The Effect of Moderate Alcohol Use on the Relationship between Stress and Depression

ABSTRACT

Objectives. The purpose of the study was to determine whether moderate alcohol use mediates or buffers the effect of stress on depression in a group of non-Hispanic White men and women.

Methods. Data are from the Los Angeles Epidemiological Catchment Area cohort. Individuals were assessed at two time periods, 1 year apart. Mean depression scores were analyzed for each level of stress and alcohol use.

Results. In the simultaneous presence of both chronic strain and negative life events, a U-shaped pattern was observed in which abstainers and light and heavy drinkers had higher depression scores at the second time period than did light-moderate and moderate alcohol users. The U-shaped relationship remained when the effects of sex, age, and physical health status were controlled.

Conclusions. Light-moderate and moderate drinkers had less depression in the presence of stress than persons in other more extreme drinking categories. Moderate alcohol use may serve as a proxy for a spectrum of generally moderate behaviors that either attenuate the effect of stress on depression or suppress the effects of stress. (*Am J Public Health.* 1994;84: 1913–1917)

Robert I. Lipton, PhD

Introduction

This study uses the Los Angeles Epidemiological Catchment Area data to examine the role of moderate alcohol use in buffering the effect of stress on depression in a non-Hispanic White population.

Relatively little research has been undertaken that examines the relationship between alcohol use, stress, and a psychiatric disorder such as depression. Similarly, in research that examines stress, coping, and depression, few studies examine the possible role of alcohol use as an intermediate factor between stress and illness. In these studies, the direct effects of stress on depression, as well as the direct effects of alcohol on depression, are commonly reported, whereas the stress-modifying role of alcohol use is less often described.[1–3]

In a cross-sectional study of a stress-buffering model, Neff and Husaini reported that life events were more strongly related to depressive symptomatology for both heavy drinkers and abstainers compared with more moderate users of alcohol (about two drinks per day).[3] This apparent stress-modifying role of alcohol was found to vary for specific categories of stressors, with relational events such as marriage and divorce being less modified by alcohol than were familial events such as deaths, births, and monetary difficulties. In a subsequent study, the authors distinguished between moderate alcohol use as a coping behavior that is directed at a specific or identifiable stressor and moderate alcohol use as a more generalized buffering mechanism offering nonspecific tension reduction.[4]

In an effort to more clearly determine the direction of the effect, a prospective study that examined the relationship between stress, depression, and alcohol consumption reported no evidence for the role of alcohol in modifying the relationship between stressful life events and depressive mood.[1] The direct effects of both chronic stressors and alcohol use on depression were, however, significantly positive.

The contrasting findings of the studies cited above indicate the need for further research in which possible etiological pathways between alcohol use, stress, and depressive mood are more closely examined. In this analysis of the role of moderate alcohol use in modifying the effect of stress on depression, both acute stressors (negative life events) and chronic stressors (strain) are included to more fully characterize stress exposure. Previous research did not examine the simultaneous presence of life events (acute stressors) and strains (chronic stressors). Further, self-reported health, also not previously studied, is included in this analysis because of the possible strong relationship between drinking patterns, stress, depression, and health. This research also used a complex alcohol measure that takes into account not only frequency and quantity, but also high-consumption drinking episodes and type of alcohol consumed. In the past, only simple quantity and frequency measures were used, ignoring important variations in drinking patterns.

Materials and Methods

The data are from the Los Angeles Epidemiological Catchment Area study, one of five sites of the National Institute

At the time of the study, the author was with the Alcohol Research Group, Berkeley, Calif.

Requests for reprints should be sent to Robert I. Lipton, PhD, Institute of Community Medicine, University of Tromsø, N-9037, Tromsø, Norway.

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TABLE 1—Alcohol Use Cross-Classification: Pattern of Alcohol Use, by Frequency Category

Quantity of Alcohol Consumed	Frequency of Alcohol Consumption					
	Once a Month or Less	Two to Three Times a Month	Once a Week	Several Times a Week	Daily	Several Times a Day
Low quantity,[a] no binging	Light drinkers	Light-moderate drinkers	Light-moderate drinkers	Light-moderate drinkers	Light-moderate drinkers	Light-moderate drinkers
Low quantity, binging	Light drinkers	Light-moderate drinkers	Light-moderate drinkers	Moderate drinkers	Moderate drinkers	Moderate drinkers
Medium quantity,[b] no binging[c]	Light drinkers	Light-moderate drinkers	Moderate drinkers	Moderate drinkers	Moderate drinkers	Moderate drinkers
Medium quantity, binging	Light drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers
High quantity,[d] no binging	Light drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers
High quantity, binging	Heavy drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers	Heavy drinkers

Note. Abstainers are those who did not drink in the previous 6 months, n = 273. Subsample sizes for drinkers were as follows: light drinkers, n = 151; light-moderate drinkers, n = 253; moderate drinkers, n = 274; heavy drinkers, n = 198.
[a]Less than 0.72 absolute ounces of alcohol.
[b]Between 0.72 and 1.79 ounces of alcohol.
[c]Drinking seven drinks at one sitting, at least once per week.
[d]More than 1.8 ounces of alcohol.

of Mental Health's collaborative Epidemiological Catchment Area program. Details of the goals and sampling methods of the Los Angeles catchment area study have been described previously.[5] Briefly, the Epidemiological Catchment Area program goals were to estimate the prevalence and incidence of psychiatric disorders and the rates of use of health services in general populations. Additionally, questions concerning stress, coping, and alcohol use were included at the Los Angeles catchment area site. For each respondent, data were gathered at two time periods, 1 year apart (time 1 and time 2, respectively), using the same instrument at each period.

Respondents were selected by using a two-stage area probability sample, stratified by two geographical areas within the Los Angeles catchment area. Census blocks served as primary sampling units. A 68% response rate was obtained for the Los Angeles catchment area study, resulting in a total of 3131 adults, of which 1149 were non-Hispanic Whites. Differential selection probabilities associated with catchment area, determined by the 1980 census, were weighted by the actual population counts for these areas.[6,7] Nonresponse in the whole sample was due primarily to refusals (76%) or inability to contact the sampled individual (21%). Of the 1149 White non-Hispanics present at the first time period, the population of interest in this analysis, 928 remained at time 2.

The Center for Epidemiological Studies-Depression Scale developed by Radloff is used to assess depressive mood.[8] This scale has demonstrated adequate internal validity, test-retest reliability, and content, criterion, and construct validity.[8–11] The scale assesses mood in the previous week. Because the score on the depression scale at time 2 could be related to the score at time 1, the depression scale scores for both time periods were used. The inclusion of the score on the depression scale at time 1 as an independent variable in the analysis helped control for previous, possibly severe, depressive mood.

Stress was assessed by both negative life events (acute stressors) and by a strain variable (a chronic stressor). Negative life events for the 6 months before each measurement point include death of someone important to the respondent, housing problems or moved, marital dissolution, work and/or money problems, legal problems, and death of child or other loved one. These negative-life-event categories are a subset of the life event scale developed by Holmes and Rahe.[11] Negative life events occurring to the respondent and negative life events occurring to someone important to the respondent were analyzed separately due to the possible differences between types of negative life events.[3,12] Negative life events were assessed at time 1 of the Los Angeles Epidemiological Catchment Area study.

Five conditions were defined as part of a composite financial strain index: having difficulty affording food, clothing, medical care, and furniture, and paying bills, each contributing one point to a summary ordinal scale ranging from 1 to 5 (Aneshensel C, Rulter C, Lachenbruch P, unpublished manuscript, 1991). Financial strain was assessed for time 1 of the Los Angeles Epidemiological Catchment Area study. All questions referred to ongoing problems during the previous year.

Alcohol use was measured with a combination of four questions: quantity, frequency, usual type of alcohol consumed, and occasional high-alcohol-consumption episodes. In Table 1 a grid is shown cross-classifying quantity, frequency, and high-quantity drinking behavior. Quantity is given in absolute ounces of alcohol based on usual type of alcohol drunk: wine, beer, or spirits. This composite alcohol measure was assessed at time 1. Questions concerning alcohol use and alcohol-related problems covered the 6 months preceding the interview, with some questions referring to behavior in the last month, to mitigate problems associated with recall.[13–16] Social desirability may play a role in response to these questions in that heavier drinkers could report artificially low levels of intake.

In a series of one-term logistic regression models predicting risk of leaving the study, women were at greater risk, as were those undergoing financial strain and those who had someone important to them experiencing negative life events. Dropouts did not have markedly different levels of depression, stress, or alcohol use.

Differences between mean levels of the depression scale score were analyzed with the generalized linear models procedure in SAS.[17] Mean depression scale scores were calculated for each level of alcohol use and the stressors: negative life events occurring to both the respondent and someone important to the respondent and financial strain. Potential confounders, age, sex, depression scale score at time 1, and self-reported physical health status were also included in the models.

Results

Descriptive Results

In this sample of 1149 people, 928 remained at time 2, the average age was 42.1 years with 64% of people less than 54 years old, and 53.2% of the sample were female. The average years of education was 14 years, and the mean household income was $35 000 per year. Descriptive information on demographic, confounding, exposure and outcome variables is shown in Table 2.

The average depression scale score at time 1 was 6.4 (SD = 7.6), and at time 2 it was 5.6 (SD = 7.1). As in other studies (due to the fact that most people report very few depressive mood symptoms), the depression scale distribution is highly skewed toward zero. The average number of negative life events occurring to each respondent, 0.74 (SD = 1.0), was lower than the average number of negative life events occurring to someone important to each respondent, 1.46 (SD = 1.4). Financial strain averaged 0.90 (SD = 1.3), with 86% of the respondents having scores from 0 to 2 on the financial strain scale. Alcohol use categories appeared to be broadly distributed without a prominent skew in either direction.

Women had slightly but significantly higher depression scale scores than men. As self-reported health went from poor to excellent, a monotonic inverse relationship was found in which those who reported excellent health had significantly lower depression scale scores than did those who reported poor or fair health. A slight U-shaped relationship was observed across the alcohol use categories, with light-moderate and moderate drinkers having lower depression scale scores than did those in other drinking categories. For each negative-life-event category, the mean depression scale score increased as the number of reported events increased. As the financial strain score increased, a similar increase was observed. These scores are shown in Table 3.

Stratification by Negative Life Events and Financial Strain Considered Individually and Simultaneously

Moderate and light-moderate alcohol users generally had lower depression scale scores than did abstainers and light and heavy drinkers for every level of stress (Table 4). The results shown have been controlled for the effects of sex, age, reported health status, and depression scale score at time 1. Although heavy drinkers had higher depression scale scores than did more moderate alcohol users for all categories of stress, mean depression scale scores for heavy drinkers were not as high as those for persons in the abstainer and light-drinking categories. When any kind of stress was present, mean depression scale scores for abstainers, light drinkers, and heavy drinkers increased slightly relative to the no stress category. Nevertheless, differences between moderate drinking categories and more extreme drinking behaviors are similar, in magnitude and pattern, for the first four columns of Table 4.

Differences in mean depression scale scores between moderate alcohol consumption categories and more extreme drinking categories are markedly larger when both life events and strains are examined together (the last two columns of Table 4) than when they are examined separately (the first four columns of Table 4). This difference is most noticeable for the simultaneous presence of financial strain and negative life events experienced by the respondent. Across all the stress categories, the absolute changes in mean depression scale scores did not markedly differ for light-moderate and moderate alcohol users, except for the simultaneous presence of financial strain and negative life events experienced by someone important to the respondent.

Light drinkers reported the highest mean depression scale scores for negative life events experienced by someone important to the respondent, the simultaneous presence of negative life events experienced by the respondent and financial strain, and the simultaneous presence of negative life events experienced by someone important to the respondent and

TABLE 2—Demographic, Confounding, Exposure, and Outcome Variables among White Non-Hispanics (n = 928) in the Los Angeles Epidemiological Catchment Area

Variables	No. (%)
Female	494 (53.2)
Male	434 (46.8)
Age, y	
18–24	96 (10.3)
25–34	323 (34.8)
35–44	167 (18.0)
45–54	93 (10.0)
55–64	124 (13.4)
65–74	84 (9.1)
75+	41 (4.4)
Alcohol use category	
Abstainer	193 (20.8)
Light	131 (14.1)
Light moderate	203 (21.9)
Moderate	245 (26.4)
Heavy	156 (16.8)
Overall self-reported health rating	
Poor	23 (2.5)
Fair	86 (9.3)
Good	397 (43.2)
Excellent	414 (45.0)
Financial strain score	
0 (no strain)	543 (59.3)
1	126 (13.8)
2	116 (12.7)
3	76 (8.3)
4	31 (3.4)
5 (high strain)	23 (2.5)
Negative life events experienced by respondent	
< 1 event	753 (81.8)
≥ 1 events	167 (18.2)
Negative life events experienced by someone important to respondent	
< 1 event	549 (60.1)
≥ 1 events	364 (39.9)
	Mean (SD)
Average age	42.1 (16.7)
Household income (in thousands)	30.5 (22.2)
Education, y	14.07 (3.02)
Financial strain	0.90 (1.3)
Negative life events experienced by respondent	0.74 (1.0)
Negative life events experienced by someone important to respondent	1.46 (1.4)
CES-D score time 1	6.42 (7.62)
CES-D score time 2	5.61 (7.13)

Note. CES-D = Center for Epidemiological Studies-Depression Scale.

TABLE 3—Mean CES-D Scores at Time 2 for Demographic, Exposure, and Confounding Variables at Time 1

Demographic, Exposure, and Confounding Variables	Mean CES-D Score (95% CI)
Male	4.89 (4.30, 5.48)
Female	5.94 (5.31, 6.57)
Alcohol use categories	
Abstainers	6.11 (4.95, 7.26)
Light drinkers	5.87 (4.50, 7.24)
Light-moderate drinkers	5.48 (4.59, 6.27)
Moderate drinkers	4.71 (4.02, 5.40)
Heavy drinkers	6.37 (5.11, 7.62)
Self-reported physical health	
Poor	11.98 (7.57, 16.39)
Fair	7.25 (5.88, 8.62)
Good	6.21 (5.48, 6.93)
Excellent	5.05 (3.56, 4.54)
Negative life events experienced by respondent	
0	4.86 (4.37, 5.35)
1	5.09 (4.25, 5.93)
2	7.41 (5.78, 9.04)
3	9.14 (6.24, 12.04)
Negative life events experienced by someone important to the respondent	
0	4.69 (4.08, 5.30)
1	5.15 (4.35, 5.95)
2	4.92 (4.02, 5.82)
3	5.45 (4.10, 6.80)
4	10.49 (7.45, 13.52)
5	8.78 (4.76, 12.80)
Financial strain	
0	4.34 (3.91, 4.77)
1	5.36 (4.05, 6.67)
2	6.09 (4.97, 7.21)
3	8.38 (6.22, 10.54)
4	9.69 (6.81, 12.57)
5	13.58 (8.99, 18.17)

Note. CES-D = Center for Epidemiological Studies-Depression Scale; CI = confidence interval.

financial strain. Light drinkers also constitute the smallest drinking category. Relatively few observations could strongly influence mean depression scale scores. In this regard, mean depression scale scores could be less stable in this category. When this category was removed or merged into the light-moderate category, the overall U-shaped pattern remained.

Discussion

By analyzing the effects of both chronic and acute stressors together, this study approached the stress process in terms posited to be somewhat more consistent with actual stress exposure in the population. In previous work on the stress-buffering role of alcohol use, the simultaneous effect observed in these data was not reported for acute and chronic stressors. When negative life events and financial strain were analyzed separately, the mean depression scale scores were slightly higher for more extreme alcohol consumption categories—intermediate between the no stress and combined-stress (financial strain and negative life events) categories. This may be a further indication that a more complete characterization of the stress process is helpful in elucidating possible stress-mediating effects. This analysis was also bolstered by the inclusion of a complex alcohol use measurement, as well as a self-reported health measure, an important possible confounder that was not examined in previous research.[1-4]

It should be emphasized that this study did not consider alcohol consumption to be a response to stress, but as a typical element of a person's lifestyle. Thus, moderate drinkers may also do other things in moderation. This general behavior may be most important in affecting the relationship between stress and depression.

Because the depression scale score is cross-sectional in nature, little insight is possible into the course of depressive mood over the year between time periods. Prevalent cases of depression could cause changes in alcohol use and changes in level of stress independently from hypothesized coping mechanisms. Further, many changes could have occurred in stress, alcohol use, and depressive mood during the year between data gathering that were not shown by these data. Respondents could have forgotten behavior or stressors and/or had fluctuations in depressive mood not reflected in the data.

Even though reported health status was controlled for in this study, none of the studies mentioned above nor this analysis (due to power problems) examined the composition of the abstainer group. Thus, former alcoholics, individuals with physical or psychological conditions that contraindicated alcohol use, and those who did not drink for religious reasons and/or personal prerogative were grouped together.

In terms of the reliability of alcohol use reporting, because there is a great deal of evidence that most misreporting involves underreporting of alcohol use (especially for those who are heavier drinkers), we would expect that any differences between drinking categories would be artificially diminished.[13-16] Thus, the findings presented here are probably conservative in terms of differences found between drinking categories.

Conclusions

Although this research provides evidence consistent with the hypothesis that moderate alcohol use modifies the effect of stress on depression, interpretation is not straightforward. If, as stated earlier, moderate alcohol use is thought to be only part of a general lifestyle behavior and not a specific coping response, research strategies must be reoriented to consider general lifestyle as either an unconscious or conscious method for protecting against, buffering, or mitigating the effects of stress. Further, specific buffering models should be tested so that more precise relationships between stress, alcohol use, and depression can be studied.[18] Finally, to test the manner in which alcohol use interacts with stress and depression in a truly buffering manner, very detailed research that assesses a spectrum of stressors and mediating variables (both

TABLE 4—Mean CES-D Score at Time 2 and Alcohol Use Category Cross-Classified by the Presence or Absence of Financial Strain and Negative Life Events Experienced by Respondent, with Sex, Age, Self-Reported Health, and CES-D Score at Time 1 Controlled

	Mean (95% Confidence Interval) [*P* Values for Differences between Mean CES-D Scores][a]					
Alcohol Category	No Stress at Time 1	Financial Strain at Time 1	Negative Life Events Experienced by the Respondent at Time 1	Negative Life Events Experienced by Someone Important to the Respondent at Time 1	Financial Strain and Negative Life Events Experienced by the Respondent at Time 1	Financial Strain and Negative Life Events Experienced by Someone Important to the Respondent at Time 1
Abstainer	9.13 (7.64, 10.62)	10.73 (8.85, 12.61)	11.83 (9.32, 14.34)	9.62 (7.72, 11.52)	13.73 (10.67, 16.79)	11.98 (9.23, 14.71)
	. . .	. . .	. . .	. . .	. . .	. . .
Light	9.70 (9.66, 9.74) [.63, .35]	10.98 (7.81, 14.15) [.89, .42]	11.94 (8.57, 15.31) [.95, .12]	12.33 (9.66, 14.99) [.09, .06]	14.35 (8.84, 19.86) [.84, .16]	14.42 (9.99, 18.85) [.36, .41]
Light-moderate	7.47 (5.90, 9.04) [.09, .45]	8.37 (6.09, 10.65) [.11, .51]	7.94 (5.37, 10.51) [.03, .66]	7.56 (5.74, 9.38) [.10, .12]	7.93 (3.95, 11.91) [.02, .52]	9.18 (6.42, 11.94) [.15, .09]
Moderate	6.33 (4.90, 7.76) [.00, .04]	7.39 (5.34, 9.44) [.01, .18]	5.88 (3.62, 8.13) [.00, .07]	6.70 (4.92, 8.48) [.02, .02]	6.78 (3.37, 10.19) [.00, .24]	8.01 (5.23, 10.79) [.04, .02]
Heavy	8.19 (6.6, 9.78)	9.39 (7.12, 11.66)	8.69 (6.24, 11.14)	9.41 (7.59, 11.23)	9.64 (6.03, 13.25)	12.29 (9.68, 14.90)
	. . .	. . .	. . .	. . .	. . .	. . .

Note. CES-D = Center for Epidemiological Studies-Depression Scale.
[a]The first number in the brackets is the *P* value for the least-square means *t* test between the mean CES-D score for that category and the mean score for the abstainer category, and the second number is the *P* value for the *t* test difference for that category relative to the heavy-alcohol-use category.

personal coping and social support) must be undertaken in a multiwave prospective study. Otherwise, alcohol use alone remains an incomplete but interesting representative for a complex and indeterminate mixture of multimodal coping strategies and lifestyle choices. □

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