It is also possible that men and women differ in the recognition and acceptance of the risk of alcohol-impaired driving. To examine these issues, subjects (Ss) in an alcohol experiment rated their intoxication and driving ability.

## Method

### Subjects

Ss were 48 men and women who had been recruited for a closed-course driving study. They were 21 - 54 years of age, and they were light (n=12), moderate (n=12), and heavy (n=24) drinkers. Drinking category assignments, based on self-reports of alcohol use, were made with the Quantity-Frequency-Variability scale of alcohol consumption (Cahalan et al., 1969).

### Alcohol Treatment

At five consecutive sessions, 8 - 10 Ss arrived at the test site between 1700 and 2030 hours each day. If a S's blood alcohol concentration (BAC) upon arrival was 0.00%, as measured with an Intoxilyzer 5000, alcohol treatments were administered.

Alcohol doses were based on Ss' body water estimated as a percentage of body weight (Frisch, 1988). Estimates were adjusted for gender, age, frame size and body composition. Beverages were one part 80 proof vodka and 1.5 part orange juice and were given as three equal drinks at

10-minute intervals. Ss were monitored continually during the drinking period.. After drinking and after a 30-min absorption period, the first post-dose BAC measurement was obtained.

### Rating Scales

Two rating scales, as illustrated below, were presented to the subjects on a single 8 ½ x 11" page.

Make a vertical mark across each of the lines below to indicate how you feel at this moment.

I am not at all intoxicated.	_____	I am very intoxicated.
I could drive safely at this time.	_____	I could <u>not</u> drive safely at this time.

Following the standard drinking and alcohol absorption periods, and immediately after obtaining a breath specimen for BAC measurement, the response sheet was presented to the S without comment or additional instruction. Ss typically made the vertical marks without asking for more information, and there was no discussion of the ratings among the drinkers.

### **Results**

Ss' mean peak BAC was 0.076%. On the 0 -100 mm scale, the means of the intoxication and driving ratings were 59 and 60, respectively. The two ratings were closely related as can be seen in the statistically significant correlations (Table 1). More than 60 percent of the driving ratings were as high or higher than the associated intoxication ratings. It is likely that Ss' judgements of their driving ability were based largely on their awareness of intoxication.

The relationships of the ratings to alcohol level differ between drinking categories. It is assumed that the small, non-significant correlations for light drinkers reflect their limited experience with alcohol effects. The more substantial correlations for moderate drinkers, on the other hand, are consistent with more drinking experience and, therefore, more knowledge of alcohol effects. Interestingly, heavy drinkers' ratings are negatively related to BAC.

Table 2 presents data for the three drinking-category groups, for men and women, and for the total sample. Higher values in columns (1) - (4) indicate more awareness by the Ss of intoxication and driving impairment. Scale scores appear in columns (1) and (2). The ratings index, which appears in columns (3) and (4), adjusts the responses on the 0 - 100 mm scale by BACs for the purpose of group comparisons. Note that the mean driving rating of 64 by light drinkers at a mean BAC of 0.057% appears to be essentially the same as a mean rating of 63 by heavy drinkers at a mean BAC of 0.096%. Converted to the ratings index with values of 11 and 7 respectively, however, it becomes apparent that the heavy drinkers were more confident than the light drinkers that they could drive safely after drinking.

TABLE 1  
Correlations of BACs and Ratings, by Subject Category

Drinking Category		Correlations (r)		
		Intoxication Rating - Driving Rating	BAC - Intoxication Rating	BAC - Driving Rating
Light	n= 12	.762**	.299	.037
Moderate	n=12	.739**	.686*	.466
Heavy	n=24	.885**	-.198	-.330
All Women	n = 21	.662**	.231	.003
All Men	n = 27	.651**	.442*	.339
Total Sample	N=48	.789**	.303*	.118

\* p<.05, \*\* p<.01

### Intoxication Index

Light and moderate drinkers' assessments of their intoxication did not differ, and their intoxication index reflects a relatively keen awareness of intoxication (Figures 1 and 2). The lower index for heavy drinkers, however, differed significantly from those of both moderate drinkers ( $t$  2.44, 16 df  $p$ <.05) and light drinkers ( $t$  3.57, 12 df,  $p$ <.01). Men and women differed in their assessments of intoxication with higher ratings by the women (index,  $t$  3.01, 30 df,  $p$ <.01).

TABLE 2  
BACS and Ratings of Intoxication and Driving Ability

Drinking Category	Peak BAC (%)	Means		Ratings Index*		
		(1) Rating <sub>Intox.</sub> (0 - 100 mm)	(2) Rating <sub>Drive</sub> (0-100 mm)	(3) Intoxication **	(4) Driving **	
Light	n= 12	0.057	59	64	10	11
Moderate	n=12	0.055	52	50	10	9
Heavy	n=24	0.096	61	63	6	7
All Women	n = 21	0.071	66	73	9	10
All Men	n = 27	0.079	52	50	7	6
Total Sample	N=48	0.076	59	60	8	8

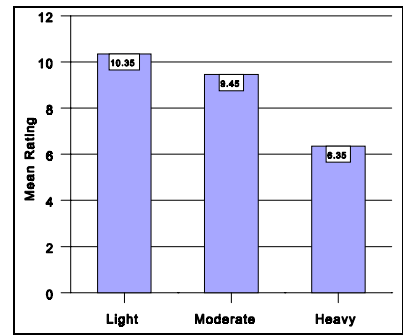
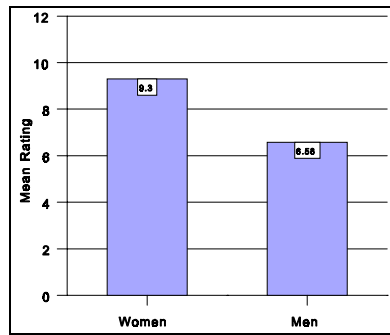
\* Index =  $\frac{\text{Mean Rating}}{\text{Mean BAC}}$

\*\* The higher the value the more intoxicated the subject felt

\*\*\* The higher the value the more the subject believed his/her driving impaired.

### Driving Index

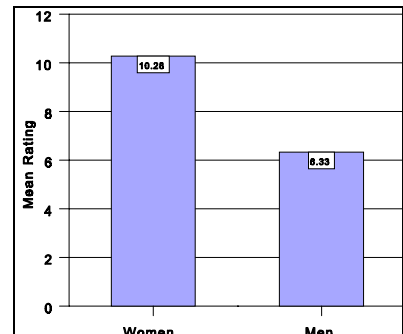
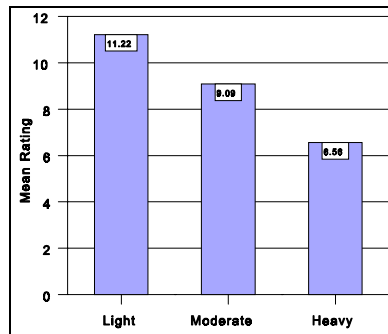
Heavy drinkers' ratings of their ability to drive at a mean BAC of 0.096% differed significantly from light drinkers' ratings at a mean BAC of 0.057% ( $t$  2.598, 13 df,  $p < .05$ ). Moderate drinkers' ratings fell midway between those of heavy and light drinkers but did not differ significantly from either (Figures 3 and 4).



The difference between men and women in their ratings of driving ability is large and statistically significant ( $t$  3.09, 30 df,  $p < .01$ ). Ratings by male subjects reflect either more confidence in their ability to drive or less willingness to acknowledge that they were impaired.

### Gender Differences by Drinking Category

The differences between men and women in their intoxication and driving ratings were further examined by drinking category. As can be seen in Table 3 and Figures 5 and 6, women's ratings of intoxication were higher than men's in all



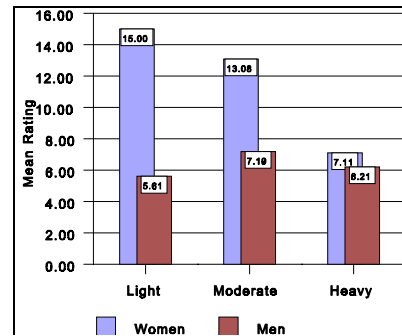
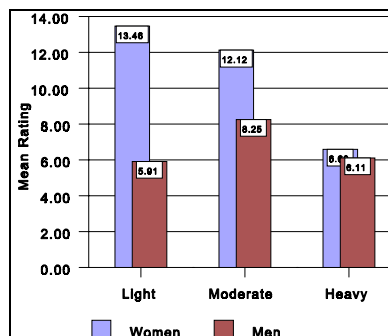
drinking categories. Similarly, they believed they were unable to drive safely to a greater degree than the men. Although the differences are present in all drinking categories, the disparities are most evident for light drinkers and remain large among moderate drinkers. In the heavy drinking category, the differences between men and women are small. Note, too, that among men, the indices of intoxication and driving show no differences between the light and heavy drinking categories, and the moderate drinkers differ only slightly.

TABLE 3  
Gender Differences in BACs and Ratings by Drinking Category

		BAC (%)		Intox. Rating		Drive Rating		Intox. Index	Drive Index
		mean	SD	mean	SD	mean	SD		
<b>LIGHT</b>	Women n=8	0.052	0.017	70	17	78	20	14	15
	Men n=4	0.066	0.034	39	21	37	20	6	6
<b>MOD.</b>	Women n=4	0.052	0.034	63	21	68	19	12	13
	Men n=8	0.057	0.027	47	23	41	20	8	7
<b>HEAVY</b>	Women n=9	0.097	0.017	64	16	69	23	7	6
	Men n=15	0.095	0.013	58	19	59	24	6	6
<b>TOTAL</b>	Women	0.072	0.030	66	18	73	21	9	10
	Men	0.079	0.028	52	22	50	24	7	6

\* Index =  $\frac{\text{Rating}}{\text{BAC} \times 100}$

The intoxication index and driving index values are interpreted for purposes of discussion as follows. Assume that a S marked both scales at the extreme right (100 mm), that is, he felt very intoxicated and believed he could not drive safely. Assume further that his BAC was 0.10%. The index values then would be 10. It is reasonable, therefore, to interpret an index of 10 (or higher) as evidence that a S recognizes his intoxication and impaired driving ability.



In a second case, assume that another S whose BAC was 0.10% marked the scales exactly at midpoint for ratings of 50. His index values would be 5. An index of 5 (or less) is taken as evidence of failure to adequately recognize or acknowledge either his intoxication or the effects of alcohol on his driving skills. It is assumed that there is a high probability of risky behavior with an index of 5 (or less).

Nine Ss (>18% of the total sample) had an intoxication index of 5 or less. Eight were men (4 heavy, 2 moderate, and 2 light drinkers). The intoxication index for a heavy drinker female at a 0.116% BAC also was below 5. A very similar pattern emerged for the driving index with the same female and nine male Ss (>20% of total sample) having a driving index below 5.

The intoxication index for 10 women and five men was 10 or above. The driving index for 10 women and four men was 10 or above. Thus, fewer than 15% of the men expressed a clearly cautious attitude about driving after drinking whereas one-third seemed willing to engage in risky driving behavior.

### **Discussion**

Data obtained with 48 subjects reveal that heavy drinkers rate their intoxication lower than either moderate or light drinkers. Intoxication ratings by men in all drinking categories were lower than ratings by women, but among heavy drinkers the gender differences were small. Driving ratings did not differ between heavy-drinking men and women, but among light and moderate drinkers, women expressed a more cautious view of their ability to drive safely after drinking.

These rating scale data, which describe Ss' perceptions of their intoxication and driving ability, do not support statements about the underlying reasons for the observed difference. It is suggested, however, that the finding that heavy drinkers are less likely to acknowledge intoxication reflects their acquired tolerance to alcohol effects. The findings of gender differences are consistent with a presumed need of the male Ss to appear macho; i.e., strong and manly, and therefore less vulnerable to alcohol effects. Recalling, however, that the ratings were seen only by the rater and the experimenter, the need to appear macho does not fully account for the finding. It is important to note that the scientific literature provides no evidence of male-female performance differences in response to alcohol at equivalent BACs (Burns & Moskowitz, 1978; Mills & Bisgrove, 1983).

Ss' ratings point to heavy drinkers of both sexes and to men of all drinking practices as the appropriate targets for countermeasures. Furthermore, the perceptions of intoxication and driving ability by male Ss suggest that effective countermeasures will require both the content and mode of delivery to be acceptable to men.

---

The cooperation of Dr. Jack Stuster, Anacapa Sciences, Santa Barbara, CA is gratefully acknowledged

### References

1. Calahan, D., Cisin, I., Crossley, H. American Drinking Practices. New Brunswick: Rutgers, pp. 260, 1969.
2. Frisch, R.E. Fatness and fertility. Scientific American, Vol. 258, No. 3, 1988.
3. Burns, M., Moskowitz, H. Gender-related differences in impairment of performance by alcohol (In: Seixas, F., Ed.) Currents in Alcoholism, Vol. III. New York: Grune & Stratton, 1978.
4. Mills, K. C., Bisgrove, E. Z. Body sway and divided attention performance under the influence of alcohol: Dose-response differences between males and females. Alcoholism: Clinical and Experimental Research, Vol. 7, No. 4, pp. 393-397, 1983.