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Older women's cognitive and affective response to moderate drinking

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SUMMARY

Objective—In this paper we investigated the question, how do older women who drink moderate amounts of alcohol differ from those who do not drink on measurements of cognitive function, memory, affect and health?

Methods—The nonprobability sample of female participants ($n = 182$) averaged 75 years of age and had a Mini Mental State Examination scores of 28. The participants were asked to indicate whether they drank alcohol or abstained (yes/no) and if they indicated that they did drink, to describe how many drinks they consumed in a given period of time (day/week/month).

Results—None of the participants acknowledged drinking more than 2 drinks a day. Caucasian women had the largest number of moderate drinkers (53% vs 47%), while the majority of African-American and Hispanic women reported not drinking. The moderate drinkers reported less depression, had higher self-reported health, performed better on instrumental everyday tasks, had stronger memory self-efficacy, and used more strategies to improve memory performance. In addition, these women had higher performance on tests of executive function: attention, concentration, psychomotor skills, verbal-associative capacities, and oral fluency.

Conclusions—The circumstances under which people drink are complex and were not evaluated in this study. Therefore, rather than endorsing drinking behavior, these findings suggest that future research might examine why elders make the decision to drink, the circumstances that predispose women to drink (alone/with others), and other qualities that characterize female drinkers over the age of 65.

Keywords

alcohol; cognition; depression; memory performance; executive function; health benefits; older adults; health promotion; moderate consumption

INTRODUCTION

The population of elderly Americans is increasing and will continue to grow at least through 2030 (Smith, 2003). Siegel (1996) projected a population of approximately 79 million elderly people by 2050. Moderate consumption of alcohol by older adults has both risks and benefits (Dufour, 1999; Peele and Brodsky, 2000). In the older adult population, abstinence rates have been reported from a low of 25% to a high of 80% (Lakhani, 1997; Schoenborn and Adams, 2001; Blow and Barry, 2002).

The number of people labeling themselves as current drinkers also varies by race. Schoenborn and Adams (2001) found that white women (62.4%) were more likely than minority women

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(Black women, 40.4%; Hispanic women, 40.4%; Asian/Pacific Islander women, 30.6%) to label themselves as current drinkers. Results from the 2002 National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration, 2003) yielded similar results, with 55.0% of whites, 39.9% of blacks, and 42.8% of Hispanics labeling themselves as current drinkers. In the National Survey sample, only 1.4% of individuals 65 and older acknowledged heavy drinking.

Physical and psychological difficulties may be aggravated in elderly individuals who consume heavy amounts of alcohol. Atkinson (2002) summarizes these to include mood, cognitive and sleep changes, cardiovascular problems and attendant hypertension, adverse drug–alcohol interactions, diabetes, ambulation difficulties and osteoporosis. In an article particularly relevant to this age cohort, Fein and Di Sclafani (2004) caution that aging as a process may reveal cognitive difficulties which resulted from periods of substance abuse earlier in life. These individuals may make a seemingly full cognitive recovery following a period of abstinence in middle age, only to have these cognitive problems reemerge, complicated by cerebrovascular disease, dementias, reduced cognitive reserve and normal brain changes associated with aging.

Both Dufour (1999) and Masters (2003) emphasized that defining moderate drinking is problematic due to measurement of levels, patterns and cultural definitions of drinking. The manner in which a sample is recruited (random, convenience and/or volunteer) and the setting in which the measurement takes place (primary care, public health clinic, university setting, research project) will influence an alcohol self-report, and limit the generalizability of specific results to the population in general. In a review of alcohol use, Collins and McNair (2002) identified numerous social and cultural influences on the drinking patterns of minority women. According to Blow and Barry's (2002) schema, older female low-risk drinkers are defined as having less than one drink per day or seven drinks per week, are able to employ reasonable limits on alcohol consumption, and do not drink when driving a motor vehicle or when using medications that may interact with alcohol. Although the elderly generally drink less, and have fewer alcohol related problems than the population in general, problems may arise at a lower level of alcohol consumption (Dufour and Fuller, 1995). In summary, there are risks for elderly drinkers who overuse alcohol, who are less well able than their younger counterparts to metabolize alcohol, and are, in general, more affected by a smaller dose of alcohol.

Memory difficulties are a pervasive cognitive concern for people 65 years of age and older. In 1985, Poon reported that 80% of community-dwelling elders were concerned about forgetfulness and memory problems. Cutler and Grams (1988) documented that in the preceding year, 15% of those 55 and older, and 23% of those 85 and older reported some form of memory problem. The influence of an aging memory on the accuracy of a self-reported drinking history is a major concern when studying abstinence rates (Liberto *et al.*, 1992; Simpson *et al.*, 1994). Goodwin *et al.* (1987) found that community-dwelling elders who consumed alcohol performed better on cognitive measures than the non-drinkers, but the relationships were not significant when income, education, gender and age were controlled. Moderate alcohol consumption in women, about one drink per day, is positively associated with maintenance of cognitive function and physical health (Blow *et al.*, 2000; Blow and Barry, 2002; Leroi *et al.*, 2002; Krahn *et al.*, 2003; Peele and Brodsky, 2000). Among moderate drinkers, there was a reduced risk of cardiovascular disease (Scherr *et al.*, 1992), cognitive disorders (Klatsky *et al.*, 1997; Orgogozo *et al.*, 1997; Broe *et al.*, 1998; Zuccala *et al.*, 2001), lowered mortality (Simons *et al.*, 2000), increased high density lipoprotein (HDL) levels (Mukamal and Rimm 2001), and improved functioning in a non-institutional setting (Nelson *et al.*, 1994). In a 2003 study, men and women were assessed cognitively at age 53 and these scores were compared with cognitive ability scores determined for these participants when they were freshman and juniors in high school (Krahn *et al.*, 2003). Educational attainment

was also gathered for each of these participants. Women who consumed minimal amounts of alcohol (0–1 drink a day) appeared to have less cognitive decline over time, however when adjustments were made for pre-determined cognitive ability and level of educational attainment, any significant effects of alcohol on cognition were nonexistent. Therefore, the purpose of this paper was to investigate the question, how do older women who drink moderate amounts of alcohol differ from those who do not drink on measurements of cognitive function, memory, affect and health?

METHODS

Screening

The screening interview required that the participants were 65 or older, spoke, understood and read English, lived independently in the community, had reliable transportation, and agreed to come for an initial screening meeting. In the study both self-report and performance data were collected. At the screening interview, prospective participants completed checklists, were reassessed to determine that they met study criteria, and were administered the following measures of intellectual and executive functioning, specifically, the Mini-Mental Status Examination (MMSE; Folstein *et al.*, 1975), The Controlled Oral Word Association Test (COWAT) from the Multilingual Aphasia Examination (Summerall *et al.*, 1997), and The Trail-Making Test (Reitan, 1958). Participants were required to achieve a score of 23 or higher on the MMSE to be eligible for the study. Those participants who passed the other eligibility tests, but had a score just below the cutoff on this test were reviewed on a case by case basis for inclusion into the study. After passing the pre-screening and screening battery, participants were administered the baseline testing battery, which is described below.

Alcohol consumption

The question inquiring about alcohol consumption was embedded in the health interview self-report questionnaire. The participants were asked to indicate whether they drank alcohol or abstained (yes/no) and if they indicated that they did drink, to describe how many drinks they consumed in a given period of time (day/week/month).

Anxiety

The Spielberger State-Trait Anxiety Inventory (STAI) was used to measure anxiety. The STAI was developed for the expressed purpose of detecting anxiety in adults (Spielberger *et al.*, 1970) and to differentiate between the temporary condition of ‘state anxiety’ and the chronic concept of ‘trait anxiety’. The STAI has been used with older adults in memory improvement studies (Yesavage, 1984; Yesavage *et al.*, 1988).

Depression

Participants were given the Centers for Epidemiologic Studies Scale (CES-D), a measure of depressive symptoms (Radloff and Teri, 1986). Somatic complaints are emphasized on this measure that individuals respond to on a four-point Likert scale. Reliability coefficients from 0.85 to 0.91 have been obtained when the CES-D was used with older adults (Himmelfarb and Murrell, 1983).

Executive function

The Controlled Oral Word Association Test (COWAT) (Summerall *et al.*, 1997) was used to measure organizational strategy. The Controlled Oral Word Association Test is part of the Multilingual Aphasia Examination (MAE). The Controlled Oral Word Association Test required corrections for both age and education. The Trail-Making Test (Parts A and B) (Reitan,

1958) was used to evaluate executive processes. Participants were required to pass Trails A and/or Trails B at or above the 10th percentile for their age group for inclusion into this study.

Cognitive flexibility

This variable was assessed using the Trail-Making Test, Part B. On Part B, randomly arrayed numbers and letters must be connected in an ascending alpha-numeric sequence (1–A, 2–B, 3–C, etc.).

Memory performance

The Rivermead Behavioral Memory Test (RBMT), which was designed to reflect everyday memory performance, served as the memory performance measure (Cockburn and Smith, 1989; Wilson *et al.*, 1989). The components include remembering of a name (first and surname), a hidden belonging, an appointment, picture recognition, a brief news article (immediate and delayed), face recognition, a new route (immediate), a new route (delayed), a message, orientation, and date. Prospective memory, or remembering to complete an action in the future without the direct assistance of someone else, was tested with three items from the RBMT: Item #3 (remembering to ask for a belonging); Item #4 (remembering to ask about an appointment); and Item #11 (remembering to deliver a message). Each task was developed so that an individual with normal memory functioning would pass, but individuals with memory difficulty would fail. For each subtest, two scores are produced, a pass/fail screening score (0 = *abnormal*; 1 = *borderline*; 2 = *normal*) and a standardized profile score (SPS) with a range from 0–24. The analysis reported here uses the standardized profile scores.

The RBMT has been proven to be an acceptable memory measure for individuals over 70 years of age and, to minimize practice effects, is available in four alternate (parallel) forms. Test–retest reliability has been reported as a correlation of 0.78 for the screening score and 0.85 for the profile score.

Memory evaluation

The Metamemory in Adulthood Questionnaire (MIA) measures a person's affect, beliefs, and knowledge of memory (Dixon and Hultsch, 1983; Dixon *et al.*, 1988). The MIA consists of seven subscales containing 108 statements, with responses rated on a five-point Likert scale. The subscales are achievement, anxiety, capacity, change, locus, strategy, and task. When used with middle aged and older adults, Cronbach alpha scores for the seven subscales are as follows: Strategy 0.85; Task 0.84; Capacity 0.85; Change 0.92; Anxiety 0.83; Achievement 0.80; and Locus 0.79. McDougall (1994) reported that Cronbach's alphas for each subscale varied from 0.73 to 0.95 in a population of older adults. Intercorrelations between the MIA subscales were extremely low to moderate, from –0.05 to 0.60.

Memory self-efficacy

The Memory Self Efficacy Questionnaire (MSEQ) (Berry *et al.*, 1989; Bandura, 1993) is a Guttman scale consisting of 50 questions, five questions for each of ten everyday tasks: objects, text, groceries, photographs, story, number sets, locations, animals, phone numbers, and pictures. In the Bandura tradition, subjects make performance predictions on self-efficacy level (Yes or No) and on strength and confidence in each performance prediction, from 10% to 100%. In a study using community elders, McDougall (1994) found coefficients of reproducibility for level ($r = 0.88$) and strength ($r = 0.95$).

Instrumental Activities of Daily Living (IADL)

The Direct Assessment of Functional Status (DAFS) is a performance-based measure that contains 85 items (Loewenstein *et al.*, 1989; Loewenstein *et al.*, 1992). The DAFS scale

measures a wide range of behaviors within each of the seven functional domains and is administered in an outpatient setting. A modified version of this test was used and found to reliably measure cognitive status with community elders (Rankin and Keefover, 1998). With the developers' permission, a modified version of the DAFS was also used in this study to account for a lack of kitchen and bathroom facilities in the evaluation rooms at the study sites. The DAFS domains used in this study included time orientation, communication abilities, transportation, financial skills, and shopping skills. A fifth domain, medication knowledge, was added for this study.

The Instrumental Activities of Daily Living (IADL) scale (Lawton and Brody, 1969; Lawton *et al.*, 1982; Lawton, 1988) is a self report measure of activities of daily living. The Instrument has a total of nine domain areas covering such activities as using the telephone, managing transportation, going shopping, preparing meals, cleaning the house, performing handyman work, doing the laundry, taking medications, and managing money. Three response formats are available for each question. Lawton (1988) reported an alpha reliability of 0.91.

Procedure

The study was promoted in the community as a health promotion intervention in which the participants were taught strategies for successful aging. Study participants were drawn from a metropolitan area in Central Texas through print and TV media, direct recruitment at city-run senior activity centers, churches, health fairs and festivals. Members of the SeniorWISE Research Team presented information about the study at these locations, answered questions about the protocol, and screened interested participants. Other participants called the Research Office after a newspaper article about the study appeared in a local paper, and their screening information was taken over the telephone. All participants were seen in face-to-face interviews for the Eligibility Testing. There were 182 women in the study with an average age of 75 (Table 1). Despite having males and females in this study, this paper emphasized the female participants, because the small number of men in the study ($n = 53$) made reliable statistical analysis of this particular topic unfeasible. Female participants ($n = 182$) described their alcohol consumption as part of a baseline health survey.

RESULTS

Data analysis

Based on their answer, the participants were divided into two groups, either 'Do drink' or 'Don't drink'. A member of the research team reviewed their answers on the Drinking Status question to verify the accuracy of the response. Those individuals who reported drinking consumed $\leq$ two drinks per day. Ninety-one percent of the Hispanic women reported not drinking, compared with 51% of the non-Hispanics. Ninety-five percent of the 21 African-Americans reported that they did not drink, compared with 47% of those identifying themselves as Caucasians. For the total sample, 57% of the women reported being abstinent, while 43% of the sample acknowledged drinking alcohol. Those who drank were more likely to be married than non-drinkers, while the non-drinkers were more likely to be widowed. The average age of both groups was comparable. The average education of non-drinkers was 12.6 years, compared with 14.6 years for drinkers, and was statistically significant ($t = 3.77, p < 0.001$).

Independent *t*-tests were used to compare the two groups on 15 study variables. As shown in Table 2, there were statistically significant differences on 10 of the 15 measures. In all cases, the group who drank scored better than those who did not drink. These were generally moderate differences, with *d* values ranging from 0.38 to 0.73. Because multiple analyses were conducted on this data set, the Bonferroni adjustment was used to modify the alpha level for the 15 outcomes studied. The resulting alpha probability for each individual analysis became *p*

<0.004. Seven of the analyses remained statistically significant at $p < 0.004$: the MMSE, the RBMT, the CES-D, the DAFS, the Trail Making Test (Parts A and B), and the COWAT.

Those women who did not drink had significantly less education than the group who drank. Since educational differences are associated with differences in memory performance, we performed a series of Analyses of Covariance comparing the drinkers and abstainers, using years of education as a covariate. See the last column of Table 2. The adjustment for differences in education did decrease the magnitude of the differences between groups. However, the differences between drinkers and non-drinkers on the CES-D, the MMSE, the DAFS, the COWAT, and the Trails B remained statistically significant, using a 0.05 alpha level.

Because there were differences between drinkers and non-drinkers on the measures of depression and cognition, we decided to control for their effects and then determine if the differences in cognitive functioning remained statistically significant. Hierarchical linear regressions were performed with CESD scores and MMSE scores entered on the first step, and the various cognitive functioning measures entered on the second step. In these analyses, the drinking status variable added significantly to the prediction of only Trails B and the COWAT, after controlling for depression and mental status. Drinking status also contributed significantly to the prediction of the DAFS, after depression and mental status were entered as covariates.

DISCUSSION

The findings from this study, that women who consumed a moderate amount of alcohol (two or less drinks a day) performed better on a number of affective and cognitive factors, adds to the growing evidence found in other studies (Klatsky *et al.*, 1997; Orgogozo *et al.*, 1997; Broe *et al.*, 1998; Blow *et al.*, 2000; Peele and Brodsky, 2000; Zuccala *et al.*, 2001; Leroi *et al.*, 2002). Compared to the abstainers, the group of moderate drinkers had higher memory self-efficacy, reported lower levels of depression, enjoyed better overall health, and used more strategies to enhance their memory performance. In addition, the self-acknowledged drinkers performed better on two tests of executive function and they report better functioning in tasks of everyday living, such as money and household management.

This study contributes new information to the field of cognitive aging, specifically in the areas of executive function (cognitive flexibility and organizational strategy), subjective memory evaluation, including memory self-efficacy and metamemory, affective function (anxiety and depression), and functional ability, or IADLs. However, these findings should not be construed as an endorsement for drinking, and women who do not currently drink alcohol should not start on the basis of these findings. Women who drink alcohol sensibly show a number of cognitive, intellectual, affective, memory and mood benefits. The decision to drink is a result of multiple influences including social, cultural, emotional and interpersonal factors.

Alcohol tolerance decreases with age, complicating a reliable measurement of troublesome drinking in this age cohort (Dufour and Fuller, 1995). In addition, drinking behavior, over a lifetime, is influenced by a great many factors including, but not limited to health status, access to resources, religious beliefs and physical vigor. This study was a 'cross-sectional snapshot' of drinking behavior at one point in time, and does not reflect drinking patterns over many years. Future studies might investigate lifetime drinking histories to further elucidate the relationship between drinking and cognitive status. Great latitude exists in what constitutes mild, moderate or 'problem' drinking. Masters (2003) found that almost half of her elderly participants defined moderate drinking in excess of the SAMSA Federal guidelines. Asking participants to report the total number of drinks consumed may not be the best way to stratify drinking behavior along a continuum from sensible to problematic. Frequently used alcohol

screening tests are sometimes not standardized and often do not have well established reliability or validity for people over 65 years of age (Lakhani, 1997; Blow and Barry, 2002).

Participants were asked to self-report drinking behavior and discussed their answer with a research team member. Werch (1989) emphasized the underreporting of alcohol consumption that results from a self report measure like the one used in this study as opposed to a diary. The stigma attached to the endorsement of drinking, especially by women in this age cohort, has been mentioned in the literature, as has the impact of the aging memory on the accuracy of an individual's drinking history (Liberto *et al.*, 1992; Simpson *et al.*, 1994). Given this set of circumstances, study participants may have felt pressure to answer in a socially desirable manner.

None of the participants in this study acknowledged drinking more than two drinks a day, a finding also present in Marsh's (2003) study of community-dwelling elderly. However, in that study, Marsh also found that Caucasian elderly were very prone to rate moderate drinking in excess of Federal guidelines. Given drinking patterns previously described in other studies, it is highly likely that some of the participants in this study may have consumed more than two alcoholic beverages a day. Lakhani (1997) found the prevalence of drinking problems in the elderly population somewhere between 0.006% and 18% with an average of 5.1%.

In this sample, Caucasian women had the largest number of moderate drinkers (53% *vs* 47%), while the majority of African-American and Hispanic women reported not drinking. Previous research on abstinence rates in elderly women range from a low of 40% (Lakhani, 1997) to a high of 70–80% (Blow and Barry, 2002). Collins and McNair (2002), summarizing previous studies, reported abstinence rates of 45–60% among African-American women and 43% among Mexican-American women. Masters (2003) found a 19% incidence of moderate alcohol consumption among African-Americans and 40% among Hispanic elders. Seventy-three percent of Master's sample were women. Schoenborn and Adams (2001) reported a lifetime abstention at 25% among widowed adults; however, in our sample, a greater percentage of widows (61% *vs* 47%) reported not drinking than previously reported. African-American elderly were less likely to consume alcohol when they belonged to churches practicing fundamentalist religions or found meaning in religion; although church attendance and prayer were not related to alcohol use (Krause, 2003). Our inquiry about drinking behavior in this study may not have been sufficiently precise enough to obtain answers influenced by cultural characteristics unique to each ethnic group. Using more sensitive instruments and taking a more comprehensive drinking history would likely yield more precise information about the reasons people choose to drink or abstain from alcohol, and result in a more varied pattern of alcohol use.

One of the differences identified between the groups in this study was marital status. Study participants chose a marital status at the beginning of the study, and updated the demographic form during subsequent interviews when they experienced a change in life situation. We are evaluating these participants for a two-year period, in the latter years of their lives, and do not know their relationship or socialization histories. Some participants have never married, some are divorced, often multiple times, while others are widowed, some more than once, and still others are married or partnered, once or many times. Any conclusions about these study participants based on marital status would be speculative, based on the lack of a relationship history. Nonetheless, previous research has documented improved health in married *vs* non-married individuals (Ross *et al.*, 1990). In an effort to examine the relationship between health-related behaviors and marriage benefits, specifically in the elderly, Schone and Weinick (1998) analyzed data on 4443 people ages 65 and older, isolating the propensity to engage in four positive behaviors. They reported overwhelmingly that being married increased the likelihood that an individual would engage in these behaviors, and from this evidence, conclude

that marriage continues to confer positive effects related to health behaviors into the latter years of life.

Future research might examine the circumstances in which people choose to drink. SeniorWISE study participants are volunteers with available leisure time. Previous studies (Rouse and Clawson, 1992) have found volunteers to be more sociable than individuals who do not volunteer. They may be more prone to attend business, religious and social functions where alcohol might be available. The opportunity for social stimulation may predispose a person to drink as a means of fitting into a certain setting. In this age cohort there are certain activities that are available only in a setting where alcohol is available. Some retirement facilities offer a 'Happy Hour' for their participants as a way to encourage socialization, to minimize isolation and to replicate a schedule that a person might keep in an independent home prior to moving to the retirement facility. Other studies might examine how factors such as education modify drinking motivation and behavior.

Even though the study provides interesting new data on the affective and cognitive function of a group of community dwelling older adults, there were several limitations. First, the participants were volunteers from the community. Second, the data on drinking patterns was gathered via self-report, and the forced choice nature of the question may have contributed to a lack of specificity. Third, even though the sample in this study was tri-ethnic, the abstinence group contained a higher percentage of minority participants. Fourth, participants may have underreported their alcohol consumption to please the interviewer who was sitting across the table from the participant during the questionnaire administration. Finally, the circumstances under which people drink are complex and may not have been accurately measured in this study.

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Table 1
Frequencies and percentages of demographic variables by drinking status

	Drinkers (<i>n</i> = 77)		Non-Drinkers (<i>n</i> = 105)	
	Frequency	%	Frequency	%
<i>Race</i>				
White	75	98.7	66	63.5
Black	1	1.3	20	19.2
Other	0	0.0	18	17.3
<i>Ethnicity</i>				
Hispanic	3	3.9	30	28.6
Non-Hispanic	73	96.1	75	71.4
<i>Marital Status</i>				
Married	20	26.0	15	14.4
Never Married	3	3.9	3	2.9
Divorced	18	23.4	23	22.1
Widowed	36	46.8	63	60.6
	Drinkers (<i>n</i> = 77)		Non-Drinkers (<i>n</i> = 105)	
	Mean	<i>SD</i>	Mean	<i>SD</i>
Age (in years)	74.75	6.14	75.04	6.13
Education (in years)	14.62	3.05	12.58	3.96

Table 2
Health and memory differences between elderly female drinkers and non-drinkers

Measure	Non-Drinker Mean	SD	N	Drinker Mean	SD	N	T-Test	D Value	F-Test
MMSE	27.31	2.28	105	28.70	1.63	77	34.78***	30.72	9.30**
MIA-Ach	3.91	0.38	104	3.89	0.34	77	0.46	0.07	0.61
MIA-Anx	3.30	0.69	104	3.21	0.63	77	0.86	0.13	0.39
MIA-Cap	3.03	0.61	103	3.07	0.49	77	30.40	30.06	0.38
MIA-Chg	2.49	0.60	104	2.54	0.56	77	30.67	30.10	0.82
MIA-Loc	3.56	0.49	103	3.65	0.51	77	31.17	30.18	0.70
MIA-Tsk	3.83	0.40	103	3.97	0.36	76	32.50*	30.38	2.12
MIA-Str	3.69	0.53	104	3.84	0.42	77	32.09*	30.31	1.45
SPS	17.32	4.80	105	19.38	3.63	77	33.28***	30.49	3.69
CESD	11.67	7.28	102	7.56	5.88	71	3.94***	0.61	12.46**
DAFS	80.86	5.50	104	84.01	3.23	77	34.83***	30.73	8.84
MQS35	31.22	14.06	101	35.98	10.91	72	32.50*	30.39	3.41
TRAILA	55.02	45.07	104	36.13	22.71	77	3.69***	0.55	3.76
TRAILB	153.21	95.45	104	99.17	76.03	77	4.10***	0.62	7.29**
COWAT	38.18	10.94	104	44.55	11.22	77	33.83***	30.58	9.21

*
p <0.05;

**
p <0.01;

p <0.001.

F-test analyzed differences between drinking groups using educational differences as covariate.

T-tests: equal variance was not assumed when Levine's test for equality of variances was significant. Statistically significant differences occurred at the alpha level adjusted for multiple comparisons on the following measures: MMSE, SPS, CESD, DAFS, TrailA, TrailB, and COWAT.