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Alcohol Use Following an Alcohol Challenge and a Brief Intervention among Alcohol-Dependent Individuals

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Background and Objectives: The study examined the effects of an alcohol challenge on naturalistic drinking among alcohol-dependent individuals and explored brief motivational interviewing (MI) as a potential intervention for these participants.

Method: Alcohol-dependent individuals ($n = 32$, eight females) completed the intake assessment, alcohol challenge, one MI session, and 1-month follow-up (87.5% retention) where they completed measures of drinking and motivation for change.

Results: As expected, multilevel mixed models revealed that drinking did not increase post-alcohol challenge. Participants reported a reduction in ambivalence, drinking days, and a trend towards fewer total drinks between the MI and 1-month follow-up.

Conclusions: Consistent with other studies, the alcohol challenge did not worsen alcohol use. Results support further investigation of brief MI for alcohol-dependent participants in alcohol challenges.

Scientific Significance: Alcohol administration to alcohol-dependent participants appears to not exacerbate naturalistic drinking. MI may be a feasible intervention for non-treatment seeking alcohol-dependent participants in alcohol challenge studies. (*Am J Addict* 2014;23:96–101)

consequences to alcohol-dependent individuals who participate in alcohol administration studies.^{2,4}

A few studies have tested whether direct alcohol administration poses a risk for alcohol-dependent individuals. Drobles and Anton⁶ investigated the drinking patterns of 25 alcohol-dependent participants in their study of the effects of naltrexone on response to alcohol cues and alcohol administration. Participants received a brief individualized feedback session based on Motivational Enhancement Therapy following the alcohol challenge and completed a telephone follow-up 6 weeks later. Participants reported a reduction in drinking frequency and quantity compared to drinking patterns prior to the alcohol challenge. The authors concluded that the alcohol challenge had not negatively affected the drinking patterns of these individuals. However, it was unclear whether the drinking reduction may have been a result of having received medication. To clarify this confound, Pratt and Davidson⁷ conducted an ancillary analysis of 27 non-treatment seeking alcohol-dependent participants in their study on the acute effects of repeated alcohol doses on mood, craving, and alcohol-seeking behavior. Participants received a 5–10 minute individualized feedback session following the last testing session and were followed-up through a telephone interview 6 weeks later. Participants reported an increase in number of days abstinent and a decrease in heavy drinking episodes and drinks per drinking occasion after their participation in the alcohol challenge. Pratt and Davidson⁷ also concluded that non-treatment seeking alcohol-dependent individuals may safely participate in alcohol administration studies.

The National Advisory Council on Alcohol Abuse and Alcoholism (2005) recommends that studies requiring the administration of alcohol to alcohol-dependent populations make an active effort to connect participants who are not in treatment with treatment services. This is particularly relevant for individuals with alcohol dependence given the low rates of participation in treatment and the low motivation to receive treatment among alcohol-dependent individuals. Specifically, epidemiological surveys have shown approximately 8-years lag between the onset of alcoholism and the first episode of treatment⁸ and found that less than 25% of those diagnosed

BACKGROUND AND OBJECTIVES

Findings from human laboratory studies involving the direct administration of alcohol have advanced our knowledge of alcoholism etiology^{1,2} and treatment development.³ Nonetheless, the field has been challenged to determine the balance between the risks and benefits posed by administering alcohol to alcohol-dependent participants. On one hand, conducting these studies with alcohol-dependent individuals is critical to the generalizability of findings to alcohol-dependent populations. On the other, there is a concern that administering alcohol to such individuals may exacerbate their alcohol use.^{4,5} However, studies to date have found no evidence of adverse

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with alcohol dependence receive treatment in their lifetime.⁸ Further, a study of individuals seeking psychiatric treatment who met criteria for alcoholism found that as many as 35% of patients were unsure or uninterested in receiving treatment for alcohol problems despite their alcohol dependence diagnosis and their access to services.⁹ Motivational interviewing (MI) may be well suited to aid investigators in providing a brief intervention that may have a direct positive impact on alcohol-dependent participants in alcohol administration studies. MI is a non-directive, patient-centered approach shown to reduce heavy drinking and promote behavior change¹⁰ that has been found to increase treatment compliance, reduce resistance, decrease dropouts, and improve treatment outcomes across the spectrum of alcohol dependence severity.^{11–14}

The objective of this study was to build upon prior findings and conduct an initial, open label, and uncontrolled pilot study of a single session of MI for non-treatment seeking alcohol-dependent participants of an alcohol administration challenge study.¹⁵ Alcohol use and motivation for change were measured at three time points: (1) at the intake assessment, (2) post-participation in the alcohol challenge and immediately prior to participation in the MI session, and (3) 1 month after the MI session (ie, 1-month follow-up). Consistent with previous studies,^{6,7} no significant changes in alcohol use from intake assessment to post-alcohol challenge were expected. Receiving a single session of MI was hypothesized to increase participants' motivation to change as indicated by reduced ambivalence, increased recognition of problems, and taking steps to change. It was also predicted that the MI session would reduce alcohol use at the 1-month follow-up, as measured by number of drinking days, drinks per drinking days, and total number of drinks over the 1-month follow-up period.

METHODS

Participants

The study was approved by the UCLA Institutional Review Board and all participants provided written consent. Participants were recruited through flyers, print, and online advertisements as part of a larger study of subjective responses to alcohol administration.¹⁵ In this study, participants received controlled doses of intravenous alcohol (target breath alcohol concentration = .06 g/dl) and a saline control. A total of 42 non-treatment seeking alcohol-dependent individuals completed the alcohol and saline administration session and were invited to the MI session. All participants were between the ages of 21 and 55 and met current DSM–IV criteria for alcohol dependence. Exclusion criteria were (a) a lifetime diagnosis of bipolar disorder or any psychotic disorder, (b) current use of illicit drugs other than marijuana (verified by a toxicology test), and (c) current treatment for alcohol problems or currently seeking treatment for alcoholism. Most participants were male (75% male) and the average age was 28.75 (SD = 9.7). The racial/ethnic background of the sample was: 59.4% White, 6.3% African American, 12.5% Latino, 9.4% Asian, and

12.5% Mixed Race. The average number of DSM–IV symptoms of alcohol abuse and dependence was 6.78 (range 3–11).

Procedure

The study design, measures, and procedures are illustrated in Figure 1. Interested individuals called the laboratory and completed a screening questionnaire via telephone to establish eligibility to participate in the parent study as described above.¹⁵ Eligible participants were invited to an in-person intake assessment where they completed the clinician version of the Structured Clinical Interview for DSM–IV¹⁶ to determine current dependence, a timeline follow back (TLFB) to assess alcohol use in the past 30 days, and the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) to measure motivation to change. Individuals who participated in the alcohol administration challenge¹⁵ were invited to a motivational interviewing session (described below) within approximately 30 days of completing the alcohol challenge. Participants who attended the MI session completed a TLFB to assess alcohol use between the alcohol challenge and the MI session as well as the SOCRATES to measure motivation to change after receiving the MI intervention. Participants who completed the MI session were invited for a 1-month follow-up visit where they completed a TLFB to assess alcohol use following the MI session as well as the SOCRATES to measure motivation to change. Of the 42 participants invited to the MI session, 32 completed the MI session (76% response rate) and 28 returned for the 1-month follow-up visit (87.5% retention rate).

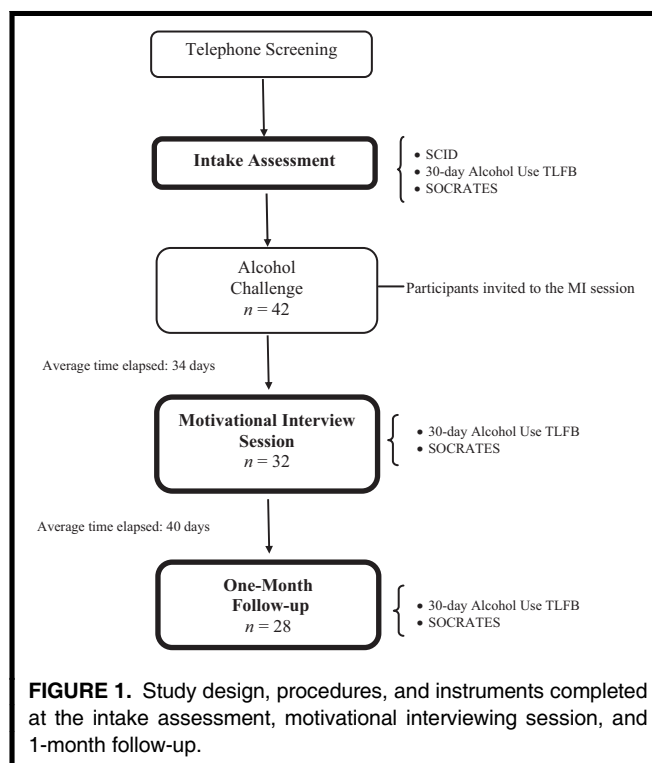


FIGURE 1. Study design, procedures, and instruments completed at the intake assessment, motivational interviewing session, and 1-month follow-up.

Participants were compensated \$40 for both the MI session and the follow-up visit.

Motivational Interviewing Session

The session lasted approximately 30–45 minutes as therapists provided feedback on participants' alcohol use and alcohol-related problems using data culled from study questionnaires. Counselors prompted a discussion of pros and cons of current drinking pattern, helped participants set goals for changes in alcohol use (if any), and elicited behavioral strategies for achieving stated drinking goals. Study therapists consisted of the senior author (L.A.R.), a licensed clinical psychologist, and clinical psychology graduate students under the senior author's supervision.

Measures

In addition to demographics and individual differences measures, the following measures of alcohol use, alcohol problems, and motivation for change were administered at the intake assessment (ie, initial screening visit), immediately prior to the MI session (ie, within 30 days of the alcohol challenge), and at 1-month follow-up as illustrated in Figure 1:

*Time Line Follow Back (TLFB)*¹⁷: This interview assessed the quantity and frequency of alcohol use in the 30 days prior to each visit. The outcome variables derived were: number of drinking days, total number of drinks, and drinks per drinking day.

*Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES)*¹⁸: The SOCRATES measured motivation to change and included the following

subscales: recognition of alcohol-related problems (Recognition subscale), uncertainty about changing alcohol use patterns (Ambivalence subscale), and taking action to change alcohol use (Taking Steps subscale).

Analytic Strategy

A multilevel model framework was used to analyze the effects of the MI session (ie, pre-post design) on past month alcohol use and motivation for change. A series of mixed models were conducted using PROC MIXED in SAS Statistical Software V9.1. Analyses compared alcohol use and motivation for change prior to participating in the MI session to 1-month post-participation nested within subjects. Past month alcohol outcomes were: number of drinking days, total number of drinks, and drinks per drinking day. Indicators of motivation to change were: recognition of problems, ambivalence to change, and taking steps to change. Measures of effect size were obtained for significant outcomes by calculating η^2 .¹⁹ According to Cohen's guidelines,²⁰ an effect size is considered small if it is $\geq .01$, moderate if it is $\geq .059$, and large if it is $\geq .138$.

RESULTS

Intake Assessment Comparisons

Table 1 provides demographic characteristics for participants who completed the alcohol challenge and were invited to the MI session ($n = 42$), those who participated in the MI session ($n = 32$), and those who completed the 1-month follow-up ($n = 28$). There were no significant demographic

TABLE 1. Intake assessment characteristics of each enrollment group: Individuals who were invited to participate in the MI session, participants who attended the MI session, and individuals who completed the 1-month follow-up

	Participants invited to MI session* ($n = 42$)	MI session* [†] participants ($n = 32$)	1-Month follow-up completers [†] ($n = 28$)
Gender (% female)	73.8	75.0	78.6
Race (% Caucasian)	59.5	59.4	57.1
Age	29.14 (9.5)	28.75 (9.7)	28.82 (9.4)
Education	14.83 (2.1)	14.91 (2.1)	14.89 (2.22)
Motivation indices			
Recognition	3.13 (1.0)	2.85 (.89)	3.07 (1.1)
Ambivalence	3.42 (.9)	3.12 (1.11)	3.32 (.95)
Steps	2.80(.9)	2.85 (.888)	2.80 (39)
Alcohol use in the past month			
Drinks per drinking day	7.03 (2.95)	6.78 (2.55)	7.08 (2.55)
Total number of drinks	136.14 (80.33)	135.18 (75.3)	138.00 (76.74)
Number of drinking days	19.6 (7.6)	20.13 (7.84)	19.75 (7.9)
Total alcohol dependence symptoms	6.52 (2.28)	6.78 (2.15)	6.75 (2.2)
Total ADS symptoms	42.43 (5.53)	42.34 (5.50)	42.57 (5.79)

*There were no significant differences at the intake assessment across all demographic and clinical variables between participants who were invited to the MI session and attended the MI session and those who were invited to the MI session but did not attend the session; [†]There were no significant differences at the intake assessment across all demographic and clinical variables between those who participated in the MI session and completed the 1-month follow-up and those who participated in the MI session but did not complete the 1-month follow-up.

differences among these three groups ($ps > .10$). Analyses included all individuals who completed the MI session (ie, intent-to-treat).

The average number of days lapsed between the alcohol challenge and the MI session was approximately 34. Change in participants' alcohol use and motivation outcomes between the intake assessment and immediately before the MI session (ie, after completing the alcohol administration) were examined first. There were no significant differences in total number of drinks, drinks per drinking day, recognition of problems, ambivalence towards change, and taking steps to change ($ps > .10$). Participants significantly reduced the number of drinking days between the intake assessment and the MI session ($\beta = -1.41$, $SE = .65$, $t = -2.16$, $p < .05$). These results suggest that there were no changes in alcohol use from the intake assessment to post-alcohol challenge ($p > .10$). Therefore, subsequent analyses of change in the number of drinking days (pre-post) were conducted, accounting for the number of drinking days at the initial screening visit as a covariate.

Alcohol Use Outcomes

Analyses of the effects of MI participation on alcohol use 1-month post-participation included: number of drinking days, total number of drinks, and drinks per drinking day. The average number of days between the MI session and the follow-up interview was approximately 40. MI participation significantly reduced the number of drinking days ($\beta = -3.33$, $SE = 1.55$, $t = -2.15$, $p < .05$). Participants reported drinking an average of 3.33 fewer days at 1-month follow-up (Fig. 2). The obtained effect size was large ($\eta^2 = .13$). Accounting for the total number of drinking days at the initial screening visit did not change the results pre- and post-participation ($\beta = -2.29$, $SE = .71$, $t = -3.21$, $p < .05$). There was a trend-level effect of MI participation on total

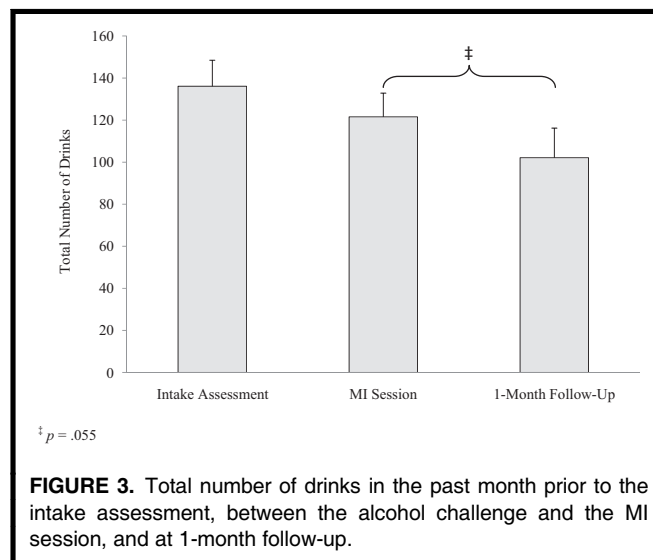
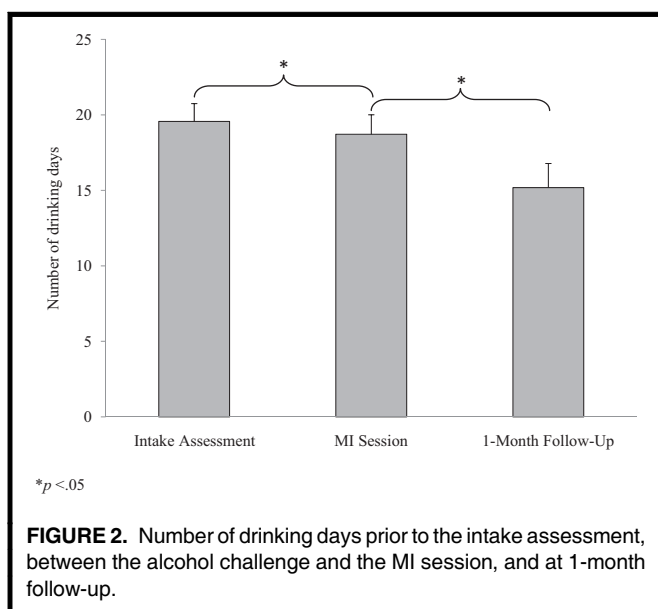
number of drinks in the hypothesized direction ($\beta = -20.67$, $SE = 10.31$, $t = -2.00$, $p = .055$), such that participants reported a reduction in their total number of drinks (Fig. 3). On average, participants reported drinking 20.67 fewer drinks at 1-month follow-up, as compared to pre-MI. The obtained effect size was large ($\eta^2 = .13$). No significant differences were found in participants' total number of drinks per drinking day ($ps > .10$).

Motivation to Change Outcomes

The effect of MI participation on motivation to change was assessed along the three SOCRATES subscales: recognition of alcohol-related problems, uncertainty about changing alcohol use patterns, and taking action to change alcohol use. Results revealed an effect of MI participation in reducing alcohol problem recognition ($\beta = -.28$, $SE = .12$, $t = -2.36$, $p < .05$) at follow-up. The obtained effect size was large ($\eta^2 = .17$). Similarly, MI participation was negatively related to ambivalence ($\beta = -.31$, $SE = .14$, $t = -2.19$, $p < .05$), such that ambivalence scores were lower at follow-up. The obtained effect size was large ($\eta^2 = .17$). No significant differences were found in participants' steps toward taking action at follow-up ($ps > .10$).

Motivation to Change and Alcohol Use

The associations among indicators of motivation to change and alcohol use were examined across the three assessment time points. Recognition of alcohol-related problems was associated with taking steps to change ($\beta = .34$, $SE = .10$, $t = 3.30$, $p < .05$), ambivalence toward change ($\beta = .66$, $SE = .11$, $t = 5.94$, $p < .05$) and greater total number of drinks ($\beta = .003$, $SE = .001$, $t = 2.12$, $p < .05$). Recognition of problems was not related to drinks per drinking day or number of drinking days ($p > .10$). Ambivalence towards



change was positively associated with steps to change ($\beta = .47$, $SE = .08$, $t = 6.00$, $p < .05$) but not drinks per drinking day, number of drinking days, and total number of drinks ($ps > .10$). Steps to change was related to drinks per drinking day ($\beta = -.14$, $SE = .05$, $t = -2.74$, $p < .05$), total number of drinks ($\beta = -.005$, $SE = .002$, $t = -2.76$, $p < .05$), and related to drinking days ($\beta = -.03$, $SE = .01$, $t = -2.04$, $p = .05$). In brief, individuals who drank a higher number of total drinks in the past 30 days reported higher recognition of problems.

DISCUSSION AND CONCLUSIONS

The purpose of this study was to (a) test the effects of the alcohol challenge on naturalistic alcohol use and (b) explore the initial feasibility and efficacy of a session of MI for non-treatment seeking alcohol-dependent individuals who participated in an alcohol administration study.

Consistent with prior findings,^{6,7,21} alcohol-dependent participants in the alcohol challenge of this study did not report a subsequent worsening of drinking, providing further evidence that administering alcohol directly to such participants does not have adverse consequences on their drinking behaviors. This is particularly important in light of the potential positive effects of completing an assessment on drinking behaviors without the delivery of an intervention²² also known as assessment reactivity. Although the present study did not include a control group, results revealed no differences in the total number of drinks per drinking day and the total number of drinks consumed between the intake assessment and after completing the alcohol challenge. Thus, completing the intake assessment and undergoing the alcohol challenge seemed to have little to no effect on naturalistic drinking patterns.

Following the alcohol challenge, participants were invited to partake in one session of brief MI. In turn, MI participants were recruited to complete a 1-month follow-up assessment. Provided that this was an exploratory pilot study,¹⁹ the study design did not include a control group that participated in the alcohol challenge but did not receive a session of MI. Consequently, the study design precludes from making causal inferences about the effects of MI participation on subsequent drinking behaviors and motivation to change. Nevertheless, study findings provide initial support, albeit uncontrolled, for MI as a feasible brief intervention that warrants further investigation to potentially be incorporated as part of research protocols for alcohol administration studies that require non-treatment seeking alcohol-dependent populations.

The majority of participants who completed the alcohol challenge (76%) attended the brief MI intervention, and most (87.5%) returned to the follow-up visit 1 month post-intervention. The positive response and high retention rates suggest that brief MI may be attractive to non-treatment seeking alcohol-dependent individuals who participate in alcohol challenge studies, and human laboratory studies

more broadly, and may represent a well-accepted intervention option for this population.

Compared to pre-participation in the brief MI, participants reported a statistically significant reduction in the number of drinking days which represents a large effect size. Similarly, participants exhibited a marginal decrease in the total number of drinks consumed in the past month, which also signifies a large effect size. However, the number of drinks per drinking episode reported by those who participated in the MI session did not change at 1-month follow-up. Consistent with other studies,^{23,24} a single session of MI appeared to be more effective in helping alcohol-dependent individuals reduce overall drinking by limiting the number of drinking occasions rather than reducing the number of drinks per drinking episode. Nevertheless, it is possible that these reductions in drinking behaviors between the MI session and the 1-month follow-up reflect random change in drinking or a change in naturalistic drinking patterns independent of the potential effects of the MI intervention. However, epidemiological studies examining the stability of drinking patterns among a variety of “classes” or groups of drinkers²⁵ and alcohol dependence subtypes²⁶ the number of drinking days remained stable across 6-, 12-, and 18-month follow-ups.²⁵ Specially for those who are categorized as “chronic severe” drinkers, the number of drinking days remained consistent over 3 years.^{26,27} Thus given the relative stability of number of drinking days documented in previous studies,²⁴⁻²⁶ results from this pilot study can be interpreted as providing initial, uncontrolled, signal to further research the potential efficacy of a single session of MI for non-treatment seeking alcohol-dependent individuals who participate in alcohol challenge studies.

Similarly, results revealed that participants’ ambivalence to change and recognition of alcohol-related problems decreased between the brief MI session and the 1-month follow-up. It is possible that the time-limited nature of a single MI session was more effective in reducing the individual’s ambivalence toward change and that by reducing their alcohol use (ie, drinking days and total number of drinks) participants also reported less recognition of problems. That is, the parallel reduction of participants’ drinking rates may have reduced the salience of alcohol problems, although causation cannot be inferred.

Findings from this study should be interpreted in light of its strengths and limitations. This exploratory pilot study did not include a control group and associated random-assignment, limiting the causal interpretation of the intervention effects observed. Similarly, the sample size was relatively small, albeit consistent with the sample size of previous studies of alcohol use among participants in alcohol challenge studies.^{6,7} While a list of treatment referrals was provided to all individuals who completed the MI, linkage to services was not a stated goal of the session and treatment seeking was not assessed at follow-up. Future studies should include a control group who completes the alcohol challenge but does not receive MI in order to provide a controlled examination of whether the MI approach plays a causal role in reducing alcohol intake.

SCIENTIFIC SIGNIFICANCE AND FUTURE DIRECTIONS

On balance, study findings suggest that alcohol administration in the human laboratory did not exacerbate drinking in the natural environment which supports the safety of alcohol administration under controlled conditions. Further, this uncontrolled pilot study provides preliminary signal for the feasibility, acceptability, and initial uncontrolled efficacy of a single session of MI for non-treatment seeking alcohol-dependent individuals who participate in alcohol administration studies. Consequently, these preliminary results support the further investigation of a brief MI session for this population through controlled trials with larger sample sizes. If supported by controlled trials, this may help address the unmet need for treatment in this population and increase the benefit-to-risk ratio of participating in alcohol administration studies that require alcohol-dependent populations.

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