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Testing a brief motivational- interviewing educational commitment module for at-risk college drinkers: A randomized trial

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Abstract

Background—The goal of the present study was to test the drink and harm reduction effects of a novel educational commitment (EC) module as a complement to a standard brief MI protocol (i.e., the Brief Alcohol Screening and Intervention for College Students; BASICS, Dimeff et al., 1999).

Methods—Using a randomized trial design, 180 university students were assigned to one of three conditions: Information, BASICS, or BASICS+EC. Participants completed an alcohol consumption interview and measures of alcohol-related problems, partying decision-making, subjective student role investment, and self-control-related traits at baseline and at two- and nine-month follow-ups.

Results—Linear models showed significant condition effects for two-month and nine-month drink quantity, but not for alcohol problems/consequences. Secondary outcome analyses showed significant condition effects for two-month high-risk high-reward partying decision-making and nine-month conscientiousness. Somewhat larger-sized decreases in consumption were observed at two months for the BASICS+EC condition compared to the BASICS condition, although these differences were not present at nine months.

Conclusions—The differential efficacy between the BASICS and BASICS+EC conditions compared to the Information condition reinforces the utility of in-person feedback modalities as more intensive indicated prevention strategies for at-risk college drinkers. The limited differential

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Contributors

Author Bogg designed the study and wrote the protocol with assistance from authors Marshbanks and Doherty. Author Bogg, with assistance from author Vo, conducted literature searches and produced summaries of previous research studies. Author Bogg conducted the statistical analyses. Author Bogg wrote the first draft of the manuscript and all authors have contributed to and approve the final manuscript.

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Conflict of interest

All authors declare that they have no conflicts of interest.

efficacy for BASICS+EC compared to BASICS suggests a brief MI module for the academic/vocational aspects of the student role is not associated with greater long-term drink and harm reduction. Future research should examine more intensive educational commitment modalities, the utility of on-going academic goal and action feedback, and mechanisms of differential efficacy across intervention groups.

1. Introduction

Despite advances in depictions of the biopsychosocial factors associated with excessive alcohol consumption among young adults, prevalence rates of heavy episodic drinking (five or more alcoholic drinks on any occasion in the past 30 days) are relatively unchanged over the past 15-plus years (Hingson et al., 2009; Hingson, Zha, & Smyth, 2017), with rates of unintentional non-traffic alcohol-related deaths among college students increasing by 18% (per 100,000) from 1998–2014. Notably, these patterns have been observed during a period of increased deployment of campus-based universal prevention and indicated prevention programs (Nelson et al., 2010; Wechsler et al., 2004).

Although recent research on individual-level (one-on-one) interventions has shown mandated students under the threat of consequences and at-risk volunteer students show similar intervention responsiveness (Henson, Pearson, & Carey, 2015; Terlecki, Buckner, Larimer, & Copeland, 2015), results from quantitative syntheses of interventions, including brief motivational interventions, suggest a general challenge for facilitating harm reduction is the limited effectiveness of such programs (Carey et al., 2007; Tanner-Smith & Lipsey, 2015; Smedslund et al., 2011). To address this challenge, the present research tested a novel educational commitment module as a complement to conventional motivational-interviewing-based harm reduction approaches for college students. Motivational interviewing (MI) approaches typically include an initial assessment component, followed by counselor-administered feedback that uses a digest of the assessment for what Miller and Rollnick define as “a collaborative conversation style for strengthening a person’s motivation and commitment to change” (Miller & Rollnick, 2013, p. 12).

A recent Bayesian individual-level meta-analysis of brief MIs for college student drinking showed effects were small and not statistically significant. Follow-up analyses showed individual delivery of MI sessions with personalized feedback was associated with a small significant reduction in alcohol-related problems (Huh et al., 2015) – findings that aligned with work showing larger effects for personalized decisional balance (i.e., pro versus cons), practical cost, and harm reduction strategy feedback (Miller et al., 2013). The authors of the recent synthesis suggested the field would benefit from studies that closely adhere to manualized approaches (e.g., Brief Alcohol Screening and Intervention for College Students; BASICS, Dimeff et al., 1999), include evidence-based components to heighten effects, and consider additional theoretical orientations when testing novel intervention components. Furthermore, other meta-analytic work has shown few studies utilize longer-term follow-ups (more than 6 months; Carey et al., 2007).

While MI-based approaches offer an improvement over some individual-level interventions, their focus on alcohol-centric constructs, such as drinking norms, leaves the influence of

dispositional and role-related constructs unaddressed. Trait self-control (i.e., being careful and cautious versus being impulsive and spontaneous) has shown consistent negative associations with alcohol consumption and problems (e.g., Bogg & Roberts, 2004). Separate lines of research investigating social role investment have demonstrated the importance of role-related influences on excessive alcohol consumption. Consistent with the social investment hypothesis (Roberts & Wood, 2006), longitudinal research using a college sample with a heterogeneous prevalence of alcohol dependence showed greater initial subjective student role investment (i.e., feeling committed toward the educational/vocational aspects of being a student) predicted greater trait self-control and lower alcohol consumption 12 months later (Bogg, Finn, Monsey, 2012). Cross-sectional research extended these findings to identify pathways from trait self-control, subjective student role investment, and high-risk high-reward partying decision making to alcohol consumption in a large college sample with a heterogeneous prevalence of lifetime alcohol dependence (Bogg, Lasecki, & Vo, 2016). The results showed students scoring lower on trait self-control endorsed more high-risk high-reward partying by virtue of lower feelings of educational investment.

Despite targeting university students, BASICS alone does not explicitly address the educational/vocational aspects of the role, instead focusing on drinking behaviors, perceived norms, consequences and harms (of which a few relate to academic/vocational outcomes), risk based on family history, experiences associated with dependence, and alcohol expectancies (Dimeff et al., 1999). Building on other research showing the presence of alternative contingencies and reinforcers to be associated with decreases in substance use (Bogg & Finn, 2009; Higgins, Heil, & Lussier, 2004), a recent individual-level intervention used a behavioral economic perspective based in delay of gratification to combine a 50-minute BASICS-style BMI with a 50-minute substance-free activity session (SFAS) designed to “enhance the value of delayed academic and career goals in part by specifying the specific academic and financial benefits associated with these outcomes” (Murphy, et al., 2012; p. 880). The results showed an incremental benefit in harm reduction compared to the BASICS-style BMI combined with 30-minute relaxation training.

Although the SFAS incorporates academic and career goals, it includes a wide range a feedback topics, such as differential career earnings, suggested extracurricular activities, and substance-free leisure activities. The present study attempted, in part, to disambiguate this varied approach by focusing on educational self-views and developing strategies and actions (per MI techniques) to potentiate academic/vocational goals and actions. As indicated by prior work, subjective student role investment is associated with and predictive of levels of trait self-control, partying decision-making, and alcohol consumption. As a novel focus of a brief harm reduction intervention, MI-delivered educational/vocational feedback represents an empirically- and theoretically- informed approach.

In the present study, a randomized trial of at-risk college drinkers was used to test a brief educational commitment (EC) module as a complement to standard delivery of BASICS. The EC module was designed to provide a forum to discuss, develop, and refine visions, goals, and actions in the service of increasing levels of investment in the educational/vocational aspects of the student role. Compared to students assigned to the BASICS-only and Information conditions, it was expected that the BASICS+EC condition would show

larger drink and harm reductions at a two-month follow-up and a longer-term nine-month follow-up. Moreover, owing to the EC module's focus on educational goals and actions, students in the BASICS+EC condition were expected to show fewer risky partying decisions, as well as moderate increases in subjective student role investment and small increases in self-control-related traits.

2. Material and Methods

2.1 Design, Participants, and Procedure

Participants were screened into the study and randomized (stratified by sex) to one of three conditions (Information, BASICS, or BASICS+EC). Participants were eligible for the study if they consumed 3 or more drinks for women or 4 or more drinks for men on a typical drinking occasion and/or they had two or more binge drinking occasions (4 drinks or more for women, 5 drinks or more for men) during the past 30 days, if they scored greater than 8 on the AUDIT and/or endorsed one or more of seven DSM-IV diagnostic criteria for alcohol dependence, were between the ages of 18–23 years, were not currently receiving counseling or treatment for substance use, were not taking any prescribed medications that affected behavior, did not have a history of severe psychological problems, cognitive impairments, or head trauma, and were currently enrolled college students.

Three hundred ten students responded to advertisements (flyers, university-based notice system, campus-wide emails) and were screened by telephone, resulting in 180 students being scheduled and randomized to one of the three conditions (see Figure 1). The largest plurality of the sample was Caucasian/European American (41.1 %), followed by Asian American (26.1 %), African American/Black (19.4 %), Other (11.7 %), Hispanic/Chicano/Mexican American (1.1 %), and American Indian/Native American (.6 %). At baseline, the Information group (mean age = 20.43 years, SD = 1.54 years) was almost equally divided between men and women (51.7 % female) and 36.7 % met lifetime DSM-IV diagnostic criteria for alcohol dependence. The BASICS group (mean age = 20.40 years, SD = 1.54 years) was almost equally divided between men and women (51.7 % female) and 43.3 % met lifetime DSM-IV diagnostic criteria for alcohol dependence. The BASICS+EC group (mean age = 20.37 years, SD = 1.69 years) was equally divided between men and women (50 % female) and 33.3 % met lifetime DSM-IV diagnostic criteria for alcohol dependence. Participants were compensated \$45 for the baseline session and \$35 for each subsequent session. The study was approved by the Wayne State University IRB and was registered at clinicaltrials.gov (NCT01757353: The more descriptive label of “educational commitment” is used here, rather than “normative enhancement,” as appears on clinicaltrials.gov). After arriving for the baseline assessment, participants were randomized and completed informed consent forms. Interventionist training and fidelity procedures are described in the Supplementary Materials.

2.2 Intervention Conditions

2.2.1 Information—The function of the Information condition was to improve alcohol-related knowledge and modify beliefs related to drinking norms, perceived risk of harm from alcohol consumption, and alcohol expectancies. At the end of the baseline session,

Information participants scheduled their two-month follow-up session and received six handouts from the BASICS manual (Dimeff et al., 1999), covering topics related to drinking moderation, alcohol expectancies, the body's biphasic response to alcohol, intoxication and performance, gender differences and alcohol, and alcohol and sexual assault.

2.2.2 BASICS—The BASICS condition adhered to the approach described in its manual (Dimeff et al., 1999). At the end of the baseline session, BASICS participants scheduled their in-person MI-based feedback session 10–14 days later with one of two session administrators. Consistent with the BASICS procedure, participants were asked to complete an alcohol consumption diary. Upon returning for the feedback session, participants met with a trained research associate who administered the 40–60-minute BASICS feedback sessions, starting with the diary, then using a printed single-sheet digest of personalized figures and information from the baseline assessment to facilitate discourse and MI techniques following the BASICS procedure. The feedback session was designed to 1) provide a personalized context for modifying beliefs related to drinking norms, alcohol expectancies, and perceived risk of harm, and 2) foster greater readiness for change (i.e., enable and develop drinking moderation and harm reduction goals and strategies) via MI techniques.

2.2.3 BASICS+EC (educational commitment)—At baseline, only participants in the BASICS+EC condition completed a measure of possible college student selves, describing two hoped-for and feared selves in the college student role. At the end of the baseline session, participants in the BASICS+EC condition were given an alcohol diary (as in the BASICS condition) and an academic activity diary, and were scheduled for the personalized feedback session. Upon returning for the feedback session, participants completed the BASICS feedback procedure and then transitioned to the EC module, which started with the academic diary, then addressed an additional section in the personalized feedback form devoted to “College Student Role Investment,” which used responses from the baseline assessment to depict subjective levels of involvement in the academic/vocational aspects of the role, as well as one hoped-for self and one feared self.

The MI-informed EC module was designed to provide a forum to discuss, develop, and refine visions, goals, habits, and actions in the service of increasing levels of commitment, importance, involvement, and responsibility for the academic/vocational aspects of the college student role. The approach of the BASICS+EC sessions was to transition from alcohol-centric content (i.e., BASICS) to broader college student role content (i.e., EC) and build upon an individual's (often rudimentary) academic and vocational goals. Consistent with the wrap-up for the BASICS procedure, the 20- to 30-minute EC module concluded with the solicitation of commitments to change that were consistent with the level of readiness for change of the participants. The total time of the BASICS+EC sessions ranged from 60–90 minutes.

2.3 Materials

2.3.1 Primary outcome measures

2.3.1.1 Alcohol consumption: The Brief Drinker Profile was administered to assess typical weekly frequency and quantity of alcohol consumption during the past 30 days (Miller & Marlatt, 1984).

2.3.1.2 Alcohol-related problems: The 48-item Young Adult Alcohol Consequences Questionnaire (YAACQ) was used to assess the frequency of the co-occurrence of alcohol consumption and deleterious behavioral problems/consequences, including social-interpersonal, impaired control, self-perception, self-care, risk behaviors, academic/vocational, physical dependence, and blackout drinking ($\alpha = .93$; Read et al., 2006).

2.3.2 Secondary outcome measures

2.3.2.1 Partying decision-making scenarios: Two hypothetical scenarios presenting highly rewarding and highly punishing student role- and alcohol-related information assessed decisions to attend social gatherings where alcohol would be available for consumption (Bogg & Finn, 2009). The exact wording of the scenarios appears in the Supplementary Materials. After reading each scenario, participants reported whether they would attend the gathering. The responses were summed (scores ranging from 0–2) to produce a single high-risk high-reward party attendance score.

2.3.2.2 Subjective college student role investment: Subjective educational investment was assessed using a seven-item scale (Bogg, 2011). The seven-item scale assessed involvement in education and the student role ($\alpha = .78$; e.g., “I feel a strong sense of responsibility for my education”) using a 5-point scale (1 = strongly disagree, 5 = strongly agree).

2.3.3.3 Self-control-related traits—The control subscale of the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982; $\alpha = .84$), the disinhibition subscale of the Sensation-Seeking Scales, with three substance-related items removed (SSS; Zuckerman, 1979; $\alpha = .48$), the conscientiousness scale of the Big Five Inventory (BFI; John, Naumann, & Soto, 2008; $\alpha = .76$); and the International Personality Item Pool (IPIP) analogue of the NEO-PI-R self-discipline subscale (Goldberg et al., 2006; $\alpha = .88$) were used to assess self-control-related traits.

2.4 Data Analyses

Given the novel nature of the randomized trial, the analyses were conducted using a per protocol approach. Per protocol (or “as treated”) analyses are recommended when a determination of intervention efficacy is desired, i.e., testing whether the intervention, when actually received and assessed at a given point in time (i.e., follow-up), potentiates some effect (*cf.* Armijo-Olivo, Warren, & Magee, 2009).

All linear models included condition as a between-subjects fixed effect and baseline scores on the dependent variable as a covariate. In addition, due to significant sex differences at baseline, two-month and nine-month drink quantity and risk behaviors, two-month SSS

disinhibition, and nine-month BFI conscientiousness models also included sex as a covariate. Consistent with CONSORT guidelines (www.consort-statement.org), within-condition standardized mean difference scores (i.e., Cohen's d scores) from baseline are reported.

3. Results

Details regarding adherence and fidelity to MI style and condition format appear in the Supplementary Materials. A randomization check of baseline variables using analyses of variance showed no significant group differences. The results of non-significant attrition analyses, as well as non-significant analyses related to the presence versus absence of an academic break period during the follow-ups are reported in the Supplementary Materials.

Table 1 displays the F statistics corresponding to the linear models for completers at two months and nine months, respectively, as well as Cohen's d scores for each variable at each follow-up period within each condition. Figures 2 and 3 display the means and standard errors for the primary outcomes at baseline and at two months and nine months, respectively.

Among the primary outcomes, significant condition effects were observed for two-month drink frequency and quantity, as well as nine-month drink quantity. At two months, corresponding d scores showed large drink frequency and quantity decreases for the BASICS+EC condition, and moderate and small decreases for the BASICS and Information conditions, respectively (see Table 1). No significant condition effects were observed at two months or nine months for drinking problems/consequences (see Table 1 for effect sizes).

Among the secondary outcomes, two-month high-risk high-reward partying decision making showed a significant condition effect, with moderate-sized decreases observed in the BASICS and BASICS+EC conditions. Among the self-control-related traits, conscientiousness showed a significant condition effect at nine months, with the Information condition showing a small-sized decrease (with confidence intervals including zero) at nine months compared to negligible changes for the BASICS and BASICS+EC conditions.

4. Discussion

The goal of the present study was to assess the incremental drink and harm reduction efficacy of a novel complementary brief MI educational commitment module for an existing intervention for at-risk college student drinkers (i.e., BASICS). Significant condition effects were observed among the primary drinking outcomes, showing that, compared to the Information group, the BASICS and BASICS+EC conditions had lower quantity and frequency at two and nine month follow-ups and lower quantity at nine months. Only somewhat larger effect sizes were observed in drink quantity and consumption at two months in the BASICS+EC condition compared to the BASICS condition. These differences did not persist at nine months. Moreover, it is possible that the differences in effect sizes between the BASICS and BASICS+EC conditions are attributable to the exclusive use of the possible selves measure in the BASICS+EC condition, rather than the EC module per se.

Compared to prior work using a similar BMI combined with a substance-free activity session (SFAS; Murphy et al., 2012), the BASICS+EC two- and nine-month typical weekly drink quantity decreases were larger than the one-month and six-month decreases reported for the BMI/SFAS. It should be emphasized that Murphy et al. (2012) used less restrictive screening criteria than those of the present work, making direct comparisons of effects difficult. However, to the extent the present work used a better powered, shorter, and more focused approach to foster delay of gratification through academic/vocational goal-setting and produced comparable (if not larger) typical drink reductions at longer follow-ups, then the present work's focus on educational commitment offers somewhat improved efficiency and reliability over the SFAS.

Among the secondary outcome measures, a small-sized decrease in subjective college student role investment was observed in the BASICS group at two and nine months. No change in subjective college student role investment was observed in the BASICS+EC group at two months, but a small reduction was observed at nine months. Given the EC module's inability to foster an increase in subjective college student role investment, a clear test of the possible mechanistic effect of additional role investment was not possible in the present study. The small decrease in the secondary outcome of trait disinhibition in the BASICS+EC condition at two months corresponded to a slightly larger differential decrease in alcohol consumption at two months, but not at nine months, compared to the BASICS condition. This pattern provides limited support for the short-term mechanistic role of decreases in self-perceived trait disinhibition as a mechanism for the BASICS+EC condition's drink reduction effects. The pattern of corresponding change in trait disinhibition and alcohol consumption was not observed over the long term. Finally, the condition effect observed for the secondary outcome of conscientiousness at nine months was small, corresponding to less than a fifth of a standard deviation decrease from baseline for the Information condition, with null changes in conscientiousness observed for the BASICS and BASICS+EC conditions.

Although the BASICS+EC condition showed small to negligible differences compared to the BASICS condition, it is possible the comparative efficacy of the EC module was attenuated by its brevity. This more restrictive formulation resulted in a somewhat reduced capacity for goal scaffolding and action planning (*cf.*, Hagger et al., 2016). A solely *directed* discussion of academic consequences tied to alcohol consumption was avoided to maintain fidelity with the spirit of MI, which favors a *guiding* approach. As indicated by evaluations of the feedback session content, this openness resulted in generally cursory discussions of the interplay of academics and drinking ("going out," "partying") and related decision-making (*cf.* Bogg, Lasecki, & Vo, 2016). It should be noted that rather than a quantitative evaluation based on numerical ratings, a qualitative evaluation of the MI dynamic was used as part of the fidelity procedures. Nonetheless, the sparse differences between the BASICS and BASICS+EC conditions might be strengthened by including additional EC feedback components related to the enhanced specification of academic/vocational goals and actions in the context of social pursuits involving alcohol, such as the relationship between the work and play components of the college lifestyle.

While condition effects favored the BASICS conditions at two months, only the drink quantity condition effect remained at nine months. At two months and nine months, the

decreases in consumption observed in the Information group were consistent with research showing the effectiveness of assessment alone as indicated prevention for college drinkers (McCambridge & Day, 2007; Walters et al., 2009). From the pragmatic perspective of maximizing the implementation of scarce prevention/intervention resources, the results of the present study suggest brief psychodiagnostic interviewing, questionnaire assessment, and the dissemination of alcohol-related information can produce small- to moderate-sized reductions in consumption and consequences that persist to nine months. Finally, although the study design was powered more strongly than related work (*cf.* Murphy et al., 2012), it was underpowered to detect small condition and within- group effects that could have meaningful practical significance when scaled up to larger populations.

5. Conclusions

The findings from the present research demonstrated 1) a BASICS+EC module produced only modestly stronger patterns of short-term decreases in drink quantity compared to BASICS and 2) the relative paucity of condition effects at nine months highlights the longer-term limitations of brief MI-based approaches for potentiating larger reductions in consumption and consequences compared to an assessment and information approach alone. Future research is needed to test 1) more in-depth elaborations of educational commitment approaches that might increase levels of subjective investment, 2) investigate the utility of continuing academic/educational assessment/feedback via booster sessions (*cf.* Mastroleo et al., 2011), and 3) explore additional candidate mechanisms of differential efficacy across intervention groups (e.g., assessment effects, self-monitoring effects, types and depth of feedback, change versus sustain talk).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights:

- In this randomized trial, the efficacy of a brief educational commitment (EC) module combined with BASICS was tested among at-risk college drinkers.
- Modestly larger decreases in drink quantity and frequency were observed in BASICS+EC at 2 months.
- At 9 months, the BASICS alone condition showed larger effects than BASICS +EC.
- Given the mixed findings and the brevity of the EC module, further development of academic/vocational feedback and training modalities is warranted.

Figure 1.
Participant flow throughout trial.

Figure 2. Drink frequency, drink quantity, and total consequences means and standard errors from baseline to two months.

Figure 3. Drink frequency, drink quantity, and total consequences means and standard errors from baseline to nine months.

Table 1

Two-month completer and nine-month completer follow-up group differences and within-group Cohen's *d* scores.

	Two-Month Follow-up				Nine-Month Follow-up			
	Information Baseline M (SD) 2-month M (SD) (Cohen's <i>d</i>)	BASICS Baseline M (SD) 2-month M (SD) (Cohen's <i>d</i>)	BASICS+EC Baseline M (SD) 2-month M (SD) (Cohen's <i>d</i>)	<i>F</i> (<i>df</i>)	Information Baseline M (SD) 9-month M (SD) (Cohen's <i>d</i>)	BASICS Baseline M (SD) 9-month M (SD) (Cohen's <i>d</i>)	BASICS+EC Baseline M (SD) 9-month M (SD) (Cohen's <i>d</i>)	<i>F</i> (<i>df</i>)
<u>Primary outcome measures</u>								
Drink frequency	3.11 (3.11) 2.76 ^a (1.65) (<i>d</i> = −.23)	3.02 (1.23) 2.20 ^b (1.34) (<i>d</i> = −.64 [*])	2.75 (1.04) 1.90 ^b (1.12) (<i>d</i> = −.78 [*])	4.07 [*] (2, 146)	3.02 (1.42) 2.50 (1.67) (<i>d</i> = −.33 [*])	2.93 (1.21) 1.87 (1.39) (<i>d</i> = −.82 [*])	2.80 (1.08) 2.08 (1.38) (<i>d</i> = −.57 [*])	2.37 (2, 142)
Drink quantity	20.08 (14.36) 15.02 ^a (13.84) (<i>d</i> = −.36 [*])	19.80 (17.12) 10.17 ^b (8.69) (<i>d</i> = −.68 [*])	16.54 (10.90) 8.46 ^b (1.02) (<i>d</i> = −.84 [*])	24.90 [*] (2, 145)	20.91 (18.32) 12.31 ^a (12.97) (<i>d</i> = −.53 [*])	19.01 (17.16) 7.54 ^b (7.36) (<i>d</i> = −.83 [*])	16.69 (11.10) 9.39 ^{a,b} (7.87) (<i>d</i> = −.74 [*])	3.11 [*] (2, 140)
Total Consequences	18.11 (10.30) 12.48 (9.53) (<i>d</i> = −.57 [*])	15.29 (9.45) 9.09 (8.90) (<i>d</i> = −.67 [*])	17.07 (9.82) 13.47 (13.19) (<i>d</i> = −.31)	1.63 (2, 145)	17.81 (10.31) 15.38 (12.75) (<i>d</i> = −.21)	14.75 (9.67) 10.39 (11.01) (<i>d</i> = −.42 [*])	16.90 (10.12) 13.73 (12.16) (<i>d</i> = −.28)	1.44 (2, 140)
<u>Secondary outcome Measures</u>								
High-risk high-reward partying decision making	.81 (.89) .74 ^a (.85) (<i>d</i> = −.09)	.84 (.90) .40 ^b (.62) (<i>d</i> = −.56 [*])	.76 (.79) .51 ^{a,b} (.78) (<i>d</i> = −.32 [*])	3.62 [*] (2, 146)	.90 (.89) .58 (.78) (<i>d</i> = −.38 [*])	.82 (.90) .52 (.76) (<i>d</i> = − .35 [*])	.89 (.81) .32 (.64) (<i>d</i> = −.77 [*])	2.12 (2, 134)
Subjective college student role investment	4.11 (.70) 3.98 (.74) (<i>d</i> = −.19)	4.30 (.55) 4.14 (.61) (<i>d</i> = −.28 [*])	4.30 (.49) 4.28 (.69) (<i>d</i> = −.03)	1.46 (2, 145)	4.11 (.72) 3.99 (.82) (<i>d</i> = −.16)	4.30 (.55) 4.07 (.72) (<i>d</i> = −.34 [*])	4.32 (.48) 4.23 (.80) (<i>d</i> = −.15)	.48 (2, 131)
Self-control-related traits								
M PQ control	16.31 (5.13) 15.78 (5.27) (<i>d</i> = −.10)	17.38 (4.26) 18.36 (7.48) (<i>d</i> = +.15)	16.69 (5.27) 17.29 (5.38) (<i>d</i> = +.11)	1.84 (2, 146)	16.58 (4.87) 15.56 (5.67) (<i>d</i> = −.19)	17.36 (4.50) 18.11 (5.34) (<i>d</i> = +.15)	16.84 (5.14) 16.91 (5.47) (<i>d</i> = +.01)	2.61 (2, 134)
SSS disinhibition	4.47 (1.54) 4.28 (1.61) (<i>d</i> = −.12)	4.40 (1.81) 4.16 (1.81) (<i>d</i> = −.14)	4.00 (1.69) 3.57 (1.58) (<i>d</i> = −.28 [*])	1.66 (2, 145)	4.56 (1.51) 4.30 (1.75) (<i>d</i> = −.16)	4.07 (1.86) 3.84 (1.79) (<i>d</i> = −.12)	3.86 (1.53) 3.64 (1.60) (<i>d</i> = −.15)	.28 (2, 134)
BFI conscientiousness	3.54 (.60) 3.45 (.58) (<i>d</i> = −.16)	3.84 (.60) 3.84 (.62) (<i>d</i> = −.01)	3.66 (.56) 3.68 (.67) (<i>d</i> = +.05)	2.13 (2, 146)	3.59 (.61) 3.43 ^a (.61) (<i>d</i> = −.16)	3.84 (.60) 3.84 ^a (.60) (<i>d</i> = −.01)	3.66 (.59) 3.71 ^a (.64) (<i>d</i> = +.01)	4.34 [*] (2, 133)

IPIP NEO-PI-R self-discipline	3.25 (.82) 3.21 (.69) (<i>d</i> = -.05)	3.41 (.75) 3.42 (.82) (<i>d</i> = +.02)	3.31 (.75) 3.38 (.79) (<i>d</i> = +.10)	.80 (2, 144)	3.37 (.82) 3.19 (.67) (<i>d</i> = -.24)	3.37 (.78) 3.34 (.70) (<i>d</i> = -.04)	3.34 (.81) 3.44 (.83) (<i>d</i> = +.13)	2.84 (2, 132)
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Note. All linear model analyses controlled for baseline scores on the same variable. Two-month and nine-month drink quantity, two-month SSS disinhibition, and nine-month BFI conscientiousness linear models also controlled for sex.

Different letter superscripts denote significant group differences based on *post hoc* contrasts of estimated marginal means.

*
p < .05, or 95 % confidence interval for Cohen's *d* score excludes zero.

MPQ, Multidimensional Personality Questionnaire; SSS, Sensation-Seeking Scales; BFI, Big Five Inventory; IPIP, International Personality Item Pool.