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A Comparison of College Male and Female Alcohol Consumption and Recall: A Replication

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Abstract

Objective: *In a 1987 study, college male and female drinkers leaving a bar filled out a questionnaire about their drinking and took a breathalyzer test. Men were fairly accurate in their recall of drinking but women were considerably less accurate. Further, men had significantly higher blood alcohol levels (BALs) than women. These differences were attributed to the greater experience men have with consuming alcohol. Given the changes in the patterns of alcohol consumption by college men and women, the study was replicated with a substantially larger sample size. It was predicted that women would be more accurate in their recall of consumption and have higher BALs than those in the 1987 sample while men would perform about the same.*

Method: *Eighty men and 35 women participated in the current study by providing both a self-reported measure of their drinking and a breathalyzer test of their BAL after being approached outside a public drinking establishment in March of 2010.*

Results: *The results confirmed the prediction for women as the correlation between recalled consumption and breathalyzer results increased from r=.284 to r=.555 and the mean BAL increased from .040 to .092. The results for men were mixed as the accuracy of their recall declined from r=.766 to r=.636 while their BALs increased from .077 to .095.*

Conclusions: *The findings provide direct observational support for the dramatic increase in female college student drinking over the past twenty years and indicate a need for increased interventions aimed at women to decrease problem drinking behaviors.*

Keywords: *Alcohol Consumption, a Replication*

1. INTRODUCTION

Student heavy drinking on college campuses continues to be a major concern for both universities and the communities surrounding them. A study of university students within the United States found that 31.4% of 18-24 year old students reported driving under the influence of alcohol during 2001 and over one million, of the eight million college students, reported some sort of alcohol related injury1. Heavy episodic drinking, defined as five drinks in a row for men and four drinks in a row for women, also has significant negative consequences for school performance (missing class, getting behind in school work, etc.) as well as increasing students' risk of engaging in unplanned and unprotected sexual behavior. Furthermore, those who reported binge drinking three or more times in the previous two weeks were almost twice as likely as less frequent binge drinkers, and about five times more likely than non-binge drinkers, to report these problems2.

Historically, this alcohol related problems have been much greater for male than female students. For example in a 1987 study, college male and female drinkers leaving a bar completed a questionnaire about their drinking that evening and took a breathalyzer test3. An estimated blood alcohol level (BAL) was calculated from the information supplied on the questionnaire and compared to the level produced by the breathalyzer test. Men were fairly accurate in their recall of how much alcohol they had consumed with a correlation of .766. In contrast for women the correlation between estimated BAL and breathalyzer BAL was .284. In addition, women had significantly lower BALs (M=.04) than the men in the study (M=.077). However, since that study was completed, research suggests that there has been

a substantial increase in drinking by college women as well as men.4-8

If correct, this increase in the drinking behavior of female university students is of great concern due to the biological differences between males and females in their ability to metabolize alcohol. Women tend to have more body fat, lower levels of alcohol dehydrogenase, and naturally fluctuating hormonal cycles, all of which may cause women to have higher BALs than men when consuming the same or smaller amounts of alcohol ,with body size held constant.9 With college women's intoxication levels rising, the increased likelihood of these women being sexually victimized becomes of great concern. Research suggests that about one in four college women will be sexually assaulted during their university career10 and college women who frequently drink are up to nine times more likely to be sexually assaulted than those who do not.11

Much of the information we have about the levels of alcohol consumption by college students is based on self-reports of drinking.4,8 There is some support for the accuracy of self-reported drinking behavior,12,3,13 however, those studies were conducted in the 1980s before the reported increase in college age drinking. It therefore seems appropriate to revisit the issue.

The present research systematically replicates the Meier et al. study3 to determine if differences in accuracy of recall have changed in the past 20 years. Due to the apparent increased drinking behavior of women, it is predicted that their recall of consumption will be on par with men and their mean BAL will be higher than in 1987. Similarly, men have shown an increase in drinking in the same period, and it is predicted they will show increased BALs. However, it is unclear how the increased drinking will affect their ability to recall their consumption. It may be that there will still be an experience effect and accuracy will increase. On the other hand, increased levels of intoxication may impair recall as it impairs other cognitive processes.

2. METHODS

2.1. Participants

This research was conducted according to ethical guidelines and approved by the Washington State University Institutional Review Board to ensure the safety of our participants. One hundred male and 45 female college aged individuals (Mean Age=22.7, SD=2.6) agreed to participate in a short survey and received a breathalyzer as they exited a local drinking establishment. The majority of participants identified themselves as Caucasian (87.6%) and was primarily undergraduate students (70.3%, see Table 1).

Table1: *Participant Demographics*

	Total	**Male**	**Female**
Participants	145	100	45
Age	M = 22	M=22.78 (18-34)	M=22.67 (20-27)
< 21	6%	8%	2%
21-23	67%	66%	69%
> 23	27%	26%	29%
Student Status			
Undergraduate	70%	74%	62%
Graduate Student	11%	7%	20%
Non-student	19%	19%	18%
Weight	M=172 lbs	M=184 lbs (130-280)	M=146 lbs (113-200)
Drinks	M=8.3	M=8.9 (1-24)	M=6.9 (1-18)
1-2	8%	7%	11%
3-4	17%	13%	24%
> 5	75%	80%	65%

2.2. Measures

A survey designed to last at least five minutes was administered to each participant after they consented to participate in the study. This survey included questions critical to calculating their blood alcohol level (sex, weight, # of drinks, size of drinks, type of drink, total time drinking) as well as other information primarily used to increase the length of the survey to make sure it took at least five minutes to complete to insure the majority of alcohol in the mouth had been absorbed. Based on the information obtained from the survey an estimated BAL was generated using a BAL calculator developed by researchers in the department of psychiatry and

behavioral sciences at the University of Washington.14 Once the participant had completed the survey, an Intoxometers Alco-Sensor FST hand-held breathalyzer unit was used to obtain a BAL.

2.3. Procedure

Potential participants were approached by a male and female research assistant as they exited one of three drinking establishments primarily catering to college students located near a major Western University. Participants were then informed of the purpose of the study and were asked if they would be willing to fill out a short survey and take a breathalyzer test. Those who agreed were asked to read a description of the procedures and a consent form. If the person agreed to continue they were given a copy of the form but not asked to sign it in order to maintain the anonymity of the data. Participants next filled out the short survey while separated from the experimenters in order to offer as much privacy as possible. After completing the survey, participants were instructed how to give a breath sample and a breathalyzer was administered. Participants were then told their breathalyzer reading and were thanked for their participation.

3. RESULTS

Of the 145 individuals who agreed to participate, nine were removed because they did not provide enough information to calculate an estimated BAL; Ten participants provided breath samples that indicated no alcohol had been consumed (0.000% BAL), all of these participants reported drinking alcohol indicating a possible breathalyzer malfunction and their data was removed from analysis; A further 11 participants had an estimated BAL that differed from their actual BAL by more than two standard deviations, all of whom had overestimated their BAL and were also removed from further calculations. The remaining 115 participants consisted of 35 female and 80 male individuals who were similar across all demographic variables reported (age, ethnicity, student status).

Analysis of the BAL's collected through breathalyzer samples show very similar, and non-significant, mean BAL's for both men and women (M=0.095%, SD=.047% and M=0.092%, SD=.048% respectively; t(115) = -.292, p=.771, d=.06). Mean estimated BAL's were then compared for men (M=0.133%, SD=.077%) and women (M=0.167%, SD=.052%), with women having significantly higher estimated BALs than men (t(115)=2.261, $p<.05$, d=.52). The estimated BAL's and the BALs obtained through the breathalyzer test were then compared for men and women. Analysis indicates a moderate to strong correlation for both women (r=.555) and men (r=.636).

Of further interest were the comparisons between the current study and the 1987 Meier et al study. The mean female BAL obtained through the breathalyzer shows a substantial increase from 1987 to the current study (0.040% to 0.092%) and a dramatic increase of the proportion of women with a BAL above 0.10%, with one of the ten women (10%) in the 1987 study and 11 of the 35 female participants (31%) in the current study reporting this elevated BAL. Accuracy of recall of women also dramatically increased from the previous study from a weak correlation of .284 in 1987 to a moderate correlation of .555 in the current study. The comparisons between men's BAL's and accuracy in the previous and current study showed a much less dramatic change, with actual BAL increasing slightly from 1987 (0.077% to 0.095%) and accuracy of recall decreasing slightly (r=.766 to r=.636, see Table 2).

Table2: *Calculated BAL, Estimated BAL, and Recall Accuracy by Gender*

	2010		1984	
	Male	**Female**	**Male**	**Female**
Calculated Bal	.095%	.092%	.077%	.040%
Estimated Bal	.133%	.167%	ND	ND
Recall Accuracy (Estimated X Calculated)	r = .636	r = .555	r = .766	r = .284

4. COMMENT

4.1. Conclusions

The results from the current study lend support to the stated hypotheses. The data for men's accuracy of recall replicate the findings from the 1987 Meier et al study with men in the current study having on average slightly higher BALs and being slightly less accurate at recalling the number of drinks consumed. The slight

differences are likely due to random error caused by the small sample size of the 1987 study as other research does not show a major change in college aged men's drinking over the past 20 years,4 though the slight increase in the BALs of the men could also have been a factor in their slight decrease in accuracy.

The hypothesized change in women's drinking was also supported from the current data. Actual BALs obtained from the women in the current study were more than twice as high as those obtained in the 1987 study bringing them to the same level of intoxication as the men. This rise in college women's drinking suggests that not only has female drinking on college campuses increased in the past 20 years but that many women now drink to the same BAL as their male counterparts. The results also indicate that women have become more accurate at recalling the number of drinks they have consumed which is expected due to the increase in women's drinking experience over the past 20 years. Although women's accuracy has clearly increased from the 1987 study, they still show lower levels of accuracy than the men in the study.

There are a number of possible reasons for this gender difference. First, men could still have more drinking experience than women allowing them to be more accurate at recalling how much they have had to drink. This is supported by research which still shows a stable difference between male and female binge drinking for adolescents15 and the large study by Grucza et al. which shows that the increase in college aged women's drinking is really only for women aged 21-234. These studies suggest that, while college women do catch up to college men after they hit the legal drinking age of 21, they have not been drinking as long and thus still have less drinking experience. Another possible reason for the gender difference is the natural biological difference between how men and women metabolize alcohol. Women reach higher levels of alcohol than men while consuming the same amount of alcohol.9 The fact that women's BAL is increasing more quickly per drink means that if a woman and a man overestimate the number of drinks they consumed by one drink, the man will be closer to accurately estimating his BAL than the women simply because one drink for her means a greater increase in BAL.

One interesting finding from the current study was that both men and women were much more likely to over-report the number of drinks they had consumed than to under-report. The data collected in 1987 showed that only those at elevated BALs were likely to over-report the number of drinks, while those at lower BALs were equally as likely to under-report. Due to this finding it may seem sensible to assume that, since the current study showed increased BALs across the board, this is the reason for the trend to over-report. Results indicate, however, that both those at low and high BALs were likely to over-report. One possible reason for this is that students over-report to impress their friends or the experimenters. Although further studies need to be done to support this, there seems to be a general increase in the acceptance of binge drinking, with many of today's college students having the goal of getting drunk instead of just wanting to have a couple drinks. Thus, telling people they have had a large number of drinks may make them seem more popular and/or more experienced. This may be especially true for women, many of whom drink large quantities of alcohol in order to fit in and be respected by their male peers.16

4.2. Limitations

One possible limitation to this study was that participants self-reported their weight and these measurements were used to calculate the estimated BAL. Research indicates that while most individuals are fairly accurate (within 4.5 lbs) women are more likely to underestimate their weight, while men are more likely to overestimate their weight. This may cause issues with calculating an accurate BAL for both men and women. Using a scale to get a more accurate measurement of weight would be ideal, though for this study it was decided this would be invasive to the individual's privacy. Even though the self-reported weight may have been an issue it should be noted that the majority of both men and women (62.2% & 70.0%) were very accurate, and those who tend to be least accurate are severely overweight women.17 Although without height measurements we cannot tell who in our sample would be considered severely overweight, the average weight of our participants indicates a very normal sample of those of relatively healthy weights.

The results of the current study provide direct observational support the argument that female student drinking has dramatically increased over the past 20 years. Furthermore, this study shows a prevalence of over-reporting of number of

drinks consumed by these students. Further research is needed to discover the causes and consequences of this increase women's drinking and to examine reasons for such widespread over reporting of consumption by college students.

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