Published in final edited form as:

Contemp Clin Trials. 2020 October ; 97: 106107. doi:10.1016/j.cct.2020.106107.

Guilt and Expressive Writing for Reducing Alcohol Use in College Students: Study Protocol for a Randomized Control Trial

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Abstract

The current proposed study aims to evaluate expressive writing as a novel intervention for reducing problematic drinking among college students. College students are at increased risk for alcohol misuse compared to other adults, and the development of efficacious intervention approaches is an urgent priority. The vast majority of individually focused brief interventions targeting college drinking have focused on personalized feedback approaches and recent innovations have largely been limited to refinements of this paradigm, which require large-scale assessment and intricate programming for implementation. The present research proposes expressive writing as a novel alternative, which has been used extensively in other domains but not as an alcohol intervention strategy. We propose a theoretically-based approach that incorporates expression of the self-conscious emotion of guilt and the written analogue of change talk as proposed mechanisms of intervention efficacy. We will also examine individual differences in guilt-proneness as a moderator of intervention efficacy. Heavy drinking college students ($N=600$) will be randomly assigned to one of six expressive writing conditions based on a 2 (alcohol vs. distress) $\times$ 2 (guilt vs. no guilt) + 1 (control writing) + 1 (personalized feedback) design. Participation in the study involves completion of a screening assessment, a baseline assessment, three in-lab intervention sessions, post-intervention assessments, and follow-up assessments one-month, three-months, six months, and twelve-months later. If effective, this novel intervention approach would not require any pre-assessment or programming of personalized feedback, and would serve as a more easily disseminable alternative to existing approaches.

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Financial Disclosures: None of the authors have conflicts to report within the last 2 years.

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Keywords

expressive writing; alcohol; intervention; guilt; college drinking

Introduction

Alcohol consumption among college students continues to be both prevalent and problematic. Negative consequences related to heavy episodic drinking include poor class attendance, hangovers, engaging in risky sexual behavior, disordered eating, sexual assault, depression, trouble with authorities, injuries, and fatalities (Abbey et al., 2003; Dunn et al., 2002; Geisner et al., 2004; Hingson et al., 2009; Kaysen et al., 2006; Wechsler et al., 1994; Wechsler et al., 2000). Further development of effective interventions that are low cost and easy to disseminate remains a top priority for this high-risk population.

The majority of efficacious prevention and intervention approaches for drinking among college students have followed a personalized feedback paradigm (Baer et al., 1992; Kivlahan et al., 1990; Marlatt et al., 1998). While this approach has shown promising results, few alternative paradigms have been considered. One such paradigm is expressive writing. Expressive writing is a brief intervention that has been linked to various health and social benefits (Pennebaker, Kiecolt-Glaser, & Glaser, 1988; Barclay & Skarlicki, 2009; Klein & Boals, 2001; Baddeley & Pennebaker, 2011). In the traditional expressive writing paradigm, participants are instructed to reflect on a stressful experience and write about their deepest thoughts and feelings about that experience for 20 minutes per session for up to four sessions (Pennebaker, 1997).

Despite repeated success of expressive writing in improving physical health and psychological well-being, the relationship between expressive writing and behavior change is unclear. However, recent research adapted the expressive writing paradigm to specifically target drinking (Young, Rodriguez & Neighbors, 2013). Results indicated reduced drinking intentions after writing about a negative drinking event compared to control, suggesting that a narrative intervention may be effective in reducing drinking. An additional study (Rodriguez, Young, Neighbors, Campbell, & Lu, 2015) further suggests that feelings of guilt were more strongly associated with intentions to reduce drinking after writing about a negative drinking event, and that this event-related guilt mediated intervention effects. The rationale for expressive writing as a brief alcohol intervention differs from traditional expressive writing interventions, which focus on emotional expression. Rather, the goal of expressive writing as a brief alcohol intervention is to facilitate processes that have been found to underlie successful changes in drinking coming from several other lines of work. One such process is guilt. Guilt is a negative, moral-focused, self-conscious emotion that is associated with behavior change (Tangney, 1991). When individuals experience guilt, they may feel tense or regretful and desire to alleviate this unpleasant feeling by making amends for their behavior. Therefore, we expect guilt to mediate the association between the negative drinking narratives and drinking such that those who experience greater guilt related to their alcohol use will reduce their drinking at follow-up.

The current research builds on previous research targeting heavy drinking among college students. Expressive writing has received extensive support in other domains but has only recently been considered as a potential intervention for heavy drinking. Further, the present study incorporates novel theoretical constructs, including the specific focus on guilt in expressive writing content.

Methods

Study design

We will recruit a large sample ($N = 600$) of heavy-drinking college students over a three-year period. Participants will be randomly assigned to one of six conditions in a complex experimental design: 2 (Alcohol or Distress) $\times$ 2 (Guilt or No Guilt) $+ 1$ (Personalized Normative Feedback; PNF) $+ 1$ (Neutral Control). Participants in the five expressive writing conditions (i.e., Alcohol-No guilt, Alcohol-Guilt, Distress-No guilt, Distress-Guilt, and neutral control) will come into the lab once per week for three weeks and engage in expressive writing for 20 minutes during each session. Participants in the PNF condition will receive a one-time administration of PNF, immediately after baseline, which has been found to reduce drinking in multiple randomized trials and will serve as an active comparison group in this trial. Participants in the PNF condition will then return to the lab for two sessions as members of the neutral control condition for equitable amounts of participant burden (i.e., three in-lab sessions), engagement, and activity (i.e., writing exercises). We do not anticipate that these later writing sessions will have any impact on drinking for participants in the PNF condition. However, not having these participants return may introduce a confound in that differences may be attributed to differential burden.

For this initial randomized trial of expressive writing as an alcohol intervention, we deemed it important to construct a design that provided the strongest possible test. Research suggests that brief alcohol interventions for young adults with multiple sessions have larger effect sizes than those with single sessions (Tanner-Smith & Lipsey, 2015). Therefore, participants who completed all three sessions were eligible for follow-up assessment. Follow-up assessments will occur 1, 3, 6, and 12 months post-baseline, which will allow for precise evaluation of the durability of intervention effects over the course of a year. As eligibility for follow-up required all other participants to attend three sessions, PNF participants were asked to also attend three sessions to avoid effects related to differential attrition.

Specific aims

The present study aims to provide experimental evidence of the efficacy of expressive writing as a brief intervention for hazardous drinking college students. The magnitude and duration of effect will be demonstrated by comparing drinking over time among participants in the expressive writing intervention conditions relative to neutral control and relative to a demonstrably efficacious PNF intervention. We also expect to replicate previous work showing the positive effects of distress narratives on well-being. Specifically, we hypothesize:

H1a: Participants writing about negative drinking events (Alcohol Guilt and Alcohol No-Guilt) will show reduced drinking and drinking-related negative consequences relative to students in the Neutral Control group.

H1b: Participants writing about distressing non-alcohol events (Distress Guilt and Distress No-Guilt) will show increased psychological well-being relative to students in the Neutral Control group.

H1c: Participants writing about negative drinking events (Alcohol Guilt and Alcohol-No Guilt) will show reduced drinking and consequences compared with those in the PNF group. This is an exploratory hypothesis.

A secondary aim of the present study is to evaluate differences between guilt and no guilt narratives and distress versus alcohol content in predicting changes in drinking. We expect differences between distress narratives and guilt narratives on drinking outcomes. Specifically, we hypothesize:

H2a: Alcohol narratives (Alcohol Guilt and Alcohol-No Guilt) will have stronger effects on reducing alcohol outcomes relative to distress narratives (Distress Guilt and Distress No-Guilt).

H2b: Alcohol Guilt narratives will have the strongest effect on reducing alcohol outcomes relative to all other conditions (Alcohol No-Guilt, Distress Guilt, Distress No-Guilt, PNF, and Neutral Control).

An additional aim of the present study is to evaluate the written expression of guilt and change thought as mechanisms by which writing about drinking events results in reduced drinking and negative consequences. It is hypothesized that:

H3a: Expression of guilt, assessed by self-report and by content-coding with LIWC, will mediate intervention effects on drinking outcomes.

H3b: Change thought, assessed by LIWC coding, will mediate intervention effects on drinking.

Lastly, the present study sought to evaluate guilt-proneness as a moderator of intervention effects. Specifically, we hypothesized:

H4: Writing about drinking-related guilt (Alcohol Guilt vs. All Other Conditions) will be more effective in reducing drinking among those higher in guilt-proneness relative to individuals lower in guilt-proneness.

Participants

Participants will be 600 heavy-drinking students (18–26 years of age) enrolled at a large, southeastern university who report experiencing at least one of the ten most common negative drinking consequences within the last month and who engage in heavy drinking. Heavy drinking behavior will be determined by a score of 7 (for females) or 8 (for males) or above on the Alcohol Use Disorders Identification Test (AUDIT; Babor, Biddle-Higgins, Saunders, & Monteiro, 2001). We will employ the following exclusion criteria: (1) not currently enrolled at the university; (2) not a heavy drinker per the AUDIT; (3) did not indicate experiencing a negative drinking consequence in the past month.

Measures

Demographics.—Descriptive information, including age, height, weight, sex, race, ethnicity, fraternity/sorority membership, most recent grade point average, year in school, class standing, full-time/part-time enrollment status, and residence (dormitory, off-campus housing, with parents, etc.) will be assessed using standardized questions developed in previous research with this population. Weight is included to estimate Blood Alcohol Level (BAL).

Manipulation Check.—Items will be given after each narrative session for participants in the five narrative conditions. Sample items include, “How emotional were you during the course of writing?”; “Did you write about alcohol during the assigned writing time?”; “How distressing was the event you wrote about?”; and “How guilty did you feel during the course of the writing?”. Additionally, two judges, blind to conditions, will read the narratives and judge to which condition the participants belonged.

Outcome Measures.

Alcohol Consumption.—Drinking will be assessed with multiple indices: The Timeline Follow-Back (TLFB; Sobell & Sobell, 2000; Tonigan et al., 1997), the AUDIT (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), the Quantity-Frequency-Peak Alcohol Use Index (Baer, 1993; Marlatt, Baer, & Larimer, 1995), and the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985; Kivlahan et al., 1990). The TLFB is a calendar-based measure assessing daily drinking (and abstinence) over a designated period of time and provides memory aids to support participant recall. The validity of the TLFB has been extensively and favorably evaluated in several different formats for periods of up to 1 year (Searles et al., 2002; Sobell & Sobell, 2004). We have recently adapted the TLFB to a 90-day web-based format with optional memory cues including all holidays, Spring Break, major sporting events, important academic dates, homecoming, among others, and up to 10 personally significant events. Note that the TLFB will also yield a wealth of information for potential secondary analyses regarding variability in drinking over time and across specific days.

The AUDIT consists of 10 items; three that assess for hazardous alcohol use, three that assess for dependence symptoms, and four that assess for harmful use. The Quantity-Frequency-Peak Alcohol Use Index is a five-item questionnaire that includes two items addressing the occasion where respondents drank the most during the previous three months, two items addressing typical weekend drinking in the previous three months, and one item addressing typical number of drinking days per week in the previous three months. Typical weekly drinking and typical drinks per occasion will be assessed with the DDQ. Participants fill in the average number of standard drinks they consumed and the time period of consumption for each day of the week over the previous three months. The TLFB is anticipated to serve as a primary source for assessing drinking outcomes, and we will include the AUDIT, DDQ, and QF as alternative outcomes, which have all been validated in previous studies in this population (Collins, Parks, & Marlatt, 1985).

Drinking Intentions.—Intentions for quantity and frequency will be assessed by modifying the DDQ and QF. Response options will be identical to the DDQ and QF, but participants will be asked to indicate their intended drinking behaviors for the upcoming week. This measure will be administered at each in-person session.

Alcohol-related Consequences.—Consequences from drinking will be assessed with the Rutgers Alcohol Problems Index (RAPI; White & Labouvie, 1989) and the Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006). The RAPI assesses how often participants experienced 23 alcohol-related consequences (e.g., “suddenly found yourself in a place that you could not remember getting to”) over the past three months. Two items related to drinking and driving were added. Item responses range from 0 (never) to 4 (more than 10 times). Internal reliability for the RAPI with the additional two items in a previous sample was .96 (Angosta, Steers, Steers, Riggs, & Neighbors, 2019). The YAACQ (Read et al., 2006) measures a variety of negative outcomes related to drinking. Item responses will be modified from the past year to the past three months to prevent overlap in follow-up assessments and to mirror the timeframe for alcohol consumption. The YAACQ has good internal consistency and test-retest reliability (Read, Merrill, Kahler, & Strong, 2007).

Psychological Well-being.—This will be assessed by anxiety, depression, mood, and satisfaction with life. Anxiety will be assessed by the Beck Anxiety Inventory (BAI; Beck, Brown, Epstein, & Steer, 1988), a 21-item measure of common symptoms of anxiety. Depression will be assessed by the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), a 20-item measure of depressive symptomatology in the general population. Mood will be assessed by the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988), a 22-item measure of the degree to which one experiences positive and negative affective states on a regular basis. Satisfaction with life will be assessed by the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), a 5-item measure of general life satisfaction.

Mediators

Event-related Guilt.—Guilt associated with the event that was written about will be measured in three ways. First, we will use a modified version of the self-report State Shame and Guilt Scale (SSGS; Marschall, Sanftner, & Tangney, 1994), a 15-item scale asking participants to rate how guilty or ashamed they currently feel. Second, we will use items from an Event-related Guilt and Shame Scale, which has been used in the past in this intervention paradigm to measure event-related guilt and shame (Rodriguez, Young, Neighbors, Campbell, & Lu, 2015). This measure was created by modifying the content and structure of the Test of Self-Conscious Affect (TOSCA-3 revised; Tangney, Dearing, Wagner, & Gramzow, 2000) to ask participants to think back to the event they wrote about and imagine thoughts and feelings as they experienced them during the event. Participants will report their agreement with 40 items from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Two event-related guilt subscales will be constructed, each consisting of 10 items. Consistent with the revised TOSCA, these include: (a) guilt-affect and cognition; and (b) guilt-reparative behavior. Third, we will assess guilt using content coding from the LIWC

software, wherein guilt will be calculated as a percentage of the total number of words using LIWC.

Change Talk/Thought.—The degree to which participants write about wanting to change their behavior will be assessed through the narratives by the percentage of change talk/thought utterances or statements, as defined in the Manual for the Motivational Interviewing Skill Code (MISC 2.1; Miller, Moyers, Ernst, & Amrhein, 2008). Change talk/thought will be calculated as a percentage of the total number of words using the LIWC software.

Moderators

Guilt-proneness.—Guilt-proneness will be measured by a subscale of the Test of Self-Conscious Affect-3 (TOSCA-3; Dearing, Stuewig, & Tangney, 2005). The TOSCA-3 consists of 16 scenarios (e.g., “You make plans to meet a friend for lunch. At 5 o’clock, you realize you stood him up.”), each with 4 different ways to react to the situation (e.g., “You would think: ‘I’m inconsiderate.’”). Participants then indicate how likely they would endorse each reaction on a 5-point scale (1 = “not at all likely” to 5 = “very likely”).

Perceived Descriptive Norms (Personalized normative feedback (PNF) participants)

Perceived descriptive norms.—These will be measured by a modified version of the Drinking Norms Rating Form (DNRF; Baer et al., 1991; Lewis & Neighbors, 2004). The gender-specific version (Lewis & Neighbors, 2004) assesses perceived typical number of drinks consumed per drinking occasion (e.g., “how many drinks on average do you think a typical male UH student consumes on a given occasion?”). In addition, this measure assesses perceived frequency of drinking occasions (e.g., “how often do you think a typical female UH student consumes alcohol?”). The DNRF assesses perceived typical weekly drinking in which participants fill in the average number of standard drinks they think the typical (male/female) UH student consumes for each day of the week over the previous month. The DNRF has been used in multiple studies of college drinking and has shown good concurrent and prospective validity (Neighbors, Dillard, Lewis, Bergstrom, & Neil, 2006).

Procedures

The study reported in this publication is supported by the National Institute on Alcohol Abuse and Alcoholism of the National Institutes of Health under Award Number R01AA023495–01. The Institutional Review Board of the University of Houston approved the study, and it is registered as a clinical trial (identifier [NCT02927132](#)). The study is currently in the enrolling by invitation phase.

Screening.

Potential participants are recruited via e-mail and asked to complete a 5-minute confidential web-based survey to determine their eligibility to participate in the longitudinal trial. The screening survey will ask participants about their gender and drinking behaviors (i.e., the AUDIT, alcohol-related consequences). Students who complete the screening survey and who report at least a score of 7 or 8 (female or male, respectively) on the AUDIT and report experiencing at least one negative consequence from their drinking will be notified at the

completion of the screening survey of their eligibility to participate. Participants who meet screening criteria will be immediately routed to the web-based baseline assessment.

Baseline and Scheduling.

Participants will complete a series of questionnaires on a laptop or desktop computer at a time and location of their convenience. Upon completion of the baseline survey, participants will be routed to a screen to schedule an in-person session using an online scheduling module.

Intervention Sessions.

Prior to coming into the lab, participants will have been randomized to one of the six in-lab conditions. Upon entering the lab, students will be greeted by a trained research assistant and upon providing consent, directed to a private computer to complete their first of three in-lab sessions. The research assistant will enter a custom PIN, allowing the participant to enter the survey. Participants in the expressive writing conditions will receive instructions to complete the expressive writing prompt on the computer after completing a few questionnaires. Participants will be instructed that they may be able to write about the same event or a different event across sessions, which is the standard procedure used in most expressive writing studies and reduces potential confusion among participants. Research assistants will keep time for the writing task, letting participants know when they have two minutes remaining and once the time is up, will guide participants to the next section. Following the narrative intervention, participants will be asked to complete a short post-intervention questionnaire (i.e., event-related guilt and drinking intentions). When finished, the participant will be asked to schedule their next writing session. The scheduling options will be graduated, first providing a list of possible times in the next week. If students cannot attend a session within the next week, they will be given a list of possible times for the following week, but no more than ten days will elapse between writing sessions. Participants will come in for a total of three in-lab sessions.

Follow-up Assessments.

Follow-up assessments will be completed remotely online at one, three, six, and twelve months post-baseline. All follow-up assessments will be completed using web-assessment. Measures will be identical to those administered at baseline.

Intervention conditions and narrative prompts.

Alcohol-No Guilt Condition.—“For the next three sessions, we would like for you to write about the following topic. Please tell us about an occasion when you drank alcohol heavily and had a bad time or experienced things you did not want to experience as a result of your drinking. We would like you to be as descriptive as possible in elaborating your very deepest thoughts and feelings. For example, what specific things made this event so negative for you? We would like you to really let go and explore your very deepest emotions and thoughts. You might consider the event or experience in terms of your relationships with others, including parents, romantic partners, friends, or relatives. You might also consider tying it to your past, your present, or your future, to who you have been, who you would like

to be, or who you are now. You may write about the same event or experience on all days of writing or on different topics each session. Depending on your experience, you may feel that you need to provide more detail. All of the information you tell us will remain confidential and will not be shared with anyone outside of the research study. Don't worry about spelling, sentence structure, or grammar. The only rule is that once you begin writing, continue to do so until your 20 minutes are up."

Alcohol Guilt Condition.—"For the next three sessions, we would like for you to write about the following topic. Please tell us about an occasion when you drank alcohol heavily and felt guilty as a result of your drinking. Think of an instance when you felt regretful or disappointed for your behavior, and resolved to be better in the future, apologize, or make up for it in some way. We would like you to be as descriptive as possible. For example, what specific things about this event made you feel guilty? We would like you to really let go and explore your very deepest emotions and thoughts. You might consider the event or experience in terms of your relationships with others, including parents, romantic partners, friends, or relatives. You might also consider tying it to your past, your present, or your future, to who you have been, who you would like to be, or who you are now. You may write about the same event or experience on all days of writing or on different topics each session. Depending on your experience you may feel that you need to provide more detail. All of the information you tell us will remain confidential and will not be shared with anyone outside of the research study. Don't worry about spelling, sentence structure, or grammar. The only rule is that once you begin writing, continue to do so until your 20 minutes are up."

Distress-No Guilt Condition.—"For the next three sessions, we would like for you to write about the following topic. Please tell us about an upsetting experience that has affected you and your life. We would like you to be as descriptive as possible in elaborating your very deepest thoughts and feelings. For example, what specific things made this event so distressing for you? Please focus on an event that is not alcohol-related. We would like you to really let go and explore your very deepest emotions and thoughts. You might consider the event or experience in terms of your relationships with others, including parents, romantic partners, friends, or relatives. You might also consider tying it to your past, your present, or your future; to who you have been, who you would like to be, or who you are now. You may write about the same event or experience on all days of writing or on different topics each session. Depending on your experience you may feel that you need to provide more detail. All of the information you tell us will remain confidential and will not be shared with anyone outside of the research study. Don't worry about spelling, sentence structure, or grammar. The only rule is that once you begin writing, continue to do so until your 20 minutes are up."

Distress-Guilt Condition.—"For the next three sessions, we would like for you to write about the following topic. Please tell us about an upsetting occasion when you felt guilty. Think of an instance when you felt regretful or disappointed for your behavior, and resolved to be better in the future, apologize, or make up for it in some way. We would like you to be as descriptive as possible. For example, what specific things about this event made you feel guilty? Please focus on an event that is not alcohol-related. We would like you to really let

go and explore your very deepest emotions and thoughts. You might consider the event or experience in terms of your relationships with others, including parents, romantic partners, friends, or relatives. You might also consider tying it to your past, your present, or your future, to who you have been, who you would like to be, or who you are now. You may write about the same event or experience on all days of writing or on different topics each session. Depending on your experience you may feel that you need to provide more detail. All of the information you tell us will remain confidential and will not be shared with anyone outside of the research study. Don't worry about spelling, sentence structure, or grammar. The only rule is that once you begin writing, continue to do so until your 20 minutes are up."

Neutral Control Condition.—"For the next three sessions, we would like for you to write about the setting that you are in. We would like you to be as descriptive as possible. For example, what specific things do you see? What objects are in the room? It is important that you describe things exactly as you see them. All of the information you tell us will remain confidential and will not be shared with anyone outside of the research study. Don't worry about spelling, sentence structure, or grammar. The only rule is that once you begin writing, continue to do so until your 20 minutes are up."

Personalized Normative Feedback (PNF) Condition.—Participants in the PNF condition will be given gender-specific personalized feedback regarding their alcohol use, consistent with previous NIAAA-funded trials using PNF as a brief intervention (blinded for review). Participants will be presented with the drinking estimates that they previously gave in addition to average gender-specific drinking estimates provided by 1052 students at the University of Houston (norms documentation study in (blinded for review). Feedback will be provided for drinking frequency (i.e., number of drinking days per week), and drinking quantity (i.e., the number of drinks consumed per week and number of drinks consumed per typical drinking occasion). Participants will also receive a printed a copy of the feedback for their records and to view again later. PNF participants will receive feedback immediately after the baseline assessment. A single administration of PNF was selected because this is how it has typically been administered (Dotson, Dunn, & Bowers, 2015; Lewis & Neighbors, 2006). However, we also want to control for any differences that might be attributed to attention. Thus, like all other groups, PNF participants will be scheduled to come in to the lab for two additional sessions, wherein they will be asked to respond to the neutral condition writing prompt.

Data Analysis

Aims will be evaluated using multi-level regression analyses, often referred to as Hierarchical Linear Modeling (HLM; Raudenbush & Bryk, 2002) or mixed-effects modeling. With respect to evaluating main effects of experimental conditions on drinking, each participant will provide baseline, post-intervention, 1-month, 3-month, 6-month, and 12-month follow-up data. Hypotheses will be tested using specific contrast vectors, using a general linear hypothesis framework (Fox, 2008). The study consists of a (2×2+1+1) design, represented as a factorial design with the addition of a control group that will write about the experimental room and a computer-based PNF comparison group.

Hypotheses will be tested with contrasts corresponding to the questions of interest. The first two hypotheses represent contrasts between the alcohol narrative conditions and the neutral control condition (H1a) and between the guilt narrative conditions and the neutral control condition (H1b). In examining these hypotheses, we will construct two dummy coded variables reflecting alcohol versus non-alcohol narratives conditions and between guilt and non-guilt narrative conditions with the reference group being the neutral control condition. Thus, the PNF group will not be included in the tests of these two hypotheses. Dependent variables will include alcohol outcomes for H1a and psychological well-being for H1b. For these analyses, each participant will provide up to five repeated measures (i.e., baseline, 1-month, 3-months, 6months, and 12-months), yielding up to 3000 Level 1 cases (repeated-measures) across 600 Level 2 cases. The following model will be the basis for evaluating intervention effects:

$$DV_{ti} = \pi_{0i} + \pi_{1i}(Time)_{ti} + \epsilon_{ti} \quad \epsilon_{ti} \sim N(0, I\sigma_{\epsilon}^2) \quad \text{Level 1:}$$

$$\begin{aligned} \pi_{0i} &= \beta_{00} + \beta_{01}(Alcohol)_i + \beta_{02}(Guilt)_i + r_{00i} \\ \pi_{1i} &= \beta_{10} + \beta_{11}(Alcohol)_i + \beta_{12}(Guilt)_i + r_{10i} \end{aligned} \quad \text{Level 2:}$$

where t indexes repeated-measures and i indexes participants. Alcohol and Guilt represent the two contrasts. DV_{ti} represents the outcome vector for each individual from at each assessment point. $Time_{ti}$ measures weeks since baseline. Distributions of outcomes, which are count variables, are likely to be non-normal (e.g., negative binomial) and we will adjust analyses to utilize appropriate distributions as we have done in previous work (e.g., Atkins, Baldwin, Zheng, Gallop, & Neighbors, 2013; Neighbors et al., 2010). The test of β_{11} where alcohol consumption and alcohol-related problems are specified as DVs will represent a test of H1a. The test of β_{12} where psychological well-being outcomes are specified as DVs will represent a test of H1b. The same approach will be used to test H1c where the neutral control will be replaced with the PNF comparison condition. H2a and H2b will follow a similar approach but will focus exclusively on the 2x2 factorial conditions where H2a will examine main effects of alcohol and guilt on drinking outcomes and H2b will test the interaction between alcohol and guilt, with the expectation that the alcohol+guilt condition will be more effective in reducing drinking outcomes than the other three active writing conditions. We will also evaluate this hypothesis more generally by examining the alcohol+guilt condition relative to the other five conditions.

Aim 3 will evaluate mediators of intervention effects. We will follow procedures described by MacKinnon and colleagues (e.g., MacKinnon et al., 2007) to assess mediation. Mediation will test indirect effects using the *ab* products method where *a* will represent effects of intervention contrasts by time interactions on mediators (expression of guilt and change thought), and *b* will represent the associations of mediators on subsequent drinking outcomes. Both *a* and *b* paths will control for baseline outcomes. Evaluation of hypotheses regarding the moderation effect specified in Aim 4 will test whether individual differences in guilt-proneness interact with intervention contrasts. These will be tested by expanding the

above model to add main effects and product terms of proposed moderators with intervention contrasts.

Power Analysis

Power analyses focus on estimating a sample size large enough to detect “true” effects, thereby avoiding Type II errors. Sample size estimates were obtained for intervention contrasts, specifically between the Alcohol conditions (Alcohol Guilt and Alcohol No-Guilt) relative to Neutral Control and between the Distress conditions (Distress Guilt and Distress No-Guilt) relative to Neutral Control. Necessary sample sizes were assessed via sample size and power equations for normally distributed outcomes as detailed in Raudenbush and Liu (2001). Effect-sizes and variance components were based on preliminary studies, and power was set at 0.80 for all estimates. Power was estimated using the Optimal Design software program. We anticipate intervention effects relative to the neutral control condition on drinking to be in the range of $\delta = .30-.40$ (Young et al., 2013). Based on the proposed sample size of 500 (~PNF not included in H1a and H1b), given five assessment points, we anticipate the ability to detect main effects of intervention contrasts with power = .80. We anticipate 20% attrition, including participant drop-out and noncompliance. Considering the maximum anticipated attrition rates of 20% we will have .80 power to detect effects sizes of $\delta = .28$ and greater.

Discussion

The current research builds on previous research targeting heavy drinking among college students. A large volume of research has provided an impressive database supporting one type of individually-focused alcohol intervention for this population (i.e., personalized feedback; Larimer & Cicone, 2007; Miller et al., 2012). The success of this paradigm may have inadvertently contributed to little consideration of alternative paradigms. However, development of a variety of efficacious intervention approaches remains a priority for alcohol researchers, clinicians, and policymakers. Expressive writing is one such potential alternative, which has received extensive support in other domains but has only recently been considered as a potential brief intervention for heavy drinking. Despite impressive and consistent effects in other domains, expressive writing has received little attention among alcohol intervention researchers. If effective, this intervention approach will offer an innovative alternative that would obviate the need for any pre-assessment or programming of personalized feedback as currently required in most existing individually-focused alcohol interventions for college students. In sum, the proposed expressive writing intervention approach has the potential to serve as an alternative to existing approaches, with the added benefit of being more easily disseminated to a broader audience.

Acknowledgments:

Research reported in this publication was supported by the National Institute on Alcohol Abuse and Alcoholism of the National Institutes of Health under Award Number R01AA023495. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Pelin Cunningham-Erdogdu conducted this research while at the University of Houston and is now at the University of Texas at Austin.

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