HHS Public Access

Author manuscript

Psychol Addict Behav. Author manuscript; available in PMC 2015 June 01.

Published in final edited form as:

Psychol Addict Behav. 2014 June ; 28(2): 524–531. doi:10.1037/a0035910.

Predictors of Motivation to Change in Mandated College Students Following a Referral Incident

David Qi, B.S.[a], **Matthew R. Pearson, Ph.D.**[b], and **John T. P. Hustad, Ph.D.**[c]

[a]Department of Medicine, The Pennsylvania State University College of Medicine

[b]Center for Alcoholism, Substance Abuse, and Addictions University of New Mexico

[c]Department of Medicine and Public Health Sciences, The Pennsylvania State University College of Medicin

Abstract

The purpose of present study was to understand factors that are related to a desire or motivation to change (MTC) alcohol use in a sample of college students mandated to receive an alcohol intervention. We examined characteristics of and reactions to the referral event, typical alcohol use involvement, and alcohol beliefs about the perceived importance of drinking in college (subsequently referred to as the "role of drinking") assessed by the College Life Alcohol Salience Scale (CLASS; Osberg et al., 2010) as predictors of MTC following referral to an alcohol intervention. College students (N = 932) who presented for a mandatory alcohol intervention following a referral event (e.g., citation for underage drinking, medical attention for an alcohol-related incident, or driving under the influence) completed an assessment prior to receiving an alcohol intervention. Higher perceived aversiveness of the referral event and higher personal responsibility one felt for the occurrence of the event were positively related to higher MTC. Although alcohol beliefs about the role of drinking in college were not significantly related to either event aversiveness or responsibility, it was negatively related to MTC even after controlling for alcohol use involvement variables. Alcohol beliefs about the role of drinking in college represent an important construct that is related to increased alcohol use and alcohol-related problems and decreased MTC in a sample of college students. Interventions aimed at reducing alcohol beliefs about the role of drinking in college may be an effective strategy to reduce alcohol use and alcohol-related problems by college students.

Keywords

motivation to change; readiness to change; alcohol beliefs; mandated college students; alcohol use

Excessive alcohol consumption is a major risk factor for a variety of health problems and $223.5 billion in economic costs per year in the United States (e.g., Centers for Disease Control and Prevention [CDC], 2012). A greater prevalence of heavy alcohol use in college students has been shown in comparison to their non-college peers (Slutske, 2005). In

Correspondence concerning this article should be addressed to John T.P. Hustad, Mail Code A210, 600 Centerview Drive, Hershey, PA 17033. jhustad@hmc.psu.edu.

addition, alcohol use by college students is a major contributor of morbidity and mortality in this population (Hingson, Zha, & Weitzman, 2009). Importantly, approximately 19% of all college students meet diagnostic criteria for an alcohol use disorder in college (Dawson, Grant, Stinson, & Chou, 2004).

Mandated college students are a high-risk population for adverse alcohol-related consequences (Caldwell, 2002). Mandated students are defined as students who are required to participate in an intervention due to violation of school or local alcohol policies (e.g., drinking in an alcohol free dormitory, underage drinking) or following the medical treatment for alcohol related incidents (Barnett & Read, 2005). Campus arrests for alcohol and drug use have been increasing over the past few decades (Hoover, 2003), but it is unknown whether this is due to increased enforcement. A study of 196 institutions of higher education in 2006 showed that 73% enforce completion of an alcohol intervention upon an infraction (Anderson & Gadaleto, 2006).

A growing body of research suggests that, on average, college students decrease their alcohol use after a referral event (e.g., medical attention for an alcohol-related incident, underage drinking), but before receiving an alcohol intervention (Carey, Henson, Carey, & Maisto, 2009; Hustad et al., 2011; Morgan, White, & Mun, 2008). However, little is known about predictors of reduced alcohol use following a referral incident. One construct that has received significant attention as a potential predictor of alcohol use is motivation to change (MTC).

MTC, also referred to as readiness to change, is generally defined as a desire to change a specific behavior, such as alcohol consumption. Research suggests a significant event, such as alcohol related trauma, can increase MTC (Apodaca & Schermer, 2003) and serve as a learning opportunity where individuals may modify their behavior based on their past experiences. For example, Reis et al. (2004) surveyed first-year college students admitted to the hospital for alcohol overdose and 83% reported that they intended to decrease how much they drank, and approximately 67% of adolescents who receive an alcohol intervention at the emergency department reduce their alcohol use (Becker et al., 2012). Studies have shown that college students with a high MTC have improved success rates with alcohol interventions (Fromme & Corbin, 2004) and MTC prior to receiving an alcohol intervention predicts reduced alcohol use 1 month post-intervention (Carey et al., 2009). Increased MTC is related to female gender, increased alcohol use involvement, a history of alcohol-related problems, and lower life satisfaction (Carey & DeMartini, 2010; McGee, Williams, & Kypri, 2010; Shealy, Murphy, Borsari, & Correia, 2007). However, whereas some studies indicate that MTC increases after a brief intervention, MTC does not appear to mediate the effect of the intervention on alcohol use (Borsari, Murphy, & Carey, 2009). Collectively, these results indicate that MTC is an important factor in determining treatment outcomes (Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003).

Barnett, Goldstein, Murphy, Colby, and Monti (2006) evaluated the relationship between the subjective response to a referral event with MTC in a sample of mandated college students (82.4% were evaluated for alcohol intoxication or an alcohol-related injury). Specifically, they found that the perceived aversiveness of the referral event was positively related to

MTC. Those who reported higher alcohol use in the past 30 days perceived the event as less aversive, and individuals who made more internal attributions (i.e., took personal responsibility for the occurrence of the event) perceived the event as more aversive. Number of drinks consumed at the time of the incident was positively related to higher internal attributions. Neither alcohol use in the past 30 days nor alcohol-related problems in the past year were associated with MTC directly. Although this study highlighted the importance of the subjective reaction to the referral event on MTC, future research is needed to see if these findings replicate in an independent sample, and extend these findings by examining other variables that may influence MTC through subjective reactions to referral events.

One variable that might influence the perceived aversiveness of a negative alcohol-related incident and MTC is alcohol beliefs about the role of drinking in college life. Such beliefs regarding the perceived importance of drinking to the college experience have been assessed previously using the College Life Alcohol Salience Scale (CLASS; Osberg et al., 2010). This construct accounts for the subjective role of drinking in college (e.g., “drinking is an easy way to make friends” or “missing class due to a hangover is part of being a true college student”) and differs from estimates of others’ drinking (descriptive norms), perceived approval of alcohol use by others (injunctive norms), alcohol expectancies, and drinking motives (Osberg et al., 2010; Osberg, Insana, Eggert, & Billingsley, 2011). Beliefs about the role of drinking has been shown to predict alcohol-related outcomes cross-sectionally (Osberg et al., 2010) and prospectively (Hustad, Pearson, Neighbors, & Borsari, in press; Osberg, Billingsley, Eggert, & Insana, 2012). Further, it has been shown to mediate the effect of watching pro-college drinking movies on alcohol outcomes prospectively (Osberg et al., 2012), and the predictive effects of personality on alcohol-related outcomes after controlling for descriptive and injunctive norms (Hustad et al., in press). Thus, it appears that students who have internalized college drinking also consume more alcohol and experience more alcohol-related problems. It is plausible that individuals with such positive alcohol beliefs about the role of drinking in college may also view their alcohol use as less problematic as they perceive heavy drinking as culturally acceptable (e.g., Lewis, Neighbors, Oster-Aaland, Kirkeby, & Larimer, 2007).

The purpose of the present study was to replicate and extend Barnett et al. (2006) by investigating constructs that are related to MTC following a referral event. Specifically, we examined perceptions of the aversiveness of the referral event (event aversiveness), degree of internal attributions made regarding the event (event attribution), number of drinks consumed prior to the event (event drinking), number of drinks consumed during a typical drinking week (typical drinking), number of alcohol-related problems experienced, and alcohol beliefs regarding the role of drinking in college as predictors of MTC following a referral event. Consistent with Barnett et al. (2006) we expected that event aversiveness would predict higher MTC, event attribution would predict higher event aversiveness, typical drinking would predict lower event aversiveness, and higher event drinking would predict higher event responsibility. Finally, to evaluate our primary aim, we hypothesized that positive alcohol beliefs would predict lower event averseness and, in turn, be related to lower-levels of MTC (i.e., the referral event might be perceived as “part of the college experience” or perceived as an acceptable consequence from drinking).

Method

Participants and Procedure

Participants were 932 mandated college students who were enrolled a large, state university in the Mid-Atlantic and completed a baseline assessment for an alcohol intervention study between November 2010 and August 2012. Participants were 38.1% female with an average age of 19.27 (*SD* = 1.28). Self-reported ethnicity was 84.6% White, 7.7% Hispanic, 6.2% Asian, 5.0% Black or African American, and 3.4% was classified as other (participants could endorse multiple ethnic groups; race/ethnicity at the host site is 69.8% White, 5.0% Hispanic, 5.0% Asian, 4.2% Black or African American, and 16.0% was classified as other). For this study, undergraduate students were recruited to participate when they presented for a mandatory alcohol intervention following a referral event. Referral events included prohibited underage possession or use (53.3%), medical attention due to an alcohol-related incident (23.2%), excessive consumption of alcohol (12.0%), driving under the influence (6.3%), or other (4.8%). Mandated students were required to pay a $200 program fee, complete a computerized baseline assessment, receive a one hour brief motivational intervention styled after Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999) and complete a 1 month follow-up.

Undergraduate students were eligible to participate if they were 18 years or older (20 students were under 18) and if their score from a commonly used alcohol misuse screening measure, the Alcohol Use Disorders Identification Test (AUDIT; Bradley, McDonell, Kivlahan, Diehr, & Fihn, 1998), score was <16 (AUDIT scores ≥16 indicate severe alcohol-related problems or alcohol dependence; 307 students had AUDIT scores exceeding this cut-off), and if they did not endorse suicidal ideation (36 students endorsed suicidal ideation). A total of 2,405 potential participants were screened for eligibility. Eligible students (*N* = 2,038) received a brief explanation of the study by a trained member of the research program. Participants were notified that they would be entered into a drawing to receive one of twenty $100 gift cards for the completion of a 3 month follow-up assessment. Of the eligible students, 45.7% (*N* = 932) consented to participate in this study and completed a baseline assessment. AUDIT scores for participants (*M* = 8.15, *SD* = 3.46) were not significantly different from students who did not consent (*M* = 7.85, *SD* = 3.47). However, participants were significantly younger (*M* = 19.27, *SD* = 1.28) than non-participants (*M* = 19.39, *SD* = 1.52; $p \leq 0.05$). In addition, males were less likely to participate in the study than females ($p = 0.009$). Students who did not consent to participate were required by campus administrators to complete the baseline assessment and receive a one-on-one alcohol intervention and complete the 1 month follow-up. All procedures for this study were approved by the university's Institutional Review Board.

Measures

Alcohol beliefs—Alcohol beliefs regarding the importance of drinking to college life were assessed by the 15-item College Life Alcohol Salience Scale (CLASS; Osberg et al., 2010) using a 5-point Likert-type scale (1 = "strongly disagree", 5 = "strongly agree"). Example items include, "To become drunk is a college rite of passage" and "The reward at the end of a hard week of studying should be a weekend of heavy drinking." Items were

summed so that higher scores indicate more permissive/positive beliefs toward college student drinking ($\alpha = 0.85$).

Alcohol use involvement—The Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985) assessed the number of drinks consumed on each day of a typical drinking week during the past 30 days. Responses were summed in order to obtain the average number of drinks consumed per week (i.e., typical drinking). The Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler, Strong, & Read, 2005) is a 24-item inventory that was used to assess the total number of negative alcohol-related consequences experienced in the past 30 days using a yes/no response scale. Items were summed to reflect the number of distinct negative consequences from drinking experienced ($\alpha = 0.79$).

Event-specific variables—We used the Event Description form (Borsari et al., 2007) to assess the number of drinks consumed prior to the referral event. Specifically, participants were asked the following question: “How many standard drinks (12 oz beer, 5 oz wine, 1.5 oz 80 proof alcohol) total did you have prior to the event?” Event attribution and aversiveness were assessed by a measure developed by Longabaugh et al. (1995). Event attribution was assessed with three items (i.e., “To what extent was the event your own fault?”, “To what extent do you believe your own risk taking behavior was responsible for the event?”, “To what extent do you believe your alcohol consumption was responsible for your event?”; $\alpha = 0.70$) and event aversiveness was assessed with three items (i.e., “In terms of this event, how much physical pain or harm has it caused you?”, “How unpleasant has this event been for you?”, “When thinking about this event, how badly do you feel about it?”; $\alpha = 0.88$). All items were on a 7-point response scale (1 = “not at all,” 3 = “somewhat,” 5 = “mostly,” 7 = “totally”).

Motivation to Change (MTC)—A Readiness to Change Ruler (LaBrie, Quinlan, Schiffman, & Earleywine, 2005; Miller, 1999) was used to assess MTC. Participants were asked “On a scale from 1 to 10, how important is it for you to change your alcohol use?” (1 = not important, 10 = very important). This one item measure is a better predictor of behavioral intentions than other measures of MTC (Cunningham, Sobell, Gavin, Sobell, & Breslin, 1997; LaBrie et al., 2005) and this measure has strong predictive validity in predicting alcohol use 6 months later in a sample of young adults who received treatment for an alcohol use disorder (Maisto et al., 2011).

Data Analysis Plan—Path analysis using Mplus 6.12 (Muthén & Muthén, 1998–2012) was conducted to examine predictors of MTC. Gender was included as covariate predicting all other variables to account for known gender differences in alcohol use and related harms. We examined the predictive effects of each predictor variable on outcomes using the bias-corrected bootstrap based on 10,000 bootstrapped samples (Efron & Tibshirani, 1993). Bootstrapping creates empirically-derived sampling distributions from which statistical tests are based, provides a powerful test of mediation (i.e., indirect effects, Fritz & MacKinnon, 2007), and is robust to small departures from normality (Erceg-Hurn & Mirosevich, 2008), which is typical with alcohol use variables (Neal & Simons, 2007). Across all models,

parameters were estimated using maximum likelihood estimation, and missing data were handled using full information maximum likelihood, which is more efficient and has less bias than alternative procedures (Enders, 2001; Enders & Bandalos, 2001). There were 57 potential indirect effects on MTC and 219 indirect effects in the total model (including 120 indirect effects of gender and 57 indirect effects of alcohol beliefs alone). Thus, we focus on only a few predicted specific indirect effects on MTC via one or two mediating variables (e.g., alcohol beliefs about the role of drinking in college→event attribution→event aversiveness→MTC) and total indirect effects. The remaining indirect effects are available from the authors.

Results

Preliminary analyses

Several steps were conducted to properly manage these data. First, the distributions of the outcome variables and the pattern of missing data were examined. Second, outliers greater than 3 standard deviations above the mean for each outcome variable were incrementally recoded to one unit above the next lowest value. Finally, descriptive statistics were obtained and examined.

Descriptive Statistics

On average, participants reported drinking approximately 10.29 (*SD* = 7.27) standard drinks in a typical drinking week during the past 30 days and 6.21 drinks (*SD* = 5.07) prior to the referral incident. Participants reported experiencing an average of 2.87 (*SD* = 3.07) alcohol-related problems in the past 30 days. The descriptive statistics and correlations for the variables included in the path model are reported in Table 1.

CLASS scores were positively correlated with typical drinking and alcohol-related problems, and negatively correlated with MTC. Alcohol problems, event drinking, event attribution, and event aversiveness were all positively correlated with MTC at the bivariate level. Typical drinking, alcohol problems, event drinking, event attribution, and event aversiveness were all significantly positively correlated with each other. All of the correlations were in the direction that we predicted, supporting our hypotheses at the bivariate level.

Path Analysis

Consistent with the path model presented in Barnett et al. (2006), typical drinking, alcohol-related problems, event drinking, event attribution, and event aversiveness were modeled as predictors of MTC. In addition, CLASS scores were added as predictors of all of the variables in the path model. To control for gender differences, gender (coded 0 = men, 1 = women) was entered as a predictor of all other variables.

All significant direct effects on event aversiveness, event responsibility, and MTC are shown in Figure 1. There were six significant direct effects on MTC. As expected and consistent with Barnett et al. (2006), typical drinking had a negative predictive effect on event aversiveness, event attribution had a positive predictive effect on event aversiveness,

and event aversiveness had a positive predictive effect on MTC. In addition, alcohol problems, event drinking and event attribution had positive predictive effects on MTC, whereas typical drinking and CLASS had negative predictive effects on MTC. CLASS was predictive of higher typical drinking and more alcohol problems, but did not significantly predict any of the event-specific variables (i.e., event drinking, event attribution, event aversiveness).

Event attribution had a significant indirect effect on MTC via event aversiveness (b = .025, p < .001), which only partially mediated the effect on MTC given that the direct effect remained significant (b = .088, p < .001). Typical drinking had a number of competing indirect effects on MTC with a negative indirect effect via event aversiveness (b = −.010, p = .001) and a positive indirect effect via alcohol problems (b = .017, p < .001). Overall, the total indirect effect of typical drinking on MTC was positive (b = .025, p < .001), and its direct effect was negative (b =−.029, p = .018), leading to its total effect to be non-significant (b = −.004, p = .741). The significant total indirect effect of alcohol problems on MTC (b = .076, p < .001) was largely due to significant specific indirect effects on MTC via event attribution (b = .019, p < .001) and event aversiveness (b = .014, p = .001). Like typical drinking, the CLASS had competing indirect effects on MTC such that it had a positive indirect effect via alcohol problems (b = .005, p = .007) and a negative indirect effect via typical drinking (b = −.009, p = .022), leading its total indirect effect to be nearly zero (b = .001, p = .786).

Covariate Effects

Although not a primary focus of the present study, significant gender differences also emerged. Women reported lower CLASS scores than men. Controlling for other variables in the model, women reported less typical drinking and event drinking than men, reported higher alcohol-related problems, more event attribution, more event aversiveness, and higher MTC.

Discussion

The purpose of the present study was twofold: 1) replicate the findings from Barnett et al. (2006) as to the predictive relationships between alcohol use involvement, characteristics of a referral event, and MTC in a sample of college students mandated to alcohol intervention, and 2) extend those findings by examining how beliefs about the importance of drinking in the college experience might influence variables that are related to MTC. Not only did we replicate the finding that those who viewed the referral event as more negative (i.e., event aversiveness) also reported a higher MTC, we found that four other variables assessed by Barnett et al. (2006) had significant direct effects on MTC. Specifically, experiencing a higher number of alcohol-related problems, a lower amount of typical drinking, a higher amount of drinking prior to the referral event, and feeling higher levels of personal responsibility for the occurrence of the referral event was predictive of higher MTC. These direct effects were not significant in Barnett et al. (2006), perhaps due to differences in statistical power as the present study had more than four times the sample size (N = 932 vs. N = 227).

This study extended the results from previous studies that assessed predictors of MTC by evaluating the relationship between a measure of alcohol beliefs about the role of drinking in college with MTC. Although stronger beliefs about the role of drinking in the college experience were not associated with any of the variables related specifically to the referral event, these beliefs were associated with higher typical drinking and alcohol-related problems and lower MTC. In light of these findings, alcohol beliefs about the role of drinking in college seems to have the strongest effect on more general alcohol use involvement (e.g., drinks consumed on a typical week and alcohol-related problems) and have less of an impact upon an isolated drinking event and subjective evaluations about an event experience. Importantly, the finding that positive alcohol beliefs about the role of drinking in college was associated with lower MTC among mandated college student suggests that such beliefs may help explain why some college students continue to drink heavily despite experiencing alcohol-related problems. Specifically, beliefs about the role of drinking in college may make students less likely to perceive their alcohol behavior as abnormal, and thus less likely to consider altering their alcohol use. The present study's findings that these beliefs are associated with lower MTC provides additional evidence that such beliefs are a viable target for interventions.

Our findings also demonstrate significant positive relationships of incident attribution and incident aversiveness to MTC. Increased sense of responsibility (as measured by event attribution) and a greater negative reaction to a referral incident appear to be an important influence on MTC. While the relationship between incident aversiveness and MTC had been documented by Barnett et al. (2006), the present study found a positive relationship between incident attribution and MTC. This discrepancy may be a result of the differences in sample characteristics, for instance 82.4% of the Barnett et al. sample were referred after presenting to the emergency department, compared to 23% of the current sample. Barnett et al. also employed a different measure of alcohol use; a composite score consisting of number of drinking days, number of heavy drinking days, and average drinks per week. Barnett et al. also used the Contemplation Ladder (Biener & Abrams, 1991) to measure MTC, whereas this study used a Readiness to Change Ruler. The variability in these measures used could account for the observation of a positive relationship of incident attribution to MTC in this study as opposed to the findings of Barnett et al.

In the path model, four variables were statistical predictors of incident aversiveness. Alcohol consumption in a typical week was found to be negatively related to incident aversiveness. Additionally, incident attribution was found to be positively related to incident aversiveness. These findings that are consistent with Barnett et al. (2006) indicate that a student with low general alcohol use and greater feelings of responsibility for the incident is expected to experience a stronger reaction to the incident. Our findings also demonstrate a positive relationship between alcohol-related problems and incident aversiveness. Alcohol consumption prior to the referral event was also found to be positively associated with incident aversiveness. One interpretation of these findings is that students with a history of alcohol-related issues are sensitized to previous alcohol-related incidents. The aversiveness of the incident is magnified even further with increased alcohol consumption prior to the event, perhaps due to higher levels of intoxication. Interestingly, the positive relationship between alcohol-related problems and alcohol consumption prior to the event did not reach

significance in Barnett et al., potentially due to our larger sample size. Another possibility may be attributed to the use of different measures of alcohol-related problems in both studies.

Findings from this study regarding event attribution (i.e., perceived responsibility for the event) are slightly discrepant from the findings presented in Barnett et al. (2006). Specifically, the perception of event attribution was significantly related to MTC in the current study only. In addition, Barnett et al. reported a positive relationship between drinking prior to the event, while such a relationship was not significant in the current study. However, in both studies, alcohol-related problems were related to incident attribution. This indicates that students who have a recent history of alcohol-related problems feel more responsible for the incident, perhaps due to a higher recognition of negative problems related to heavy alcohol use.

Clinical Implications

Given the negative relationship between alcohol beliefs about the role of drinking in college and MTC, this study provides additional support to develop interventions that target alcohol beliefs about the role of drinking in college. According to the motivational model of alcohol use (Cox & Klinger, 1988), alcohol-related perceptions are proximal antecedents that motivate individuals to abstain or drink alcohol. Alcohol beliefs about the rites and rituals concerning alcohol use have been “internalized” by students (Osberg, Billingsley, Eggert, & Insana, 2012, p. 925) and influence an individual’s desire to reduce their alcohol use. It is possible that alcohol interventions designed with the goal of decreasing the perceived importance of this internalized drinking culture may be an efficacious strategy to reduce harmful drinking. As previously described (Hustad et al., in press; Osberg et al., 2012), it is possible to develop and implement interventions that target these alcohol beliefs in primary and indicated interventions, such as brief motivational interviewing. However, there currently are no interventions that target these beliefs and it is unknown whether reducing positive beliefs about drinking in college will, in turn, be associated with reductions in heavy alcohol use by college students.

Intervention strategies can be tailored according to perceptions about the referral event and alcohol use history (Barnett et al., 2008). For example, students who had low feelings of responsibility and aversiveness may benefit from a brief motivational interview (Miller & Rollnick, 2012) that focuses on identifying and resolving the student’s ambivalence about heavy drinking. On the other hand, students who describe the event as aversive and take responsibility for their behavior may be more receptive to discussing strategies to reduce future harms associated with drinking in the context of a motivational interview. In addition to alcohol prevention and intervention efforts, it is plausible that universities and communities that routinely enforce strict alcohol policies will be more successful at both identifying at-risk students and increasing the aversiveness related to heavy drinking (e.g., fines), which, in turn, may reduce heavy drinking (cf. Naimi et al., 2014).

Limitations and Recommendations for Future Research

The results of this study should be interpreted while acknowledging the following limitations. First, this study is cross-sectional in nature and we cannot infer cause and effect. Longitudinal studies examining the predictive effects of alcohol beliefs on alcohol outcomes (future alcohol use and alcohol related problems) would allow the determination of temporal precedence, one requirement for determining causality. Second, this study was conducted at a single university with mandated college students so one must be careful when generalizing these results to distinct populations (e.g., college students as a whole, non-college students). Third, despite the fact that previous research has shown that self-reported alcohol use is generally valid (Borsari & Muellerleile, 2009), it is important to point out the limitations of using only retrospective self-reports of alcohol use and alcohol-related problems. Using more objective measures of alcohol-related outcomes, including biological markers (Freeman & Vrana, 2010) and transdermal alcohol monitoring (Carey & Hustad, 2004), would be a better way to ensure that our findings do not depend exclusively on self-report.

Summary

MTC is an important intervention target (Miller & Rollnick, 2002). Results from this study indicate that alcohol beliefs about the role of alcohol use in college influence personal alcohol use and MTC. It is plausible that reducing alcohol beliefs about the role of drinking in college will confer a significant reduction in average alcohol use and alcohol-related problems. Understanding how to reduce alcohol beliefs about the role of drinking in college is a vital step towards reducing the negative consequences associated with alcohol misuse.

Acknowledgments

This research was supported by the National Center for Advancing Translational Sciences, National Institutes of Health (NIH), through Grants UL1 TR000127 and KL2 TR000126. Dr. Pearson is supported by a National Institute on Alcohol Abuse and Alcoholism (NIAAA) training grant T32-AA018108. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

The authors would like to thank everyone who contributed significantly to the work, including the participants, Liz Barton, Alywn Brittain, Rochelle Holmes, Linda LaSalle, Michelle Loxley, David Mallen, Jessica Nabozny, Steve Shephard, Katie Tenny, and Suzanne Zeman for their assistance with this project.

References

Amrhein PC, Miller WR, Yahne CE, Palmer M, Fulcher L. Client commitment language during motivational interviewing predicts drug use outcomes. Journal of Consulting and Clinical Psychology. 2003; 71(5):862–878. [Research Support, U.S. Gov't, P.H.S.]. [PubMed: 14516235]

Anderson, DS.; Gadaleto, AF. Results of the 2006 College Alcohol Survey: Comparison with the 2004 results, 1994 results and baseline year. Fairfax, VA: Center for the Advancement of Public Health, George Mason University; 2006.

Apodaca TR, Schermer CR. Readiness to change alcohol use after trauma. The Journal of Trauma and Acute Care Surgery. 2003; 54(5):990–994.

Barnett NP, Borsari B, Hustad JTP, Tevyaw TOL, Colby SM, Kahler CW, Monti PM. Profiles of college students mandated to alcohol interventions. Journal of Studies on Alcohol and Drugs. 2008; 69:684–694. [PubMed: 18781243]

Barnett NP, Goldstein AL, Murphy JG, Colby SM, Monti PM. "I'll never drink like that again": Characteristics of alcohol-related incidents and predictors of motivation to change in college students. Journal of Studies on Alcohol. 2006; 67(5):754–763. [PubMed: 16847545]

Barnett NP, Read JP. Mandatory alcohol intervention for alcohol-abusing college students: A systematic review. Journal of Substance Abuse Treatment. 2005; 29(2):147–158. [PubMed: 16135343]

Becker SJ, Spirito A, Hernandez L, Barnett NP, Eaton CA, Lewander W, Monti PM. Trajectories of adolescent alcohol use after brief treatment in an Emergency Department. Drug and Alcohol Dependence. 2012; 125(1–2):103–109. doi: http://dx.doi.org/10.1016/j.drugalcdep.2012.03.021. [PubMed: 22560729]

Biener L, Abrams DB. The Contemplation Ladder: validation of a measure of readiness to consider smoking cessation. Health Psychology. 1991; 10(5):360. [PubMed: 1935872]

Borsari B, Boyle KE, Hustad JTP, Barnett NP, O'Leary Tevyaw T, Kahler CW. Drinking before drinking: Pre-gaming and drinking games in mandated students. Addictive Behaviors. 2007; (32): 2694–2705. [PubMed: 17574344]

Borsari B, Muellerleile P. Collateral reports in the college setting: A meta-analytic integration. Alcoholism, Clinical and Experimental Research. 2009; 33(5):826–838.

Borsari B, Murphy JG, Carey KB. Readiness to change in brief motivational interventions: A requisite condition for drinking reductions? Addictive Behaviors. 2009; 34(2):232–235. [PubMed: 18990500]

Bradley KA, McDonell MB, Kivlahan DR, Diehr P, Fihn SD. The AUDIT alcohol consumption questions: Reliability, validity and responsiveness to change in older male primary care patients. Alcoholism, Clinical and Experimental Research. 1998; 22(8):1842–1849.

Caldwell PE. Drinking levels, related problems and readiness to change in a college sample. Alcoholism Treatment Quarterly. 2002; 20(2):1–15.

Carey KB, DeMartini KS. The motivational context for mandated alcohol interventions for college students by gender and family history. Addictive Behaviors. 2010; 35(3):218–223. doi: http://dx.doi.org/10.1016/j.addbeh.2009.10.011. [PubMed: 19914002]

Carey KB, Henson JM, Carey MP, Maisto SA. Computer versus in-person intervention for students violating campus alcohol policy. Journal of Consulting and Clinical Psychology. 2009; 77(1):74–87. [PubMed: 19170455]

Carey, KB.; Hustad, JTP. Methods for determining blood alcohol concentration: Current and retrospective. In: Preedy, V., editor. Comprehensive Handbook of Alcohol Related Pathology. London: Academic Press (Elsevier Science); 2004. p. 1426-1444.

Centers for Disease Control and Prevention [CDC]. Vital signs: binge drinking prevalence, frequency, and intensity among adults - United States, 2010. MMWR. Morbidity and Mortality Weekly Report. 2012; 61(1):14–19. doi: mm6101a4 [pii]. [PubMed: 22237031]

Collins RL, Parks GA, Marlatt GA. Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. Journal of Consulting and Clinical Psychology. 1985; 53(2):189–200. [PubMed: 3998247]

Cox WM, Klinger E. A motivational model of alcohol use. Journal of Abnormal Psychology. 1988; 97(2):168–180. [PubMed: 3290306]

Cunningham JA, Sobell LC, Gavin DR, Sobell MB, Breslin FC. Assessing motivation for change: Preliminary development and evaluation of a scale measuring the cost and benefits of changing alcohol or drug use. Psychology of Addictive Behaviors. 1997; 11:107–114.

Dawson DA, Grant BF, Stinson FS, Chou PS. Another look at heavy episodic drinking and alcohol use disorders among college and noncollege youth. Journal of Studies on Alcohol. 2004; 65(4):477–488. [PubMed: 15378804]

Dimeff, LA.; Baer, JS.; Kivlahan, DR.; Marlatt, GA. Brief alcohol screening and intervention for college students (BASICS): A harm reduction approach. New York: Guilford Press; 1999.

Efron, B.; Tibshirani, R. An introduction to the bootstrap. New York: Chapman and Hall; 1993.

Enders CK. The performance of the full information maximum likelihood estimator in multiple regression models with missing data. Educational and Psychological Measurement. 2001; 61(5): 713–740.

Enders CK, Bandalos DL. The relative performance of full information maximum likelihood for missing data in structural equation models. Structural Equation Modeling. 2001; 8(3):430–457.

Erceg-Hurn DM, Mirosevich VM. Modern robust statistical methods: An easy way to maximize the accuracy and power of your research. American Psychologist. 2008; 63(7):591–601. [PubMed: 18855490]

Freeman WM, Vrana KE. Future prospects for biomarkers of alcohol consumption and alcohol-induced disorders. Alcoholism, Clinical and Experimental Research. 2010; 34(6):946–954.

Fritz MS, MacKinnon DP. Required Sample Size to Detect the Mediated Effect. Psychological Science. 2007; 18(3):233–239. [PubMed: 17444920]

Fromme K, Corbin W. Prevention of heavy drinking and associated negative consequences among mandated and voluntary college students. Journal of Consulting and Clinical Psychology. 2004; 72(6):1038–1049. [PubMed: 15612850]

Hingson RW, Zha W, Weitzman ER. Magnitude of and the trends in alcohol-related mortality and morbidity among U.S. college students ages 18–24, 1998–2005. Journal of Studies on Alcohol and Drugs, Suppl No. 2009; 16(12–20):12–20.

Hoover E. Drug and alcohol arrests increased on campuses in 2001. Chronicle of Higher Education. 2003; 49

Hustad JTP, Eaton Short E, Borsari B, Barnett NP, O'Leary Tevyaw T, Kahler CW. College alcohol citations result in modest reductions in student drinking. Journal of Substance Abuse Treatment. 2011; 40(3):281–286. [PubMed: 21193284]

Hustad JTP, Pearson MR, Neighbors C, Borsari B. The role of alcohol perceptions as mediators between personality and alcohol-related outcomes among incoming college student drinkers. Psychology of Addictive Behaviors. (in press).

Kahler CW, Strong DR, Read JP. Toward efficient and comprehensive measurement of the alcohol problems continuum in college students: The Brief Young Adult Alcohol Consequences Questionnaire. Alcoholism, Clinical and Experimental Research. 2005; 29(7):1180–1189.

LaBrie JW, Quinlan T, Schiffman JE, Earleywine ME. Performance of alcohol and safer sex change rulers compared with readiness to change questionnaires. Psychology of Addictive Behaviors. 2005; 19(1):112–115. [PubMed: 15783287]

Lewis MA, Neighbors C, Oster-Aaland L, Kirkeby BS, Larimer ME. Indicated prevention for incoming freshmen: Personalized normative feedback and high-risk drinking. Addictive Behaviors. 2007; 32(11):2495–2508. [PubMed: 17658695]

Longabaugh R, Minugh PA, Nirenberg TD, Clifford PR, Becker B, Woolard R. Injury as a motivator to reduce drinking. Academic Emergency Medicine. 1995; 2(9):817–825. [PubMed: 7584769]

Maisto SA, Krenek M, Chung T, Martin CS, Clark D, Cornelius J. A comparison of the concurrent and predictive validity of three measures of readiness to change alcohol use in a clinical sample of adolescents. Psychological Assessment. 2011; 23(4):983–994. [PubMed: 21767028]

McGee R, Williams S, Kypri K. College students' readiness to reduce binge drinking: Criterion validity of a brief measure. Drug and Alcohol Dependence. 2010; 109(1–3):236–238. doi: http://dx.doi.org/10.1016/j.drugalcdep.2009.12.009. [PubMed: 20106607]

Miller, WR. Enhancing Motivation for Change in Substance Abuse Treatment (TIP) Series. Rockville, MD: DHHS; 1999. DHHS Publication no. 99–3354.

Miller, WR.; Rollnick, S. Motivational interviewing: Preparing people for change. 2nd ed.. New York, NY US: Guilford Press; 2002.

Miller, WR.; Rollnick, S. Motivational interviewing: Helping people change. 3rd ed.. Guilford Publication; 2012.

Morgan TJ, White HR, Mun EY. Changes in drinking before a mandated brief intervention with college students. Journal of Studies on Alcohol and Drugs. 2008; 69(2):286–290. [PubMed: 18299770]

Naimi TS, Blanchette J, Nelson TF, Nguyen T, Oussayef N, Heeren TC, Xuan Z. A new scale of the U.S. alcohol policy environment and its relationship to binge drinking. American Journal of Preventive Medicine. 2014; 46(1):10–16. [PubMed: 24355666]

Osberg TM, Atkins L, Buchholz L, Shirshova V, Swiantek A, Whitley J, Oquendo N. Development and validation of the College Life Alcohol Salience Scale: a measure of beliefs about the role of alcohol in college life. Psychology of Addictive Behaviors. 2010; 24(1):1–12. [PubMed: 20307107]

Osberg TM, Billingsley K, Eggert M, Insana M. From *Animal House* to *Old School*: A multiple mediation analysis of the association between college drinking movie exposure and freshman drinking and its consequences. Addictive Behaviors. 2012; 37:922–930. [PubMed: 22507304]

Osberg TM, Insana M, Eggert M, Billingsley K. Incremental validity of college alcohol beliefs in the prediction of freshman drinking and its consequences: A prospective study. Addictive Behaviors. 2011; 36(4):333–340. [PubMed: 21196082]

Reis J, Harned I, Riley W. Young adult's immediate reaction to a personal alcohol overdose. Journal of Drug Education. 2004; 34(3):235–245. [PubMed: 15648885]

Shealy AE, Murphy JG, Borsari B, Correia CJ. Predictors of motivation to change alcohol use among referred college students. Addictive Behaviors. 2007; 32(10):2358–2364. doi: http://dx.doi.org/10.1016/j.addbeh.2007.02.003. [PubMed: 17398012]

Slutske WS. Alcohol use disorders among US college students and their non-college-attending peers. Archives of General Psychiatry. 2005; 62(3):321–327. [PubMed: 15753245]

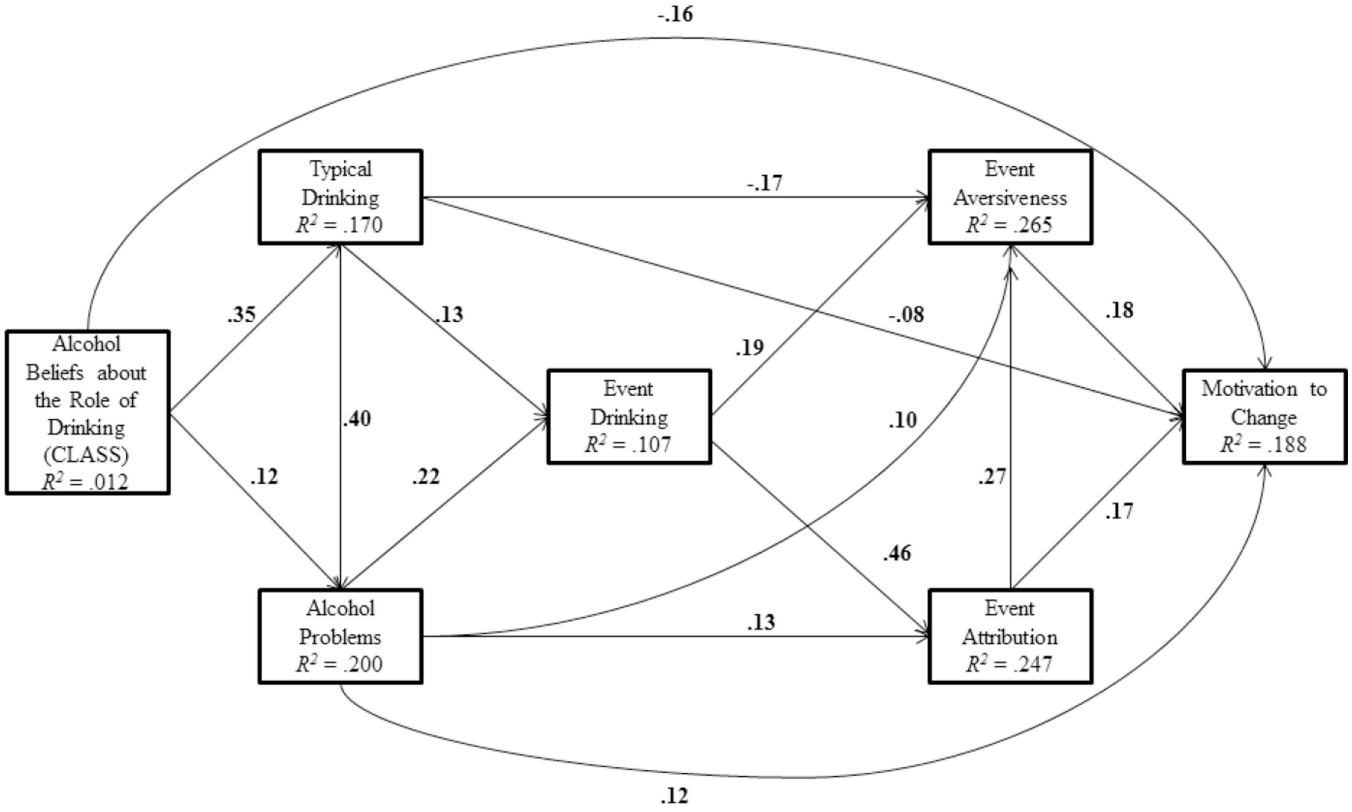

Figure 1.

Path model of associations among alcohol beliefs about the role of drinking in college as measured by the College Life Alcohol Salience Scale (CLASS), alcohol use involvement variables (typical drinking and alcohol problems), event-specific variables (event drinking, event attribution, event aversiveness), and motivation to change. Only significant effects ($p < .05$) are shown. Gender was controlled for by entering it as an exogenous predictor of all study variables; these effects are not shown for clarity.

Table 1

Correlations and descriptive statistics for all study variables (N = 932)

	Variable	1	2	3	4	5	6	7	8	*M*	*SD*
1	Gender (0 = men, 1 = women)	--								0.38	0.49
2	Alcohol beliefs about the role of drinking (CLASS)	**−.11**	--							39.79	8.20
3	Typical drinking	**−.22**	**.37**	--						10.29	7.27
4	Alcohol problems (BYAACQ)	.04	**.25**	**.41**	--					2.87	3.07
5	Event drinking	**−.18**	.05	**.23**	**.25**	--				6.21	5.07
6	Event attribution	**.07**	−.01	**.07**	**.22**	**.46**	--			14.35	4.91
7	Event aversiveness	**.29**	**−.08**	**.13**	**.14**	**.25**	**.39**	--		14.16	4.64
8	Motivation to change	**.17**	**−.18**	**−.10**	**.13**	**.18**	**.30**	**.32**	--	4.81	2.57

Note. Correlations in bold typeface are statistically significant ($p < .05$). CLASS = College Life Alcohol Salience Scale. BYAACQ = Brief Young Adult Alcohol Consequences Questionnaire.