

COVER PAGE

Official Study Title: Acute Use of Alcohol and Attentional Bias Towards Suicide: An Experimental Test of the Attention-Allocation Model

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Research Strategy

Significance

Acute use of alcohol (AUA) is associated with marked increased odds of suicide attempts⁶ and occurs prior to 34% of suicide deaths.¹⁶ Research has suggested a dose-response effect of AUA on odds of suicide attempts⁶ and deaths¹⁷ (see review¹⁵). Only one published study tested the proximal effects of AUA on suicidal ideation. Using timeline follow-back methodology with recently hospitalized individuals following a suicide attempt, AUA was associated with increases in next-hour suicidal ideation.¹⁸ In contrast, an unpublished daily diary study of college students with histories of alcohol use and suicidal thoughts demonstrated that AUA was negatively associated with suicidal ideation occurring that same day.¹¹ These contradictory findings may be due to the presence, or lack thereof, of certain conditions on which alcohol-related suicidal thinking depends. For example, college students often socially drink or have positive alcohol expectancies, which may serve as competing cues that prevent alcohol use from facilitating suicidal thoughts.

The conditions under which AUA confers risk for suicidal ideation and behavior are not well understood. This limited understanding raises questions about how to best target alcohol-related suicide risk for prevention and intervention efforts. Indeed, providers are unclear about the likelihood of suicidal behaviors among patients who use alcohol, and thus their treatment needs. For example, a recent study revealed that suicidal thoughts were insufficiently documented and one of the most incorrectly triaged problems among alcohol-intoxicated patients in emergency care settings¹⁹, highlighting the extent of missed intervention opportunities. Theory-guided studies will improve our understanding of the AUA-suicide connection by identifying targetable conditions and mechanisms. Although there are many theoretical articles about this connection, there are few, particularly experimental, tests of these theories. Identifying situational and individual factors upon which the impact of AUA on suicide may depend will inform our development of effective prevention strategies for alcohol-related suicide.

Theoretical Framework

Numerous researchers have proposed conceptual models of the impact of AUA on suicidal thoughts and behaviors.^{1-2, 10} A common thread throughout this work is an emphasis on the attention allocation model (AAM).⁷ The AAM is a promising model for clarifying the conditions under which AUA may affect suicide risk, and many studies have supported its use in explaining alcohol-facilitated interpersonal aggression.²⁰ The AAM posits that alcohol intoxication creates a myopic effect on attention (i.e., attentional bias), such that it is allocated to the most salient stimuli. In the most comprehensive theory to date, Hufford (2001) applied the AAM to understanding the acute influence of alcohol use on suicide attempts and deaths.² In brief, Hufford proposed that AUA plays a proximal role by facilitating suicide-related attentional bias and activating suicide-related expectancies.

Attentional Bias towards Suicide-Related Cues. Attentional bias towards suicide-related cues (hereafter referred to as suicide-related attentional bias) is defined as the selective allocation of attentional resources toward suicide-related stimuli.³ AUA may increase risk for suicidal thoughts and behavior through its potential for facilitating suicide-related attentional bias. If painful emotional states are the most salient stimuli, intoxicated individuals' cognitive resources will be allocated to these states and away from suicide-inhibiting stimuli, thereby increasing risk for suicidal ideation and behavior.^{1,2} Indeed, a meta-analysis has shown that suicide-related attentional bias is greater among people with histories of suicide attempts than those without.²¹ A prospective study found that this bias predicted later suicide attempts better than other clinical predictors did.³ Thus, suicide-related attentional bias may be an important cognitive process occurring early in the suicidal trajectory, which AUA may facilitate under certain conditions. What is not known is whether AUA increases suicide-related attentional bias in the presence of salient cues, such as negative mood states.

My past work guided by the AAM has revealed mixed support for this notion. Cross-sectional survey work showed that problematic drinking strengthened the association between depressive symptoms and suicidal ideation⁸, but an unpublished daily diary study of college students with histories of alcohol use and suicidal ideation failed to support an interaction between AUA and negative affect in predicting suicidal ideation.¹¹ The latter finding may not generalize beyond college populations, as college students engage in frequent social drinking—providing competing cues that may protect against suicidal thoughts. Furthermore, these studies were limited by observational design and lack of measurement of suicide-related attentional bias—central to testing the AAM. An experiment examining suicide-related attentional bias would be the most rigorous test of this model, as potential third variables (e.g., depression history) and cue salience require careful control.

Alcohol Expectancies. Likewise, there is limited understanding of individual differences, such as alcohol expectancies, that may further moderate these relations. As has been described in the other-directed aggression literature²⁰, impelling and inhibiting factors may change the effect of AUA on suicide-related attentional bias and thus suicidal behavior. Alcohol expectancies, defined as one's cognitions about the effects of alcohol intoxication²², may inhibit or impel suicidal thoughts and behaviors. First, AUA may facilitate suicidal behavior, in part, by activating suicide-related alcohol expectancies (i.e., increased pain tolerance and fearlessness).² Thus, suicide-related alcohol expectancies may become a salient cue to which attention is directed, thus increasing suicide-related attentional bias. I could find no published studies that have examined suicide-related alcohol expectancies in relation to suicidal thoughts or behaviors. However, my prior work has shown that alcohol use is associated with perceived fearlessness and pain tolerance^{11,23}—constructs theorized to enable someone to attempt suicide, if desired.²⁴ Relatedly, my work has shown that problematic drinking is negatively associated with suicidal ideation among people with low aggressive expectancies.⁹ Other researchers have similarly shown that beliefs about alcohol reducing fear and pain were associated with increased risk for *nonsuicidal* self-injury.²⁵ Alternative to this expectancy-activation hypothesis is the possibility that individuals drink alcohol purposefully to increase capability for an attempt. However, prior research has shown this is unlikely.²⁶

Other alcohol expectancies may also be relevant. Positive alcohol expectancies (e.g., mood enhancement, tension reduction) may impel or inhibit suicidal behavior, depending on one's mood state. For example, individuals who are depressed may hold the belief that AUA will improve their mood; however, distress often *increases* when alcohol is consumed during negative mood states^{12,13}, potentially increasing risk for suicidal thoughts and behavior.² In contrast, individuals with such expectancies who experience positive mood prior to drinking are likely to experience increases in positive mood, and thus reduced likelihood of suicidal thoughts and behaviors. My preliminary work has partially supported this idea, showing that problematic drinking was negatively associated with suicidal ideation among those with high positive alcohol expectancies.⁹ Albeit limited, the literature suggests an interactive effect among AUA, mood, and alcohol expectancies on suicide risk but there remains a need to test the main effects of alcohol expectancies on suicide-related attentional bias.

The Proposed Study

This pilot experiment will examine the interactive impact of AUA, mood, and alcohol expectancies on suicide-related attentional bias (See Figure 1). This study is an innovative and robust exploration of theory-guided hypotheses. It will employ an experimental design (rare in the study of suicide-related constructs), alcohol administration, mood induction, and performance-based measure of suicide-related attentional bias. This study will 1) demonstrate feasibility of procedures, 2) explore sociodemographic differences in feasibility and of procedures and in suicide-related attentional bias, and explore conditional effects of AUA on suicide-related attentional bias by 3) mood states and 4) alcohol expectancies.

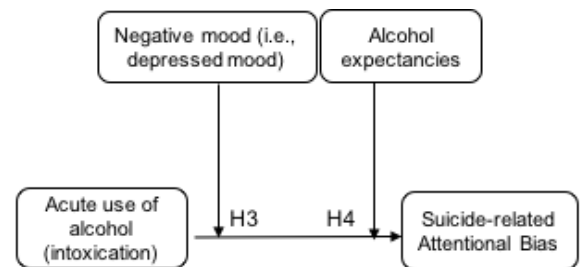


Figure 1. Hypotheses guided by theory and preliminary studies

Innovation

Theorists have conjectured that the impact of AUA on suicide risk may depend on alcohol expectancies and increased suicide-related attentional bias. However, for obvious ethical reasons²⁷, no experimental tests of this hypothesis exist. Addressing these challenges, the proposed experiment is an ethical and innovative test of these hypotheses; it examines a construct theorized to occur early in the trajectory towards suicidal behavior but which has not yet been examined in relation to AUA: suicide-related attentional bias.³ This experiment complements NIAAA's strategic goals in basic science and prevention research, as it examines targetable cognitive factors that may influence suicidal ideation—a significant comorbidity among individuals with alcohol use disorders. This study challenges the current paradigm in alcohol-related suicide research in two important ways. First, it represents the first known experimental test of the AAM as it applies to suicide-related attentional bias and would guide methodology and parameters for future related studies, including those with samples higher in dysregulated mood. Further, this would be the first known study of suicide-related expectancies, another frequently hypothesized but untested correlate of alcohol-related suicide risk. If our hypotheses are supported, it would provide empirical support for a larger-scale test of the AAM as it relates to suicide risk. Future laboratory tests could test whether decreasing the salience of negative mood reduces suicide-related

attentional bias. If alcohol expectancies are associated with suicide-related attentional bias, future work could test interactive effects of alcohol expectancies with mood and AUA on this bias. Downstream clinical implications include targeting expectancies and negative mood among individuals who consume alcohol. Ultimately, these findings may inform future basic and applied research examining the effects of AUA on suicidal ideation and behavior.

Approach

Consistent with theoretical and empirical work regarding the effects of AUA on suicidal thoughts and behaviors, this pilot study will test the interactive effects of AUA, negative mood, and alcohol expectancies on suicide-related attentional bias. The proposed study will employ a 2x2, between subjects design (alcohol-placebo X negative mood-positive mood, baseline levels of expectancies). See Figure 2 for a summary of our approach.

Preliminary Data

Preliminary work has provided partial support of H1 regarding feasibility of the study. We are conducting a partial test of our experiment (without alcohol administration) with a community sample examining the effects of the mood induction on mood and suicide-related attentional bias (Launched 10/11/19; currently paused due to COVID19 safety concerns). Using similar recruitment procedures, 86 individuals have been screened; 55 met inclusion criteria; 41 attended a study session; 35 remained eligible after in-person screening; 1 withdrew before completing the procedures. Thus, we had preliminary data from 34 participants. There was group equivalence in mood prior to mood induction ($ps = .39-.81$). *T*-tests revealed effectiveness of the mood induction. The negative mood group reported higher post-manipulation sadness ($p=.001$, Cohen's $d=1.24$) and guilt ($p=.001$, $d = 1.21$) and lower joviality ($p=.05$, $d = .68$) compared to the positive mood group. These were medium to large effects despite 5 participants claiming the mood induction was ineffective in post-study interviews.

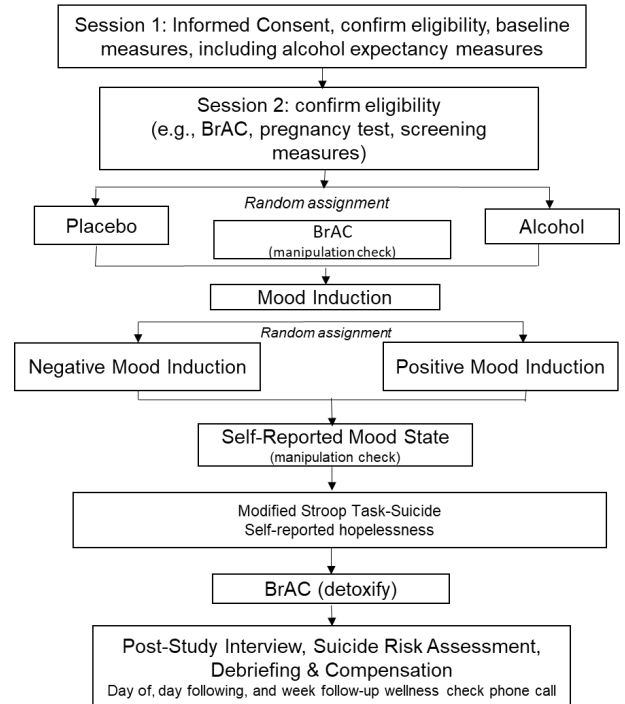
Preliminary analyses showed that the distribution and variability in the suicide-related attentional bias scores ($M=10.17$, $SD=41.32$) were similar to that of prior studies²⁸ of nonsuicidal subjects ($M=3.96$, $SD=58.48$, $d=0.12$). Preliminary analyses supported the anticipated direction of effect of mood on suicide-related attentional bias. The sample size for this analysis was reduced to 23 due to missing data on Stroop (software malfunction, $n=2$), mood induction and study aims deception failure ($n=6$), and exclusion of error trials (reducing analysis sample by 5). Although not statistically significant, the negative mood group showed more suicide-related attentional bias ($M=15.77$, $SD=31.33$) than the positive mood group ($M=2.45$, $SD=48.24$, $d=.32$). The negative mood group also had more depressive-related attentional bias ($M=4.83$, $SD=58.48$) than the positive mood group ($M=-6.70$, $SD=41.96$, $d=.23$). These data provide empirical support for the proposed study aiming to further test the feasibility of our procedures and hypotheses guided by the AAM.

In support of H3, we found that alcohol use strengthens the association of depressive symptoms with suicidal ideation in cross-sectional, observational studies of clinical samples.^{8,29} In support of H4, we found that alcohol expectancies related to mood and disinhibition change the problem drinking-suicidal ideation relation.⁹ In suicide decedents, we found that blood alcohol concentrations positively correlated with suicide means of rapid and high lethality, suggesting that AUA could be seen as reducing fear.³⁰ Similarly, in my cross-sectional and daily diary work (F31), AUA positively correlated with fearlessness and perceived pain tolerance.^{11,23}

Study Participants

A sample of 160 community adults (50% female; 10 pre-pilot; 150 pilot, about 38 per condition) will be recruited from the greater Birmingham area using flyers posted on the UAB campus and on Craigslist.com and Facebook.com (See *Recruitment and Retention Strategy*). Our original target pilot sample size was 120; however, we plan to oversample by 25% to account for the potential that 25% of participants may fail the mood induction. Participants will be told they are volunteering for a study testing "The Effects of Alcohol and Mood on

Figure 2. Summary of Research Approach



Attention.” Documented in the *Statistical Design and Power* attachment, the sample size is a compromise between feasibility and precision of estimates, and provides reasonable confidence interval widths for effect estimates. **Inclusion criteria:** a) be between the ages of 21 and 65, b) have consumed an average of at least five or more (four or more for females) standard alcoholic drinks per occasion once over the past year, c) have self-administered a quantity of alcohol that is equal to or greater than the dose that will be administered in the lab on at least three occasions in the past year, and d) be able to read and write in English fluently. **Exclusion criteria:** a) active psychosis, suicidal ideation/intent, or mania; currently receiving psychiatric treatment; have received psychiatric treatment in past year or currently experiencing significant psychiatric distress, b) in treatment or recovery from drug or alcohol use disorders or abstaining from alcohol, c) any suicide attempt history, d) pregnant/breast-feeding or immediate plans to become pregnant, e) any chronic health problems or medications that would preclude the use of alcohol, f) (to minimize adverse reactions to alcohol or inappropriate alcohol dose) < 6 feet tall and over 230 lbs., or > 6 feet tall and over 250 lbs. or weighing 15% below one’s ideal body weight, g) (to minimize discomfort during lengthy study procedures) smoking more than 15 cigarettes a day, h) orange allergies, i) color-blind or sight-impaired, and j) knowing someone who has participated in this study. Given this is the first study to test the effects of AUA on suicide-related attentional bias, our exclusion criteria are conservative to reduce adverse events related to increased distress.

Procedures

Screening and Session 1. See Table 1. Interested individuals will telephone the laboratory, and trained, supervised research assistants will assess inclusion and exclusion criteria via interview. Eligible participants will be scheduled for Session 1, which will last about one hour. Upon arrival, participants will provide informed consent, will be screened again for eligibility, and complete baseline measures. For screening purposes, participants will complete the Symptom Checklist-90-Revised (SCL-90-R; self-report measure of psychiatric symptomatology)³¹, the Paykel Suicide Scale³², and an adaptation of the telephone screening interview (to re-assess for exclusionary criteria). The Paykel Suicide Scale was selected given its ability to be modified for select periods and ease of comparison across study assessments. Participants who report a score of 65 or more on the SCL-90-R (i.e., indicative of significant psychiatric symptomatology) or current suicidal ideation will be excluded (and given appropriate referrals). Participants will also complete the Alcohol Use Disorders Identification Test (AUDIT³³), which will be utilized to provide personalized alcohol use psychoeducation and treatment referrals. Per AUDIT recommendations and the ethical guidelines of alcohol administration research, all participants will receive literature focused on the reduction of hazardous drinking at the end of the study.

Upon completion of this initial screening battery, participants will then complete a separate computer assessment battery, including measures of demographics and suicide and alcohol-related constructs (however, these will be kept to a minimum to mask study aims). Relevant to the current study aims, a measure of alcohol expectancies (Comprehensive Alcohol Expectancy Questionnaire [CAEQ]³⁴⁻³⁵) will be included. The CAEQ is a reliable and valid measure of alcohol expectancies, with confirmatory analysis supporting it in alcohol-dependent and college student samples.³⁶ The following CAEQ subscales will be used for the purposes of this investigation: Social Assertiveness/Positive Affect and Tension Reduction. We will also include items we developed regarding suicide-related alcohol expectancies (SRAEs), as there is no validated measure of suicide-related expectancies. These items will be dispersed throughout the CAEQ to keep subjects naïve to study aims. Our preliminary work supported the reliability and validity of the SRAE measure in a sample of 80 college students. The measure had high internal consistency ($\alpha=.96$). Scores were normally distributed (Range=93; M=53.83, SD=23.70; Skewness=-0.11, Kurtosis=-0.91). Concurrent validity was supported. Hazardous drinkers reported greater SRAEs than non-hazardous drinkers (M=61.00, SD=16.39 vs. M=49.55, SD=26.27, $d=0.52$), and SRAEs were positively correlated with past year suicidal ideation ($r=.43$, $p<.01$). Finally, a measure of attentional abilities (Conners’ Adult ADHD Rating Scales, Self Report: Long Version; [CAARS-LV]³⁷) will be included to reinforce the deception that the study is investigating broad attention. Participants will be compensated via cash gift card (\$20 for this session).

Session 2. Participants who remain eligible will be scheduled for a second appointment, which will be one to ten hours in duration, depending on their randomly-assigned condition (i.e., alcohol vs. placebo). When scheduling Session 2, participants will be told to refrain from drinking alcohol or using recreational drugs 24 hours prior to the session and to refrain from eating four hours prior to the session. Upon arrival at the laboratory, eligibility will be confirmed, including a breathalyzer test to ensure a zero BrAC and field sobriety test for comparison post-detoxification. Those with nonzero BrAC will be rescheduled. Female participants will be given a pregnancy test kit and asked to produce a urine sample in a private bathroom located adjacent to

the laboratory (those with positive tests will be excluded). Height and weight will be measured to calculate alcohol dosage. We will assess pre-manipulation mood via the Positive and Negative Affect Schedule-Expanded Form (PANAS-X)—sadness, guilt, and joviality subscales³⁸ and 2-item Brief Hopelessness Measure.³⁹

Manipulation of AUA and Mood: We will randomly assign eligible participants to conditions using a randomization scheme. They will proceed first to beverage administration. We will tell all participants that they are drinking alcohol. Participants in the placebo control group will receive beverages containing 4 mls of alcohol in juice and 4 mls layered on top of the juice. In addition, the rims of the glasses will be sprayed with alcohol just prior to being served. Participants in the alcohol condition will be administered two drinks consisting of an overall dose of 0.99 g/kg (males) or .90 g/kg (females) body weight of 95% ethanol USP mixed in a 1:5 ratio with Tropicana orange juice. Standard drink equivalents will be based on body weight. The beverage will be poured into two glasses in equal quantities. This dose has been used in past studies of alcohol-related self-aggression and reliably produced BrAC levels between .08%-.10%, which is within NIAAA safety guidelines.⁴⁰ This dose has consistently potentiated self-aggressive behavior⁵ and thus was chosen to maximize the likelihood of producing an alcohol-related effect on suicide-related attentional bias. We will serve all beverages chilled with no ice. We will allot twenty minutes for beverage consumption. Participants will be given their two glasses at equally-spaced times to control drinking rate. Immediately after consumption, all participants will rinse their mouths with water. We will assess BrACs of all participants with an Alco-Sensor IV breath analyzer every five minutes for 20 minutes for placebo participants and until .08% on the ascending limb of the BrAC curve for alcohol participants.

Upon reaching a BrAC of at least .075%, a brief manipulation check will be performed. Participants will rate their level of intoxication on a scale of 0 (0=not at all) to 11 (11=more drunk than I have ever been).⁴¹ Immediately after, participants will be randomized to a 10-minute mood induction procedure. A self-referent plus musical mood induction paradigm will be employed to induce a positive or negative mood state in participants.⁴² Self-referent statements (e.g., negative or positive self-statements) and musical mood inductions are both valid, stand-alone procedures for inducing mood. The combination of both has been shown to be effective in inducing a temporary negative mood state in 75% of subjects.⁴² The combined negative mood induction paradigm was created based on a modernized version⁴³ of a seminal, self-referent mood induction⁴⁴ and a musical mood induction.⁴⁵ Participants will read 25 statements presented in a timed, PowerPoint slideshow, first to themselves and then aloud, and are instructed to “feel and experience each statement as it would apply to you personally.” They will concentrate on each statement for 20 seconds and then proceed to the next one. Five statements were revised to generalize to the greater population. This is done simultaneously with the musical negative mood induction paradigm, which involves listening to a piece of music that conveys a particular mood (negative: Prokofiev’s ‘Russia Under the Mongolian Yoke’ at half speed; positive: Delibes ‘Coppelia’). These musical pieces were chosen as they are the most studied of the effective musical induction procedures.⁴⁶ Subjects will be left alone in the room during the mood induction to lessen inhibitions but will be observed by way of a window.

Manipulation Check and Dependent Variable Measurement: After the mood induction, participants will complete the PANAS-X subscales as a manipulation check (<2 min). Participants will then complete a Stroop⁴⁷ task modified to assess attention towards suicide-related cues (i.e., Suicide Stroop³). This modified Stroop task is a performance-based measure conducted via computer that documents response latencies on identification of the colors of words presented on the screen. Neutral (museum, paper, engine), negative (alone, rejected, stupid), positive (happy, success, pleasure), and suicide-related (suicide, dead, funeral) categories of words are presented, and greater response latencies indicate greater interference of the semantic content in naming the color. Participants will be instructed to indicate the word color as quickly and accurately as possible using red and blue keys. Stimuli will be presented using Empirisoft DirectRT software.⁴⁸ Trials will be presented in a random order to each participant. Interference for suicide-related words (i.e., suicide-related attentional bias) will be calculated by subtracting the response latencies for neutral words from the latencies for suicide-related words.³ Internal consistency coefficients for reaction time tasks like Stroop tasks are typically low⁴⁹⁻⁵⁰, and it has been suggested that using internal consistencies from past studies is inadvisable as sample characteristics can have a significant impact on the internal consistency.⁴⁹ Nonetheless, in our partial test, the internal consistencies for the interference scores (using a split-half coefficient) and the suicide trial reaction times were .49 and .86, respectively, which are typical of Stroop tasks⁵⁰⁻⁵¹ and much better than reliabilities in prior studies using the Suicide Stroop.²⁸ The Suicide Stroop has demonstrated construct validity through associations with past and future suicidal behavior.^{3,21} Thus, It serves as the primary outcome

of interest. Following the Stroop, participants will complete the 2-item Brief Hopelessness Measure³⁹ (a secondary outcome, see *Potential Problems* below).

Post-Study Interview and Debriefing: Following dependent variable measurement, BrAC readings will be obtained for individuals in the alcohol condition. Participants will be allowed to use the restroom and encouraged to drink the provided water. While detoxifying, individuals will be given access to magazines, access to WiFi/a tablet with internet, and offered snacks, water, and a full meal. Intoxicated participants will be debriefed after a BrAC reading of .03% (sober participants will be interviewed and debriefed in full immediately). Given that study procedures assess suicide-related constructs and, for some participants, a negative mood induction and alcohol administration, a Post-Debriefing Safety Interview will be administered prior to participants leaving the laboratory. This evaluates deception failures, participants' experiences of distress due to study participation, and suicide risk. Although changes in overt suicidal ideation are not expected, participants will complete the Paykel Suicidal Ideation Scale again to screen for current suicidal ideation (and indicate if additional risk assessment is needed). The debriefing will include a description of the study aims, hypotheses, revealing of deception (regarding true study aims, placebo), and safety checks. Research staff will go over the AUDIT fact sheets with all participants and answer any questions. If they require or request referrals, research staff will discuss the reason for the referrals (e.g., problematic drinking). Participants will be paid and thanked for their participation. Participants will be compensated via cash gift card (\$20 per hour, up to \$200 for 10 hours). Intoxicated participants will not be allowed to leave until their BrAC has fallen to 0.03% on two consecutive readings (per NIAAA guidelines; See *Protection of Human Subjects* attachment). All participants will leave via paid cab.

Table 1. Summary of Research Tasks and Measures

Telephone Screening
Session 1
Informed Consent and Eligibility Screening
Primary Baseline Assessments
Alcohol Use Disorders Identification Test
Paykel Suicide Scale (lifetime)
Comprehensive Alcohol Expectancy Questionnaire (CAEQ); Suicide-Related Alcohol Expectancies
Secondary baseline questionnaires related to alcohol, psychiatric, and mood ^{37, 52-54}
Session 2
Eligibility confirmation (Paykel Suicide Scale [current]; Changes in medication/health status)
Random Assignment
Pre-Manipulation Mood and Cognition (PANAS-X; Brief Hopelessness Measure)
Manipulation Procedures and Checks
Alcohol or placebo administration; Post drinking BrAC measurement; Manipulation check
Mood induction (positive or negative); Manipulation check: PANAS-X
Outcome Measure: Modified Stroop-Suicide (primary outcome of interest), Brief Hopelessness Measure
Post-Study Procedures: Detoxification (if applicable); Post-Study Verbal Interview, Paykel Suicide Scale (current; risk screening for post study interview), Debriefing, Payment
Follow-up Wellness Check Phone Calls (day of, day following, and week following)

Analytic plan

H1: We will quantify the number of individuals screened and the percentage who are eligible and participate. We will run descriptive statistics to quantify 1) prevalence of successful mood induction, 2) distress ratings post-study session, and 3) number of adverse events. Using measures of effect size, *t*-tests, and Chi square analyses, we will examine sociodemographic differences in these feasibility factors. **H2:** We will use measures of effect size, *t*-tests, and Chi Square analyses to examine sociodemographic differences in suicide-related attentional bias scores. **H3:** The interactive effect of mood and AUA on suicide-related attentional bias will be estimated using a general linear model of the form $\hat{Y} = \beta_0 + \beta_1 Alcohol + \beta_2 Mood + \beta_3 Alcohol \times Mood$. **H4:** The interactive effect of alcohol expectancies and AUA on suicide-related attentional bias will be estimated using a general linear model of the form $\hat{Y} = \beta_0 + \beta_1 Alcohol + \beta_2 Expectancies + \beta_3 Alcohol \times Expectancies$. For H3 and H4, we will use linear contrasts to estimate effects. Inferences will be conducted using 68% CIs for comparisons of interest, as significance testing is not a primary study aim. See *Statistical Design and Power* attachment.

Potential Problems, Alternative Strategies, Benchmarks for Success, and Impact

Given this is the first known project to examine the effects of AUA, mood, and expectancies on suicide-related attentional bias, our ongoing partial test of the proposed study includes another suicidal bias measure: the Implicit Associations Task-Life/Death (IAT-SI⁴), which measures implicit suicidal cognition. Scores indicate level of identification with life versus death and correlates with suicidal behavior.⁴ We will replace the Stroop with this task if our partial test of the reveals that the mood induction influences IAT-SI scores but not Stroop scores. Even if our proposed pilot study does not find effects of AUA, mood, and expectancies on suicide-related attentional bias, we have a post-manipulation measurement of hopelessness—a strong risk factor for suicide. This secondary dependent variable could serve as the basis for an R01. If in our 10 pre-pilot subjects, the mood induction fails >50% of the time, we will use another effective mood induction (i.e., imaginative film). Further, we are oversampling by 25% (150 subjects instead of 120, in case of 25% mood induction failures). Finally, although our proposed sample may not generalize to suicidal individuals, we believe any effect found in the present study will be larger in a sample of suicidal individuals. This study's strong internal validity offers a strong basis for future studies of individuals with higher levels of distress. **Impact.** If hypotheses are supported, it would provide strong support for the AAM as it applies to suicide risk. Future studies could test whether decreasing the salience of negative mood or suicide-related expectancies reduces suicide-related attentional bias and thus suicide risk. Possible downstream implications include the potential to inform future basic and applied research examining the effects of AUA on suicide risk. Finally, this project will provide me with the relevant experience to conduct future experiments using alcohol administration to investigate behavioral and affective consequences of AUA.