Do angry women choose alcohol?

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Abstract

Women's alcohol treatment usually includes anger management, predicated on the hypothesis that anger increases their drinking. Studies show strong association between anger and drinking but to date there is no laboratory support for this hypothesis. We examined effects of a “female-specific” anger provocation on young adult women’s drinking behavior by randomly assigning 30 women (age 21–30) to one of two conditions: Provocation (n = 15) or Non-Provocation (n = 15). In the Provocation condition, a female confederate was both annoying and condescending to the participant for 8 min. A manipulation check showed heightened anger and hostility (but not anxiety or depression) in the Provocation participants. In a subsequent taste-task, all participants could drink placebo “beer” and ginger ale. When the data analysis controlled for participants’ baseline negative emotions, Provocation participants consumed more “beer” (M = 172.33 ml, SD = 78.90) than did Non-Provocation participants (M = 118.60 ml, SD = 75.74) (p < .04), with no differences in ginger ale consumption. Results support a causal relationship between young women’s anger and their specific choice to drink alcohol.

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1. Introduction

Clinicians have long viewed anger as a motivator for alcohol consumption (cf. Dimeff & Marlatt, 1995) and relapse to drinking. For example, 29% of relapers during alcohol treatment cited anger as a major precipitant (Marlatt & Gordon, 1985) and trait anger was a significant predictor of craving for treated alcoholics (Litt, Cooney, & Morse, 2000). Thus, anger management is often considered a key component of alcohol treatment (Maisto, Ewart, Connors, Funderburk, & Krenek, 2009), especially women’s alcohol treatment (González-Prendes, 2008). There is also evidence that the association between anger and drinking might be stronger for women than for men. For example, several researchers have reported significant correlations of trait anger and alcohol consumption with women, but not men (Grover & Thomas, 1993; Lee, Mendes-de-Leon, & Markides, 1988; Leibsohn, Oetting, & Deffenbacher, 1994). Ciesla, Dickson, Anderson, and Neal (2011) reported that angry rumination was associated with college women’s (but not men’s) drinking and Lonczak, Neighbors, and Donovan (2007) found a strong link between women’s anger and risky (i.e. intoxicated) driving. Additionally, women are more likely than men to report use of alcohol to relieve several negative emotional states, including anger (Morissette, 1994).

However, despite these widespread associations, finding controlled laboratory studies of anger’s effects on drinking is surprisingly difficult. While there are studies showing that alcohol increases aggression (see, for example, Giancola et al., 2009), aggression is not synonymous with anger, nor do these studies shed light on whether a person would drink, or drink more, in response to anger. In two laboratory studies of negative affect (Noel & Lisman, 1980), college females given frustrating unsolvable problems scored higher on a hostility scale and subsequently drank more alcohol in a taste-task than those given solvable problems. In another study (Pelham et al., 1997), both male and female adult participants engaged in limited interactions in a laboratory setting with children (not their own) randomly labeled either “deviant” or “normal”. Participants who interacted with “deviant” children reported greater negative emotions, including hostility, and later consumed more alcohol than those exposed to “normal” children. However, in all three of these studies, increased hostility was accompanied by increased depression, so hostility or anger could not be isolated as the sole determinant of drinking.

We know of only one laboratory study specifically testing the effects of anger on alcohol consumption. In a three-group study (Marlatt, Kosturn, & Lang, 1975) participants (male and female) who could not retaliate following a confederate’s anger provocation drank significantly more wine than those in a second condition who were provoked and could retaliate. The authors suggested that participants’ drinking was motivated by unrelieved hostility or anger, with the inference that retaliation led to anger relief. However, in the third condition, participants who were not provoked did not drink amounts significantly different from either provoked group. This presents difficulties for the hostility explanation, so Marlatt et al. suggested three possible post hoc hypotheses: 1) that participants in the “no provocation” condition experienced
a small amount of frustration over their inability to complete an assigned distracter task and then drank more than the “provoked/retaliated” group, or 2) that “no provocation” participants experienced social anxiety worrying about the confederate’s “critical evaluation” of them or, finally, 3) anger provocation did not motivate drinking, and the results were determined by an unknown confound.

Unfortunately, actual measures of anger were not employed in this study, so evaluation of these post hoc suggestions is not possible. Participants’ ratings of the confederate as “domineering” and “aggressive” were used to infer subsequent anger (Marlatt et al., 1975). However, perception of another individual as “aggressive” does not necessarily provoke anger. In fact, aggressive individuals may provoke anxiety or fear rather than anger (Tedeschi & Quigley, 1996), so whether Marlatt et al. (1975) provoked anger remains an open question.

The present study is a more straightforward test of the hypothesis that anger is a determinant of alcohol consumption, especially for women. To implement the study, we used lessons of past research to address several difficult methodological issues, including anger provocation, anger measurement, drinking by female participants, and the moderating effects of participants’ drinking expectancies.

First, research indicates that provoking anger in women, versus men, may require different manipulations than those often used with men (Biaggio, 1989; Harris, 1994). For example, whereas men seem angered by an aggressive attitude, women appear angered by a condescending and insulting attitude (Frodi, 1977, 1978; Frodi, Macaulay, & Thome, 1977; Harris, 1993). In the present study, we developed a “female specific” anger provocation with several components, including an annoying female confederate with a condescending attitude, a frustrating task with a high rate of failure, and a strictly enforced time limit on the task.

Second, because this is the first time we were using this protocol, we included a manipulation check to assess affect change from baseline to post-manipulation. We measured self-report specifically of anger to assess the effectiveness of the provocation, but also used both the Multiple Affect Adjective Check List — Revised (MAACL-R; Zuckerman & Lubin, 1986) and a series of Likert-type scale “feeling” thermometers measuring anger, anxiety, happiness and contentment (Walk, 1956). These instruments measured multiple emotions, so we could assess if the aroused emotions were labeled “anger” specifically, and not contaminated by other negative emotions.

Third, the National Institute of Alcohol Abuse and Alcoholism (NIAAA) (1989) suggests that, where possible, researchers should avoid giving alcohol to women of childbearing age. As an alternative to real alcohol, participants in our study drank non-alcoholic “beer,” which they were led to believe was alcoholic beer. Thus, if the participants believed the deception (assessed in debriefing), we could measure participants’ actual drinking behavior, rather than their self-reports of intention or desire to consume alcohol. We used a taste-rating task to measure beverage consumption (Higgins & Marlatt, 1973; Marlatt, Demming, & Reid, 1973) because this method is an unobtrusive and sensitive measure of drinking behavior. In a taste-rating task, participants are asked to rate the comparative taste of alcoholic beverages within the guise of engaging in a separate experiment. The real dependent measure is the amount of beverage consumed. Further, we used a variation of the taste-rating task (developed by Noel & Lisman, 1980) by adding a comparison beverage that was clearly non-alcoholic (in this case, ginger ale). This allows a measure of both deliberate selection of alcohol and amount consumed.

Fourth, numerous studies demonstrate the importance of expectations in determining drinking behavior (Goldman, Brown, Christiansen, & Smith, 1991). An individual who expects that alcohol will help her cope with her anger may respond to anger by drinking more. Perhaps if she believes that alcohol can attenuate her anger (increase relaxation), a woman may drink in an attempt to reduce anger—engaging in a passive coping attempt (based on the tenets of the tension reduction theory of drinking; cf Conger, 1958). Moreover, it is reasonable to hypothesize that if she expects alcohol to increase her assertiveness, she may drink as an active coping strategy when she is angry. To assess these hypothesized associations, we gave each participant an Alcohol Expectancy Questionnaire (AEQ; Brown, Christiansen, & Goldman, 1987), to measure expectations of relaxation and assertiveness.

In summary, the purpose of the present study was to examine the effect of a “female-specific” anger provocation on alcohol consumption by young adult women. We expected that following provocation, participants would report feeling angry, selectively choose to drink a beverage they believed to be alcoholic (“beer”) more often than a non-alcoholic beverage and would consume more “beer” than participants not exposed to the provocation.

2. Method

2.1. Participants

Participants were 30 women from a small southeastern USA city, with a mean age of 22.5 years (SD = 2.0, range = 21–30), and 15.87 (SD = 1.19) years of education. Most (n = 29) were Caucasian. The majority (n = 24) were full or part time university students. Two participants had to be excluded (one because she detected the deception in the anger provocation phase of the study, and a second because she appeared, through self-report of past withdrawal symptoms, to qualify for an alcohol dependence diagnosis). This left a total of 28 participants, with 14 in each of the two conditions described below.

2.2. Materials

Participants self-reported drinking during the previous 90 days, as well as current or past alcohol problems, with a Quantity–Frequency Index (adapted from Cahalan, Cisin, & Crossley, 1969). Mean drinking days in the past 90 days was 21 (SD = 7.8). As noted, one participant was excluded before the taste test because examination of her QFI suggested current substance use problems (she was debriefed).

We assessed emotions with the Multiple Affect Adjective Checklist—Revised (Zuckerman & Lubin, 1986) and a 7-point, Likert-type Feeling Thermometer (Walk, 1956). The MAACL-R is a list of 130 adjectives describing emotions. The participant checks off items corresponding to how he or she feels “right now.” The adjectives checked (and some unchecked) are combined to yield four main scores: hostility, anxiety, depression and positive affect. A recent assessment of college undergraduates (Lubin, Van Whitlock, Reddy, & Petren, 2001) reported Cronbach’s alphas of .83, .89, .89 and .92, respectively for these four subscales. The Feeling Thermometer is a visual analog scale allowing participants to indicate on a thermometer drawing where they rate their current state of emotions. It has the advantage of being simple, fast, and face valid. It is commonly used in clinical trials because of the ability to rate “in-the-moment” values with one score (e.g. Schuennemann, Griffith, Stubbing, Goldstein, & Guyatt, 2003). On the Feeling Thermometer participants rated themselves as feeling 1 (not at all) to 7 (extremely) on five emotions: calm, angry, contented, happy and anxious. Both the MAACL-R and the Feeling Thermometer were given twice; during the initial “information gathering” baseline phase of the session, and then immediately following the experimental manipulation (before the taste task).

Following the taste task, participants completed the 120-item Alcohol Expectancy Questionnaire (AEQ; Brown et al., 1987). The AEQ is a widely used and empirically validated measure of alcohol expectancies with six subscales: global positive changes; sexual enhancement; social and physical pleasure; social assertiveness; relaxation; and arousal/aggression (Brown et al., 1987; Goldman et al., 1991). The subscales had high internal consistencies, with the lowest having a Cronbach’s alpha of .75 in this study.

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2.3. Procedure

2.3.1. Recruitment

Participants were recruited through advertisements in the local newspaper and on posted flyers (campus and nearby businesses). Instead of being paid for participation, the women’s names were entered into a drawing for $250.00 at the completion of the study. Participants were required to be 21 or older and in self-reported good health, not pregnant or trying to become pregnant, not reporting any physical, medical or psychological condition that contraindicated the use of alcohol and not having current or past indicators of substance use disorders. In addition, when they called to schedule an appointment, participants were reminded that they would have to taste some beer as part of the experiment (so abstainers and non-beer drinkers were excluded) and that participants must abstain from drugs and alcohol for 24 h and from tobacco products for 30 min prior to their experimental session. Adherence to this requirement was assessed through self-report and a breathalyzer test at the beginning of the experimental session, as noted below.

Seven female undergraduate psychology majors, ages 21–31, assisted as confederates. Five were Caucasian, one was African-American, and one was Asian-American. The two Experimenters, also undergraduates, were Caucasian females. The team was supervised by a Graduate Research Coordinator (the first author, a female clinical psychology graduate student), who did not interact with the participant until after each session.

2.3.2. Initial data collection

When the participant arrived at the laboratory, a confederate also arrived under the guise that she was a “second subject.” Experimenter 1 seated them across from each other in a small room with a one-way window. Each participant (and the confederate, acting like a participant) completed a demographic inventory, the QFI, and the baseline MAACL-R and “Feeling Thermometer.” All entering participants had a blood alcohol concentration of zero (breathalyzer assessment), and all reported following the alcohol and nicotine use guidelines.

2.3.3. Anger provocation manipulation

Participants were assigned randomly to one of two experimental conditions: Provocation (n = 15) or No Provocation (n = 15). Note that there were no differences between the two conditions on any of the initial measures. Instructions stated that participants would be in two experiments. The purpose of this “first” study was to examine problem solving strategies and females’ perceptions of different situations. The second would be a taste-rating task.

Experimenter 1 then gave each “subject” (participant and confederate) a list of anagrams to solve, and a strict time limit of 8 min in which to solve them. To motivate them, participants were told that for each anagram correctly solved, they would gain a chance for the $250 cash lottery at the end of the study. Experimenter 1 left the room for 8 min, while the participant and confederate sat in chairs facing each other with clipboards and pencils.

In the Provocation condition, anger was induced through frustration (using unsolvable anagrams for the participant) and by requiring the confederate, through a carefully scripted protocol, to be both annoying and condescending during the anagram task. The confederate “solved” her list of anagrams during the first 4 min, while simultaneously distracting and disturbing the participant with tapping noises and statements about her own fast progress (e.g., “These are so easy!”). To add further annoyance, a kitchen timer beside the participant, set for 8 min, made a continuous loud ticking noise.

For the next 4 min, the confederate sat with her completed anagrams, waiting for the participant to finish. During this time, she began to taunt the participant at pre-determined time intervals (e.g., “Do you think you’re ever going to get done with those?”), with the intensity of the taunts escalating until the end of the 8 min. Note, however, that the confederate’s script carefully avoided name-calling or profanity. To ensure consistency, all confederates used the exact same phrases and gestures at the same time intervals for all participants. The transcript of the Provocation protocol is available through contacting the second author. To verify that each confederate followed the previously memorized protocol, Experimenter 1 and Research Coordinator observed all interactions through the one-way window.

As noted, one participant from the Provocation condition was excluded because she guessed out loud during the anagram task that the confederate was not a real participant. However, the manipulation otherwise appeared effective. In fact, three participants in the Provocation condition stated loudly that they had finished solving the anagram list (even though they had not) before the 8 min had elapsed. In each of these situations, the Research Coordinator observed that the participants were visibly upset (flushed complexion, clenched jaws, and so on), and decided to terminate this phase of the experiment prematurely because of the participant’s emotional distress (all three at about 7 min). These participants’ self-ratings of anger increased greatly from pre- to post-provocation (for one, the anger rating increased 6 points on the 7-point scale) and although they did not experience the full 8 min of provocation, they were included in the study since they were, indeed, quite angry.

In contrast, participants in the No Provocation condition had a list of relatively simple anagrams and the confederate quietly took the entire 8 min to solve her list while maintaining a neutral demeanor. The loud timer was omitted and there were no deliberate distractions. The participants solved most, or all, of their anagrams.

In both conditions, after 8 min, Experimenter 1 returned to the room, announced that the time was over, and collected the lists of anagrams. Participants and confederates in both conditions then completed a second MAACL-R and the Feeling Thermometer.

2.3.4. Drinking behavior

Drinking following provocation was assessed within the guise of a separate experiment. Participants were told that they would now be subjects in a “second” experiment with a second “experimenter.” They were told that Experimenter 2 was studying women’s perceptions of the taste of different beverages. Both the participant and the confederate took part in the drinking “experiment,” but the confederate was asked to change seats so she could sit at a table on the other side of the room, out of the participant’s view, thus avoiding social influence on the participant’s drinking.

Experimenter 2, who was blind to condition, then gave four chilled beverages in opaque plastic cups to the participant (and a similar four to the confederate). Two were labeled beer and two were labeled ginger ale; however, the “beer” was, in reality, non-alcoholic beer. Participants and confederates had 20 min to rate each beverage according to a list of gustatory adjectives. Experimenter 2 said that if they finished their ratings during the 20 min, they were welcome to “finish any or all of the beverages you would like.” Experimenter 2 then left the room.

After 20 min, Experimenter 2 returned and collected the taste rating sheets and any remaining beer and ginger ale. In the observation room, the Research Coordinator measured the remainder of each participant’s beverages (in ml) and subtracted that from the original amount to calculate how much the participant had consumed of each. During this time, participants and confederates completed their Alcohol Expectancy Questionnaires. While we realize that post hoc measurement of expectations may be a limiting factor (since we did not measure expectations at baseline), we chose this timing to avoid drawing attention to a participant’s expectations about alcohol before the taste-task.

2.3.5. Debriefing

The individual debriefing process between the Research Coordinator and the participant was detailed and lengthy. The purpose of debriefing...
was 1) to assess the effectiveness of the deceptions; 2) to address and mollify any lingering emotional distress felt by the participants; and 3) to help the participant understand the importance of the research and enlist her as a “research partner” in helping to preserve the integrity of the experiment.

To begin, the participant was asked to state her thoughts on the purpose of the research. Each participant appeared to believe that the confederate was also a participant. Additionally, participants were asked how much alcohol they had consumed. All stated some amount; no one guessed she had been given non-alcoholic beer.

The Research Coordinator then fully explained the anger provocation, the role of the confederate, and the purpose of the project, including benefits to understanding women’s drinking. When participants were informed that they received only non-alcoholic beer, all indicated surprise that they had not actually consumed alcohol.

The Research Coordinator took particular care in assessing the participants’ level of emotional distress at this point. The confederate came back into the room and apologized to the participant for her annoying behavior. If the participant continued experiencing negative emotions, the Research Coordinator further discussed and validated her feelings, and again explained how the participant had assisted in furthering this research. By the time they left, all participants stated that they felt no anger, frustration, helplessness, nor other negative or unpleasant emotions. In addition, all agreed to keep their experiences confidential until the study was completed (to avoid risk of damaging the confederate’s credibility). All were entered into the drawing for the $250 lottery prize (awarded at the end of the study).

3. Results

3.1. Verification of anger provocation

To verify that the provocation led to anger, and just anger, participants’ ratings on all the Feeling Thermometer scales and the subscales of the MAACL-R were subjected to independent sample t-tests. Following the anagrams task, participants in the Provocation condition reported higher MAACL-R hostility scores (M = 3.14, SD = 2.88) than those in the Non-Provocation condition (M = 0.36, SD = 0.63) (Note that the Levene’s test showed unequal variance, so a df correction was used: t (14.26) = 3.54, p < .003). Additionally, the Provocation participants had higher Feeling Thermometer anger scores (M = 3.07, SD = 1.98) than those in the Non-Provocation condition (M = 1.50, SD = .76) (again, a Levene’s correction was used because of unequal variances, t (16.75) = 2.77, p < .02). Analyses of the remaining MAACL-R scales and the Feeling Thermometer scales failed to detect any significant differences between groups.

3.2. Beverage consumption

Next, amounts of “beer” and ginger ale consumed were analyzed to assess participants’ choice of and intent to consume alcohol. Total beverage consumption (in ml) was recorded for each of two types of beverages. Participants in the Provocation condition consumed an average of 170.0 ml of placebo beer (SD = 81.34) and 181.79 ml (SD = 112.36) of ginger ale. Non-Provocation participants consumed a mean of 120.07 ml (SD = 78.38) of placebo beer and 199.5 ml (SD = 151.71) of ginger ale.

To test the hypothesis that women exposed to Provocation (n = 14) (versus Non-Provocation, n = 14) would consume more placebo beer, we conducted a univariate analysis of covariance where condition was the fixed factor, amount of placebo beer was the dependent variable, and the pre-manipulation Anger Feeling Thermometer and MAACL-R negative emotion subscales (hostility, anxiety, and depression) were covariates. Our rationale for using these covariates was to equate groups on all forms of baseline negative affect to ensure we were truly testing the effects of the anger manipulation. The result of this analysis was significant, F (1, 22) = 4.61, p < .05, in that those in the Provocation condition consumed more placebo beer than those in the Non-Provocation condition. We conducted a similar analysis using amount of ginger ale as the dependent variable. The result of this analysis was not significant, F (1, 22) = .050, p > .05. Additionally, it might appear that participants overall drank more ginger ale than beer, this difference was not found in either group or overall (all Fs not significant).

To assess the associations between expectancies and drinking, we conducted bivariate correlations between assertiveness expectancies, relaxation expectancies and amount of placebo beer consumed within each group. As predicted, there were no significant correlations in the Non-Provocation group. However, with the 14 participants in the Provocation group, we found a significant positive correlation between assertiveness and “beer” consumed; that is, the more they believed that alcohol would make them more assertive, the more the Provocation women drank (r = .54; p < .05). We did not find a significant correlation between relaxation expectancies and placebo beer drinking.

4. Discussion

To summarize, the findings indicate that the Provocation protocol was successful in increasing anger and hostility, specifically, without affecting other emotions significantly. Moreover, significant group differences in consumption of non-alcoholic “beer” as a function of anger provocation were also noted, such that participants exposed to the Provocation protocol consumed significantly more “beer” than participants in the control group. The finding of no group differences on consumption of ginger ale strengthens indications that participants specifically chose to drink more alcohol when they were provoked. Finally, it appears that the more women expected alcohol to increase assertiveness, the more they drank, but only when they were provoked, suggesting an explanation for their choice to drink. Each of these points is discussed below in more detail.

4.1. Anger provocation manipulation

One of the strengths of the present study is that the manipulation appears to have significantly increased women’s ratings of anger and hostility with no evidence of changed ratings of anxiety, depression or positive affect on the MAACL-R, or of anxiety, calm, contentment and happiness on the feeling thermometers. This leads to greater confidence that group differences in drinking behavior were due to anger, specifically, and not to a diffuse negative affect. Our finding underscores the importance of examining the effectiveness of the Provocation protocols in anger research, and suggests that a gender-specific manipulation may be quite valuable in studying women’s drinking behavior.

4.2. Group differences in beverage consumption

In the present study, the Provocation women consumed more “beer” than the Non-Provocation women. Finding group differences in “beer” consumption as a function of anger provocation provides clear experimental evidence of anger as a determinant of alcohol consumption. To date, little other published experimental research demonstrates a causal relationship between anger and drinking, especially with women (Marlatt et al., 1975 is the major exception). Further, the present study is consistent with past survey research suggesting an association between anger and subsequent alcohol consumption (e.g. Ciesla et al., 2011; Lonczak et al., 2007) and anger as a reason for relapse (Marlatt & Gordon, 1985). These findings support the value of the current practice of including an anger management protocol as a routine part of women’s alcohol treatment programs (e.g. González-Prendes, 2008).
4.3. Specific association between expectation and “beer” consumption

A very intriguing finding in this study was that expectation appeared to play a role in the woman’s decision to drink when she was provoked. These findings must be interpreted cautiously because they are associations only (also see below), but it appears that women expecting alcohol to make them more assertive, drank more when provoked. Perhaps these women expected drinking to be an active coping strategy which could empower them to “stand up” to the aggressor and maybe, as Marlatt et al. (1975) suggested, could allow her to retaliate. Conversely, anger (tension) reduction expectancies did not seem to be associated with drinking under these circumstances. Further work in this area may better elucidate this complex relationship, but, at least with these non-problem drinkers, empowerment may have been the goal of drinking. In the future, women’s anger management treatment protocols might be tailored to reflect the strength of her association between drinking and assertiveness.

4.4. Limitations

While there are numerous strengths, there are also several limitations of the present study. First, we used non-alcoholic “beer” rather than an alcoholic beverage. While none of the participants reported any suspicions that they were consuming non-alcoholic “beer,” they did not actually consume alcohol. Therefore, conclusions must be drawn regarding women’s intention to consume alcohol rather than actual alcohol consumption, per se. Second, in regard to alcohol expectancies the findings should be seen as preliminary. Hypotheses about these associations were tentative and, additionally, were not given a “fair test” primarily because they were assessed after the taste task was over, so “drinking” might have affected the participants’ responses. Further, an adequate test of these associations would require far more participants in order to increase power. However, even with the low power, the substantial and significant correlation between assertiveness expectations and drinking in the Provocation group appeared to account for a large amount of the variance in that group. Replications will be necessary to support this finding.

Third, the sample was drawn from individuals responding to advertisements and was fairly limited in terms of demographics. The majority were Caucasian, had never been married and were college educated. Thus, the sample is not representative of women in general. Finally, the Provocation protocol appeared successful in inducing anger, but there were many variables included in the manipulation, such as the confederate’s verbal and non-verbal insulting behavior, the confederate’s interfering with the participants’ task completion, the fact that the confederate finished her anagrams in 4 min, the presence of a loud timer, and unsolvable, frustrating word problems. The specific mechanism or mechanisms leading to the participant’s anger and subsequent beverage consumption are unclear. Questions remaining to be sorted out include which aspects of the Provocation protocol led to anger and increased drinking.

4.5. Future directions

The present study demonstrated that with a specific anger provocation, women will drink more “alcohol” especially if they expect alcohol to increase their assertiveness. However, the mechanism showing how anger affects drinking behavior is still unclear. Future replications should focus on re-examining whether this finding is specific to anger. In addition, how robust are these findings with a larger, more diverse sample? Do other provocations of anger lead to subsequent drinking? Further, replications should also assess if this finding of an alcohol/anger relationship is specific to women, as opposed to men. One difficulty with this research would be that gender-specific anger provocations may be necessary to induce anger and further work will be necessary in this area. Alcohol expectations, some of which may be gender-specific, may also play a role in the relationship. Finally, research involving the actual effects of alcohol on self-reported anger would be beneficial in understanding this relationship. If the women in this study had consumed real alcohol following the anger manipulation, would alcohol have been instrumental in changing their anger (e.g. facilitating assertiveness, inducing relaxation)? Would alcohol have induced more positive emotions? Or could alcohol have an indirect incremental effect on anger, for example, intensifying their emotion and/or decreasing their inhibitions, leading to a higher likelihood of retaliation and relief?

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Contributors
Pamela M. Morrison conducted the study under the supervision of Nora E. Noel and wrote the first draft. Dr. Noel shared responsibility with her for subsequent drafts. Richard L. Ogle made a substantial contribution to the data analysis. Ms. Morrison, Dr. Noel and Dr. Ogle wrote the final draft together.

Conflict of interest
There are no conflicts of interest with this manuscript.

Author note
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