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The effects of alcohol on mood induced by an emotional film A study among women☆

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Abstract

Objective: The present study was designed to investigate the effects of alcohol on women's reactions to a negative mood-inducing stimulus. It is hypothesized that, like in men, alcohol also reduces tension or induces positive mood in women. In addition, we explored whether different mood states were affected differentially by alcohol intake. **Methods:** Participants were 132 female students who were randomly divided into four groups: (1) control, (2) placebo, (3) low-dose alcohol and (4) high-dose alcohol. A dramatic film was used to induce negative affect and mood was assessed at baseline, before and after the movie. **Results:** Alcohol consumption decreased the negative impact of the emotional film on mood. Some mood states varied with pharmacological changes, while others varied with expectancy of drinking alcohol. Relaxation, fear and sadness were not differentially affected by alcohol intake or expectancy. **Conclusion:** Drinking when exposed to emotional situations may be reinforced by the short-term positive effects on well-being among moderate female drinkers. The findings further suggest that the effects of alcohol on certain specific emotional states (including sadness and fear) are minimal at best. © 2002 Elsevier Science Inc. All rights reserved.

Keywords: Alcohol; Alcohol abuse; Mood; Negative affect

Introduction

It is widely recognized that drinking alcohol affects many mental and perceptual processes and motor skills. Even though cognitive and behavioral changes associated with intoxication can have far-reaching consequences, as when someone decides to drive after drinking, they are of lesser importance to the initiation of drinking. People often appear to use alcohol in an attempt to reduce tension and distress and/or to induce positive feelings [1,2]. Negative mood states may be important contributing components of high-risk situations for alcohol abuse, as one tries to "numb" these feelings by consuming alcohol. In order to understand alcohol's addictive effects not only physically but also psychologically, it is important to have a better understanding of the effects of alcohol on mood and mood regulation. The scarce literature on this topic indicates that alcohol does not have an unequivocal effect on mood. While some studies found that drinking was associated with inducing positive feelings like pleasure or the reduction of negative feelings like uncertainty and tension (e.g., Refs. [3,4]), others have reported an increase in negative emotions (e.g., Refs. [5,6]) or no direct effects on mood at all (e.g., Refs. [7,8]).

The consumption of alcohol influences women to a greater degree than men, in part because the same amount of ethanol produces lower blood alcohol concentrations for the latter (for an overview of studies on gender differences, see Ref. [9]). Considering that alcohol has been shown to affect men and women differently, it is remarkable that to date most researchers have not paid attention to gender differences in the alcohol–mood relation. In fact, most studies enrolled exclusively male subjects or combined data of both sexes. Interestingly, the few studies that report results in women found no noticeable effects. Perkins et al. [7] observed that alcohol intake decreased self-reported vigor and arousal in men but not in women. Similarly, in

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a study by Loke and Lim [5], men reported being more drowsy, excited and fuzzy after drinking a fairly large amount of alcohol, while no effects in women were found. Finally, in an exclusively female sample, no effects of alcohol on humor-induced exhilaration were reported [10]. These data suggest that, contrary to expectations, alcohol does not affect mood in women. However, anecdotal evidence and the prevalence of alcohol abuse among women challenge this view. Studies on alcohol abuse suggest that women, as well as men, apply drinking alcohol as an emotion-focused coping strategy aimed at affecting subjective experience. Furthermore, none of the theories on the effects of alcohol on mood states, like Conger's [11] tension reduction hypothesis or Steele and Joseph's [12] attention allocation model, explains why women would not be affected by alcohol.

Drinking alcohol generally occurs in a social context or when confronted with distressing events. It could therefore be argued that in order to get an adequate and full picture of the effects of drinking on mood, the study environment should be emotionally significant to the participants. However, in most studies, no attempt is made to present emotionally significant stimuli, which might explain the lack of clear results. Only a few investigators exposed participants to a mood-inducing stimulus. Sayette et al. [13] reported a decrease in displayed negative emotions during a stressful task (giving a public speech) after consuming alcohol. Similarly, Vogel and Netter [14] observed that alcohol reduced stress-induced emotional tension and aggression. In contrast, alcohol consumption increased self-reported anxiety when exposed to (delayed) shocks in an experiment by Dengerink and Fagan [15]. Finally, alcohol had no effect on humor-induced laughing and exhilaration [10,16,17] or on subjective mood ratings after exposure to (un)pleasant slides [18]. These results suggest that alcohol consumption may affect mood induced by an unpleasant stimulus, although there are some seemingly contrasting findings.

The present study was designed to investigate the effects of alcohol on women's reactions to a negative mood-inducing stimulus. It is hypothesized that women, like men, use alcohol to reduce tension (when in a stressful situation) or induce positive mood (as in drinking with friends and having a good time). Therefore, it is expected that emotional reactions to a stress-inducing stimulus will be less negative when women have consumed alcohol. As it has been shown that some of the effects of alcohol can be attributed to expectancy rather than to pharmacological effects of alcohol [4], both a placebo (expectancy of drinking alcohol) and a control condition (no expectancy) were introduced. The status of the current literature does not warrant any a priori predictions on how mood varies with expectations or pharmacological effects. The present study differs from previous ones in that the focus is on (1) women, whereas studies among men dominate the current literature, and (2) on affective reactions to a strong emotional stimulus rather than studying the direct effects of alcohol on mood.

Method

Participants

Participants were 132 female Caucasian psychology undergraduates (mean ± S.D. age 20.3 ± 4.5) recruited at Tilburg University. These students were all moderate drinkers. Participants were randomly assigned to one of the following four conditions: (1) control (no alcohol/no expectancy of drinking, $n = 32$), (2) placebo (no alcohol/expectancy of drinking, $n = 34$), (3) low-dose alcohol (75-ml vodka, $n = 33$) and (4) high-dose alcohol (125-ml vodka, $n = 33$). The vodka was mixed with orange juice. In the placebo condition, participants received a mix of orange juice and alcohol-free wine (with a ratio of 2:1). The two alcohol groups did not differ significantly in mean weight ($M = 60.4$ kg for the low-alcohol group and $M = 61.8$ kg for the high-alcohol group) and weekly alcohol consumption ($M = 8.8$ drinks a week for the low-alcohol group and $M = 9.3$ for the high-alcohol group). After a complete description of the study and a warning of the consequences of alcohol consumption, subjects signed a written informed consent. Respondents with alcohol-related problems, who used medication that could interfere with alcohol, with alcohol intolerance or who are pregnant were excluded from participation.

Measures

Mood was assessed by applying the following seven descriptors in Likert scales from 1 to 10: relaxation, restlessness, cheerfulness, sadness, fear, tension and nervousness.

Procedure

Participants in the alcohol and placebo groups were invited to take part in a study on the effects of alcohol on emotional reactions to a stressful movie. The placebo and alcohol groups received the same instructions and watched the movies together. In order to ensure adequate expectation of drinking alcohol in the placebo group, (1) drinks were mixed with orange juice to mask taste, (2) participants were unaware of the kind of alcohol that was being served (to prevent taste recognition of alcoholic vs. nonalcoholic beverages) and (3) participants were not informed of the placebo condition until after the experiment (meaning that all of them would expect to drink an alcoholic beverage). The stimuli consisted of a short introductory film of Tilburg University and an emotional film: Once were warriors (Tamahori, 1995 [19]). This film depicts the life of a Maori family in New Zealand. It shows dramatic scenes, including extreme violence in particular towards women, rape and suicide. In a pilot study, it had been established that the film had a strong emotional impact on female students.

When entering the lab, participants were asked to take a drink of a table. Each cup had a number written on it that corresponded to numbers on questionnaires. This procedure

Table 1
Mean scores and standard deviations on the mood indicators before and after the emotional film

	Groups			
	Control	Placebo	75-ml Vodka	125-ml Vodka
Relaxation				
Pre-movie	6.50 (3.11)	8.09 (1.36)	7.91 (1.42)	7.85 (1.89)
Post-movie	5.69 (2.46)	7.03 (2.10)	6.67 (2.55)	7.42 (2.24)
Change	0.81	1.06	1.24	0.43
Restlessness				
Pre-movie	2.88 (2.03)	2.47 (1.71)	3.48 (2.55)	3.24 (1.82)
Post-movie	3.91 (2.62)	3.59 (2.61)	3.24 (2.35)	2.97 (1.91)
Change	− 1.03	− 1.12	0.24	0.27
Fear				
Pre-movie	1.34 (.55)	1.68 (1.43)	1.73 (1.70)	1.67 (1.36)
Post-movie	2.63 (2.18)	2.65 (2.19)	2.18 (1.94)	2.03 (1.74)
Change	− 1.29	− 0.97	− 0.45	− 0.36
Sadness				
Pre-movie	2.22 (1.50)	2.24 (1.67)	2.24 (1.50)	2.82 (2.36)
Post-movie	5.66 (2.59)	5.12 (2.72)	5.55 (2.89)	4.55 (2.92)
Change	− 3.44	− 2.88	− 3.31	− 1.73
Tension				
Pre-movie	2.16 (1.30)	2.15 (1.37)	2.73 (1.84)	2.88 (1.87)
Post-movie	4.50 (2.77)	3.26 (2.15)	3.91 (2.54)	3.21 (2.25)
Change	− 2.34	− 1.11	− 1.18	− 0.33
Cheerfulness				
Pre-movie	6.38 (1.94)	6.69 (1.55)	6.97 (1.76)	6.58 (2.53)
Post-movie	3.00 (1.61)	4.62 (2.15)	4.36 (2.09)	5.15 (2.49)
Change	3.38	2.07	2.61	1.43
Nervousness				
Pre-movie	1.72 (0.92)	1.85 (1.42)	2.52 (2.28)	2.27 (1.86)
Post-movie	2.16 (1.83)	1.94 (1.48)	1.67 (0.96)	1.73 (1.07)
Change	− 0.44	− 0.09	0.85	0.54

was followed to guarantee randomization across groups. Participants completed the mood indicators before consuming their drinks (containing 50-ml vodka/alcohol-free wine:100-ml orange juice). During the subsequent absorption period, the participants watched the introductory film. A second mood rating was collected immediately after this movie. Subsequently, a second drink was served (containing 25-ml vodka:125-ml juice in the low-alcohol condition, 75-ml vodka:75-ml juice in the high-alcohol condition and 50-ml alcohol-free wine:100-ml juice in the placebo group). After having consumed this beverage, the emotional film (93 min) was shown and mood data were collected a third time. In summary, the procedure was as follows in chronological order: mood rating 1–drink 1–neutral movie–mood rating 2–drink 2–emotional movie–mood rating 3. None of these activities were overlapping, meaning that drinks were not consumed *while* filling out the questionnaire or watching the movie but *after* the mood ratings were completed and *before* the movies were shown.

The control group, whom were informed that the study was on the effects of a stressful film on emotions, was run at a different time and did not receive any drinks. The reason for this was to prevent undue influences of the "intoxicated" group on mood in the control group (like becoming elated because everyone else is or getting angry at the uninhibited reactions of those who have drunk).

Results

Preexisting mood differences between groups were investigated by one-way ANOVA on the pre-alcohol/pre-film mood ratings. As no significant differences between groups were found, subsequent analyses were not adjusted for basic mood ratings. In order to test the effect of (expectation of) consuming alcohol and exposure to the emotional film on mood, ANOVA with repeated measures was applied with group as the between-subject factor and time of measurement as the within-subject factor. Tables 1 and 2 summarize the results from the ANOVA

The interaction effects are most important, because they reflect differences in mood changes over time between the four groups. As this study was not set-up to test the main effects of time or group and these are therefore not readily interpreted, main effects will not be discussed. Group × Time of measurement interactions were significant for restlessness, cheerfulness, tension and nervousness at an α of .05. Movie exposure was associated with an increase in restlessness in the placebo and control groups but not for the two alcohol groups. For nervousness, a similar pattern was found. Alcohol consumption was associated with decreased nervousness after exposure to the emotional film, while in the no alcohol conditions nervousness increased. Table 1 further shows that there is no difference in cheerfulness between groups before exposure to the emotional film. After the film, the control group is less cheerful than the three other groups. Relaxation, fear and sadness were not differentially affected by alcohol intake or expectancy.

Table 2
Analysis of variance of the effects of alcohol on affective reactions to an emotional film

	Between-subject factor: Group	Within-subject factor: Pre–post film measurements	Interaction: Group × Measurement
Relaxation	$F(3,128)=6.17$, $P<.001$	$F(1,128)=12.02$, $P=.001$	$F(3,128)=0.48$, $P=.70$
Restlessness	$F(3,128)=0.33$, $P=.81$	$F(1,128)=3.42$, $P=.07$	$F(3,128)=3.05$, $P=.03$
Fear	$F(3,128)=0.32$, $P=.81$	$F(1,128)=16.49$, $P<.001$	$F(3,128)=1.31$, $P=.28$
Sadness	$F(3,128)=0.19$, $P=.91$	$F(1,128)=126.5$, $P<.001$	$F(3,128)=2.36$, $P=.08$
Tension	$F(3,128)=5.74$, $P=.31$	$F(1,128)=27.26$, $P<.001$	$F(3,128)=2.97$, $P=.03$
Cheerfulness	$F(3,128)=3.06$, $P=.03$	$F(1,128)=156.70$, $P<.001$	$F(3,128)=4.73$, $P<.001$
Nervousness	$F(3,128)=0.15$, $P=.93$	$F(1,128)=2.00$, $P=.16$	$F(3,128)=3.61$, $P=.02$

Discussion

The aim of the present study was to examine the effects of alcohol on mood states in women after exposure to emotional stimuli. The results demonstrate an anxiolytic effect of alcohol, which is in accordance with Conger's [11] tension reduction hypothesis of alcohol. Consuming alcohol appeared to reduce the power of a stressful emotional stimulus to alter mood. However, alcohol intake did not affect each mood in the same degree. For cheerfulness and tension, alcohol consumption was associated with less reactivity. After the movie, all participants reported to feel tenser and less cheerful. However, the change in tension and cheerfulness was smaller when (expected to) have consumed alcohol. In contrast, the film induced *increased* restlessness and nervousness in the control and placebo groups but *decreased* restlessness and nervousness in the alcohol groups. This suggests that alcohol not only reduces the emotional impact of a stressor but also has the potential to improve mood. On the other hand, the effects on relaxation, fear and sadness were very limited. This raises the important question whether alcohol brings (short-term) relief to all negative mood states.

It is not clear why previous studies have found no mood effects of alcohol in women (e.g., Refs. [5,7,10]). Methodological issues are most likely to explain the difference in results between those studies and the present one. Most obviously, none of these studies have examined the effect of alcohol on induced negative affect by introducing an emotional stimulus. Nevertheless, given the fact that the onset of drinking is often associated with the exposure to stressful conditions, this aspect apparently increases the ecological validity of the present findings.

It has been suggested that alcohol expectations might be as important in influencing mood as actual alcohol intake [4]. In the present study, we found that this holds only for some moods. For example, for cheerfulness, the expectation of drinking alcohol produced the same effects as actual alcohol intake. However, other moods, like restlessness and nervousness, were only influenced by actual alcohol intake, whereas a third category of moods was hardly affected by either alcohol or expectations. One could speculate whether these findings imply that positive moods are more situationally and/ or socially determined, whereas for negative moods psychopharmacological processes are more important. Future studies should focus on possible explanations and mechanisms for human moods to be differentially affected by alcohol intake.

While it has been reported that dose of alcohol intake affects mood differentially (e.g., Ref. [20]), the present study found that consuming almost twice as much vodka hardly had any differential affects on mood. No reversal in mood reaction to (e.g., from elation to depression), as has been reported previously (e.g., Refs. [6,19,21]), was found either. Maybe the difference between the two doses was not large enough to cause large variation in mood.

The present study has some drawbacks. First, individual factors like weight, height and alcohol tolerance can influence intoxication levels of subjects consuming the same amount of alcohol. Because blood alcohol levels might vary within the alcohol groups, it would have been better to titrate dose for individual participants. However, given the randomization, the observation that mood changes did not vary between the two groups, and the fact that the two alcohol groups did not differ in mean weight, height and weekly alcohol consumption, it is unlikely that individual differences in the level of intoxication affected emotional responses to a large degree. In addition, it has previously been shown that the relation between alcohol and mood may change with variation of several interacting factors like alcohol expectancies (e.g., Ref. [4]), dose of alcohol consumption (e.g., Ref. [20]), personality (e.g., Ref. [22]) and time of mood measurement (e.g., Ref. [21]). In the present study, several of these factors were taken into account, like alcohol dose and alcohol expectancies. However, some interacting factors, like personality, were not considered, limiting the generalizability of the present findings. Finally, the experimental manipulation of mood, the emotional film, induced negative rather than positive mood changes. Therefore, the present results cannot be generalized to situations inducing positive mood changes (for the interested reader, we would like to refer to Refs. [10,17,23]).

In spite of these limitations, the results of the present study strongly suggest that alcohol consumption in women may bring relief and reduces tension, when being in distress, similar to findings among men. These observations once more emphasize that the short-term positive effects on well-being may reinforce drinking when exposed to emotional situations [9]. In small quantities, alcohol appears to improve people's mood and may release inhibitions that will make them feel more sociable, making it a way to add to the fun in social drinking situations. On the other hand, the data suggest that some mood states are only minimally influenced. Future research should therefore more specifically focus on the effects of alcohol on sadness and depression, anxiety, etc.

These effects of alcohol are important when considering them in the light of the health benefits of moderate drinking (e.g., Refs. [24–26]). Low mood, especially depression and anxiety, has been associated with ill health in numerous studies, while positive emotional states are associated with enhanced health (e.g., Ref. [27]). If alcohol consumption brings relief from anxiousness and increases fun and enjoyment, this, in addition to the pharmacologically mediated positive effects, might partly explain the positive effects of alcohol on physical health. All together, this would imply that moderate alcohol consumption is a proper way of emotion regulation and coping with stress.

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