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**Alcohol in Emerging Adulthood:
7-Year Study of Problem and Dependent Drinkers**

SHORT TITLE: Emerging Adults 7-Year Alcohol

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**Alcohol in Emerging Adulthood:
Results from a 7-Year Study of Problem Drinkers**

Abstract

Objective. This study examined the level, changes and predictors of alcohol consumption and binge drinking over a seven year period among young adults (18-25 years) who met criteria for problem drinking.

Method. Interviews with 270 18- to 25-years old problem and dependent drinkers from representative public and private substance use treatment programs and the general population, were conducted after 1, 3, 5, and 7 years. Measures included demographic characteristics, severity measures, and both formal and informal influences on drinking.

Results. Overall alcohol consumption declined over time but leveled off around 24 years of age. Being male, not attending AA over time, as well as more baseline dependence symptoms and greater ASI alcohol and legal severity were associated with greater consumption and binge drinking. In addition greater levels of binge drinking were associated with less education, earlier age of first use, and a larger social network of heavy drinkers.

In conclusion, more attention should be paid to heavy drinking among young adults and to the factors that influence their drinking patterns.

Keywords: Alcohol, emerging adulthood, problem drinking, longitudinal data

1. Introduction

Alcohol consumption among young people, including binge drinking, is a serious public health concern, and the prevalence of heavy drinking among 18 to 24 year olds has increased over the last decade (Chen *et al.*, 2004). Drinking in young adults is influenced by several contributing factors, including genetic influences, ethnicity, family alcoholism, “role transition” such as marriage, health-related problems, suicide risk, and neurocognitive effects up to eight years later (e.g., (Brown & Tapert, 2004; Chassin *et al.*, 2004; Hopfer *et al.*, 2005; Paschall *et al.*, 2005; Pletcher *et al.*, 2005). Young adults, however, are more likely to have trajectories of improvement (e.g., (Fillmore, 1987).

Less well-studied are those emerging adults who already have a drinking problem. In this work we modeled both volume of alcohol and binge drinking which, while related, may provide a different perspective on behavior (Rehm, 1998). This study has three goals: (1) To describe the amount and time course of alcohol consumption and binge drinking in this sample of heavy drinking emerging adults; (2) To estimate and test a predictive model of consumption over seven years; and, (3) To compare that model of alcohol consumption to a parallel model of the frequency of binge drinking.

2. Methods

We selected all participants 18 to 25 years of age (n=265) from a larger study. The full sample was produced from two sampling procedures; details can be found in Weisner and Matzger (2002) and Weisner, Matzger, Schmidt, & Tam (2002). In-person interviews were conducted with individuals entering a county’s public and private chemical dependency programs (the *treatment sample*) and with problem and dependent drinkers from the general county population (*general population sample*) who had not received treatment in the prior year.

The *treatment sample* ($n = 926$ full sample, $n = 88$ age 25 or younger) included consecutive admissions in the ten public and private programs in the county. The *general population sample* of dependent and problem drinkers not entering treatment ($n = 672$ full sample, $n = 177$ age 25 or younger) was collected using random digit dialing methods in the same county. The behaviors modeled were the base-10 log total number of drinks taken in the year prior to each assessment—the total volume of alcohol consumed—and the frequency of binge drinking, defined by the number of days in the past year when the respondent consumed three or more drinks if they were a woman and five or more if a man. Variables used are displayed as part of Table 2. Four latent variable mixed-effects growth models were estimated and tested. Two models used log-alcohol volume as the dependent variable; one without interaction terms and one with. The other two models were parallel to the first two but used frequency of binge drinking as the outcome. Rates of follow-up for this sub-sample were 86%, 83%, 81%, and 78% in Years 1, 3, 5 and 7 respectively.

3. Results

Baseline descriptors of the young adults in the sample are shown in Table 1, broken down by their alcohol dependence status, a potentially confounding variable.

Consumption. Over the seven years, mean consumption declined significantly ($p = .014$). While the frequency of binge drinking also declined, the change did not reach statistical significance ($p = .109$). The log-transformed means of the two measures of drinking are graphed in Figure 1. The median (raw scale) number of drinks per year was 564, 290, 190, 173, and 139 over the five assessments. Similarly, the median number of binge occasions dropped over time; 48, 29, 18, 16, and 11. Given the decline in drinking, it was not unexpected to find the number of participants experiencing alcohol-related problems declining over time from 93 (35%) reporting

having had an event in the prior year down to only 24 (11%) experiencing a negative alcohol-related event in Year 7. Not all study participants drank alcohol in all years. Out of the 265 respondents, 121 (45.7%) reported not drinking in at least one of the years prior to an assessment while 73 (27.5%) did not drink alcohol in the year leading up to an assessment which followed one wherein they reported no consumption in the prior year. Table 2 displays the estimates, the standard errors and associated p-values for the statistical model of log-transformed alcohol volume consumed. Several measures were significantly predictive over the seven years. As noted and reflected in Figure 1, drinking declined over time but leveled off around Year 3 when the mean age was 24 (i.e., significant time and quadratic-time effects).

Binge Drinking. When the same model was re-estimated with the measure of binge drinking as the dependent variable, the estimates were all in the same direction, with one exception, and largely similar in value. Table 3 displays the estimates, the standard errors and associated p-values for this model which did not fit the data as well as the model for log-volume (BIC volume = 2130.4 vs. 3315.2). Change in bingeing over time, however, was no longer significant ($p = .109$). The time-varying index of having had alcohol treatment in the prior year was not significant in this model with a noticeable change in the p-value from $p = .009$ in modeling volume to $p = .944$ here. Also, the contrast between married and never married respondents was no longer significant ($p = .184$). Years of schooling, however, was significant in this model ($p = .002$) with a negative sign indicating more education was related to less binge drinking. The exception to the direction of effects was found for gender. The estimate (.322, $p = .101$) indicates that, when statistically controlling for all of the other measures, women binge more than men. The means at each assessment are greater for the men, and attempts to pinpoint a single or small set of covariates responsible for this reversal failed, suggesting a complex

relationship. Examination of the distributions of the binge measure did not vary markedly between genders; the distributions of the residuals were reasonable and the proportions indicating they did not binge at all did not differ between genders (not shown).

Change Over Time. To test for differences in the change over time, the models for both alcohol volume and binge drinking were re-estimated with the addition of interaction terms between the year of assessment (i.e., time) and five significant predictors; gender, treatment or general population sample, age of first use, number of alcohol-related consequences, and whether they attended AA. The p-values for these terms are tabled in the last column of Tables 2 and 3. For both dependent variables the estimates and p-values were generally very similar between models with and without the interaction terms. The one notable exception was that the number of negative alcohol-related events was no longer significant ($p = .825$), but the interaction term including that measure was ($p = .029$). In the binge model, similar to the model of volume, the addition of the interaction terms produced a loss of significance for the number of alcohol-related events, from $p = .007$ to $p = .867$. Change in binge drinking over time was now significant for this model and the positive sign on gender remained. As with volume, the relationship between the number of events and consumption increased over time. The interaction with age of first use was also significant, with the level of the negative correlation (lower age of first use relating to increased binge drinking) declining over time to near zero.

4. Discussion

As they aged, this sample of young adults demonstrated an overall decline in alcohol consumption. This is consistent with the findings of Brown and colleagues (Brown *et al.*, 2001) and the findings summarized by Chung (Chung *et al.*, 2003), and our findings extend those results to binge drinking as well. It should also be noted however that, in general, many

continued to consume alcohol and only a small proportion maintained abstinence—a finding also seen by Jackson, et al. (Jackson *et al.*, 2001). While the overall averages for both volume and binge drinking declined, they appeared to level off at an average age of about 24 years, which is about the end of this emergent adulthood period. This is consistent with recent findings (Casswell *et al.*, 2002; Poelen *et al.*, 2005). Being male, being dependent, age of first use, higher severity and no AA attendance were significant predictors of both greater drinking volume and binge drinking. In addition, receiving treatment in the year prior to assessment was related to decreased volume but not bingeing, while, conversely, a larger drug and heavy alcohol using social network was predictive of binge drinking but not of volume.

The most unexpected finding was the unpredicted greater level of binge drinking among women once the other measures were included in the statistical model. This suggests that if one were to find two heavy drinking samples of young adults who were identical on everything except their sex, the women would tend to binge more over time than men. More recent studies from college studies have documented increased binge drinking among young women – as a badge of honor to be able to drink “like a guy” as well as to receive positive attention from male peers (Young *et al.*, 2005). In our case, this finding may also be a function of this particular sample—women in the stage of emerging adulthood who already are problem drinkers. Unlike findings reported by Grella and Abrantes but in concert with the results of Chung, we found no evidence of gender differences in changes in consumption (Chung et al., 2003). Also, in the models with interaction terms the genders did not change differentially over time on either of the behaviors.

Acknowledgments

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Table 1. Percentages, means, and standard deviations of baseline demographic and alcohol-related measures of the young adult respondents by dependence status.

	Problem Drinkers (N=196)	Alcohol Dependent (n=69)	p-value
Demographic Characteristics			
Ethnicity (%)			
White	70.9	51.5	0.017
Black	7.6	14.7	
Hispanic	13.3	16.2	
Other	8.2	17.6	
Education (%)			
< High School	17.4	30.4	0.126
High School Graduate	57.1	53.6	
> High School	25.5	16.0	0.940
Income	50.5	50.0	
<\$25,000(%)			
Male (%)	59.7	65.2	0.418
Never Married (%)	81.1	79.7	0.798
Went to AA (%)	29.6	50.7	0.002
No suggestions tx (%)	92.9	78.6	0.001

Table 1 (continued).

	Problem Drinkers (N=196)		Alcohol Dependent (n=69)		p-value
	<i>Mean</i>	<i>Std Dev</i>	<i>Mean</i>	<i>Std Dev</i>	
Age of respondent	21.08	2.26	21.27	2.58	0.563
N drinks, yearly	897.34	1168.83	2180.37	1827.44	< 0.001
Log(10) of N drinks, yearly	2.53	0.72	3.09	0.57	< 0.001
Per year 5-12+ drinks	4.80	2.28	3.06	2.11	<0 .001
Per year 5+(men) 3+ women	90.30	131.03	214.94	182.52	<0 .001
Age of regular use	18.74	3.10	17.20	3.45	0.001
Problematic drinking measure	2.35	1.72	5.07	2.28	< 0.001
Alcohol Severity	0.12	0.11	0.39	0.23	<0 .001
Alcohol Related Events	0.36	0.81	1.23	1.24	< 0.001
Social Severity, etc.	0.17	0.23	0.31	0.27	<0 .001
Number of using people	4.40	5.91	6.12	10.51	0.097
ASI-Psychiatric	0.20	0.21	0.38	0.23	< 0.001
ASI-medical	0.15	0.27	0.17	0.27	0.621
ASI-all Drug	0.05	0.09	0.11	0.12	0.001
ASI-legal	0.08	0.16	0.13	0.20	< 0.001
ASI-employment	0.58	0.34	0.64	0.33	0.037

Table 2. Estimates of effects, standard errors and p-values for log-volume alcohol consumed without interaction terms and p-values for model with interaction terms.

Effect	Volume Measure			With Interactions
	Estimate	Standard Error	p-value	p-value
Intercept	1.660	0.3083	< 0.001	< 0.001
Time – linear	-0.111	0.0451	0.014	0.006
Time-quadratic	0.0104	0.0053	0.049	0.079
Demographics				
Female	-0.228	0.0607	< 0.001	0.051
Ethnicity				
Black v. White	-0.189	0.1051	0.073	0.068
Hispanic v. White	-0.160	0.0844	0.060	0.044
Other v. White	-0.13	0.0930	0.149	0.121
Age	0.013	0.0153	0.396	0.449
Marital Status				
Formerly Married v. Never	-0.088	0.1081	0.414	0.404
Married v. Never	-0.097	0.0483	0.044	0.054
Years of School	-0.028	0.0207	0.176	0.169
Income	0.007	0.0057	0.220	0.234
General Pop. Sample	0.522	0.0756	< 0.001	< 0.001
DSM-IV Dependent	0.243	0.0725	< 0.001	0.001
No Family Alcohol Prob.	-0.079	0.0685	0.251	0.313
Age of First Use	-0.023	0.0110	0.038	0.011
Severity				
N Dependence Symptoms	0.178	0.0125	< 0.001	< 0.001
N Alcohol-Related Events	0.079	0.0303	0.009	0.825
ASI Alcohol Severity	1.572	0.1847	< 0.001	< 0.001
ASI Psychiatric Severity	-0.027	0.1431	0.850	0.829
ASI Medical Severity	-0.031	0.0911	0.736	0.988
ASI Drug Severity	0.434	0.3946	0.271	0.286
ASI Social Severity	-0.056	0.1343	0.675	0.719
ASI Legal Severity	0.4704	0.1501	0.002	0.002

ASI Employment Severity	-0.100	0.0658	0.129	0.130
Formal Influences				
Treatment prior year	-0.193	0.0731	0.009	0.002
Formal Contacts	-0.049	0.0292	0.097	0.085
Informal Influences				
No AA meetings	0.3526	0.0627	< 0.001	0.117
Size of Drinking/Drug Using Social Network	0.003	0.0028	0.258	0.198
Suggestions to Get Help	-0.069	0.0568	0.231	0.199
Time by Gender				0.351
Time by Sample				0.066
Time by Age of First Use				0.141
Time by N Consequences				0.029
Time by AA Attendance				0.009
BIC	2130.4			2144.5

BIC - Bayesian Information Criterion

P-values < 0.05 in **bold** font

Table 3. Estimates of effects, standard errors and p-values for binge drinking without interaction terms and p-values for model with interaction terms.

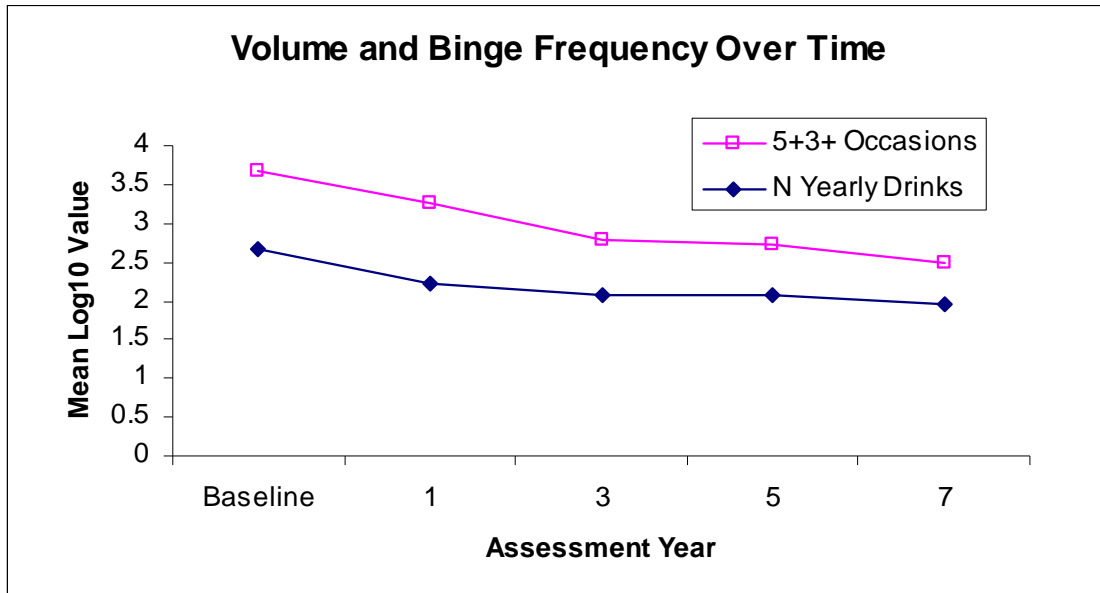
Effect	Binge Measure			With Interactions
	Estimate	Standard Error	p-value	p-value
Intercept	1.909	0.6348	0.003	0.001
Time – linear	-0.160	0.1001	0.109	0.025
Time-quadratic	0.0111	0.0119	0.351	0.319
Demographics				
Female	0.322	0.1237	0.010	0.007
Ethnicity				
Black v. White	-0.389	0.2258	0.086	0.086
Hispanic v. White	-0.304	0.1700	0.076	0.070
Other v. White	-0.121	0.1921	0.528	0.486
Age	0.053	0.0314	0.093	0.099
Marital Status				
Formerly Married v. Never	-0.153	0.2439	0.530	0.507
Married v. Never	-0.142	0.1068	0.184	0.265
Years of School	-0.129	0.0415	0.002	0.002
Income	0.0125	0.0122	0.309	0.334
General Pop. Sample	0.769	0.1618	< 0.001	< 0.001
DSM-IV Dependent	0.435	0.1484	0.004	0.005
No Family Alcohol Prob.	-0.099	0.1385	0.477	0.558
Age of First Use	-0.084	0.0226	< 0.001	< 0.001
Severity				
N Dependence Symptoms	0.337	0.0269	< 0.001	< 0.001
N Alcohol-Related Events	0.175	0.0649	0.007	0.867
ASI Alcohol Severity	3.193	0.3985	< 0.001	< 0.001
ASI Psychiatric Severity	-0.208	0.3113	0.503	0.553
ASI Medical Severity	0.011	0.2008	0.954	0.722
ASI Drug Severity	1.102	0.8683	0.205	0.238
ASI Social Severity	-0.388	0.2953	0.189	0.194
ASI Legal Severity	0.750	0.3249	0.021	0.019

ASI Employment Severity	-0.243	0.1500	0.106	0.133
Formal Influences				
Treatment prior year	0.011	0.1613	0.944	0.513
Formal Contacts	-0.088	0.0642	0.168	0.155
Informal Influences				
No AA meetings	0.411	0.1365	0.003	0.231
Size of Drinking/Drug Using Social Network	0.013	0.0060	0.034	0.025
Suggestions to Get Help	0.079	0.12600	0.532	0.681
Time by Gender				0.217
Time by Sample				0.056
Time by Age of First Use				0.045
Time by N Consequences				0.015
Time by AA Attendance				0.331
BIC	3315.2			3329.6

BIC - Bayesian Information Criterion

P-values < 0.05 in **bold** font

Figure 1. Mean yearly volume of alcohol consumed (n drinks) and frequency of drinking 3+ (women) or 5+ (men) drinks on a single occasion—both on the base-10 log scale.



Note: Scales for two measures are not the same; 5+3+ Occasions is in log-day and N Yearly drinks is in log-drinks.

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