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Randomized Controlled Trial of BASICS for Heavy Drinking Mandated and Volunteer Undergraduates: 12-Month Outcomes

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Abstract

This is the first randomized trial testing whether heavy drinking undergraduates mandated to the *Brief Alcohol Screening and Intervention for College Students* (BASICS) program following a campus alcohol violation would benefit as much as heavy drinking volunteers up to one year post-intervention using high-risk control groups to model disciplinary-related and naturalistic changes in drinking. Participants (61% male; 51% mandated; 84% Caucasian; M_{age} = 20.14 years) were screened for heavy drinking and randomized to BASICS (*n* = 115) or control (*n* = 110). Outcome measures collected at baseline, 4 weeks, 3, 6, and 12 months post-intervention included the Daily Drinking Questionnaire and Rutgers Alcohol Problem Inventory. At 4 weeks post-intervention, intent-to-treat multilevel longitudinal models showed that regardless of referral group (mandated or volunteer) BASICS significantly decreased weekly drinking, typical drinks, and peak drinks relative to controls (*d*s = .41-.92). Decreases in alcohol problems were of large effect size (*d* = .87). At 12 months post-intervention, BASICS participants (regardless of referral group) reported significantly fewer alcohol problems (*d* = .56) compared to controls. Significant intervention gains for peak drinks and typical drinks were sustained in both referral groups relative to controls (*d*s = .42; .11). Referral group had no significant main effect and did not interact with intervention condition to predict outcomes. BASICS was associated with less drinking and fewer alcohol problems, even among heavier drinking mandated students up to one year post-intervention. Provision of BASICS-style programs within disciplinary settings may help reduce heavy drinking and alcohol problems among at-risk students.

Keywords: alcohol, brief motivational intervention, psychosocial treatment, mandated college students, treatment outcome

Randomized Controlled Trial of BASICS for Heavy Drinking Mandated and Volunteer Undergraduates: 12-Month Outcomes

Heavy drinking remains problematic on college campuses in the United States. Nearly 40% of college students engage in “binge drinking” (i.e., consuming over 5 drinks per occasion for men, 4 for women) in the past two weeks (Johnston, O'Malley, Bachman, Schulenberg & Patrick, 2013). Heavy drinking students report greater injury, more health problems (e.g., hangovers, disturbed sleep), poorer academic performance, and more risky or unwanted sexual encounters (Wechsler, Dowdall, Maenner, Gledhill-Hoyt & Lee, 1998) than non-binge drinkers. Binge drinkers are also more likely to have problems with campus police (Wechsler, Davenport, Dowdall & Moeykens, 1994). Yet most at-risk heavy drinking students are not identified until their heavy alcohol use leads to a serious event (e.g., driving after drinking, arrest) that requires the attention of campus officials (Barnett & Read, 2005).

Students who receive disciplinary attention from university staff following an alcohol policy violation (e.g., driving after drinking) represent a critical group of college drinkers. Mandated students drink more heavily and experience more alcohol problems (e.g., alcohol “blackouts”) (Clements, 1999; O'Hare, 1997), drink at higher quantities (Merrill, Carey, Lust, Kalichman & Carey, 2014), and also report lower grades (Barnett, et al., 2004) relative to other students. Alcohol-related incidents are the most frequent reason for disciplinary action on university campuses (Bergen-Cico, 2000). Campus officials therefore play a critical role in the detection of problem drinking within a university setting.

Several reviews and meta-analyses suggest that brief motivational interventions (BMI) targeting alcohol use are efficacious at reducing heavy drinking, alcohol problems, or both among college students who volunteer for the intervention in the long-term, although some discrepant findings exist (Carey, Scott-Sheldon, Carey & DeMartini, 2007; Carey, Scott-Sheldon, Elliott, Garey & Carey, 2012; Larimer & Cronce, 2007). Studies have also evaluated the impact of BMI among college student drinkers who are mandated to an alcohol prevention intervention following a campus alcohol policy violation. Among mandated student samples, face-to-face BMI have generally resulted in lower drinking and/or alcohol problems (Borsari & Carey, 2005; Carey,

Carey, Henson, Maisto & DeMartini, 2011; Carey, Carey, Maisto & Henson, 2009; DiFulvio, Linowski, Mazziotti & Puleo, 2012; Kazemi, Levine, Dmochowski, Shou & Angbing, 2012; Terlecki, Larimer & Copeland, 2010; White, et al., 2006) for periods up to 6 months, with intervention effects being greater than the effect of the disciplinary sanction alone (Carey, et al., 2011; Terlecki, et al., 2010). The majority of research suggests heavy drinking mandated students experience greater benefits from face-to-face interventions relative to computerized interventions (Carey, et al., 2011; Carey, et al., 2009; Carey, DeMartini, Prince, Luteran & Carey, 2013) or mailed feedback (White, et al., 2006; White, Mun, Pugh & Morgan, 2007). However, Barnett, Murphy, Colby, and Monti (2007) showed no difference in outcomes by intervention format (counselor vs. computer delivered). Mandated students also tend to prefer face-to-face formats (Carey, et al., 2013). Given the established benefits of BMI along with mandated students' preference to receive a face-to-face BMI, it may be beneficial to provide such interventions within the university judicial system in an effort to curtail heavy and risky drinking practices among vulnerable student drinkers. This suggestion is compelling in light of findings that non-mandated heavier drinking undergraduates are least interested in volunteering for BMI (Neighbors, Palmer & Larimer, 2004) and BMI completion by non-mandated heavy drinkers can be fairly low (53.8%) in some studies (e.g., Turrisi, et al., 2009). These findings together suggest that a large proportion of high-risk drinkers may remain vulnerable to heavy drinking and alcohol problems until their drinking leads to an event requiring disciplinary action that sparks an interest in behavior change. Given the time and resources needed to deliver in-person BMI within this setting and possible difficulty getting students to attend the BMI, additional research is warranted to examine longer-term intervention effects and predictors of intervention engagement.

Despite the promising short-term BMI outcomes, research has yielded mixed findings regarding the efficacy of BMIs for reducing heavy drinking and/or alcohol problems among mandated students in the long term. To illustrate, longitudinal studies evaluating the impact of a one-session BMI for alcohol policy violators reported that although students reduced drinking and alcohol problems through 6-month assessment periods, gains were not maintained at 12-months post-intervention (Carey, et al., 2011; Carey, et al., 2009). In a similar study, BMI mandated

students reported even greater drinking at 12-months post-intervention than at baseline (Barnett, et al., 2007), although it should be noted that intervention effects for alcohol use and problems were non-significant at the 3-month assessment. In a stepped care evaluation trial, high-risk mandated drinkers who continued to drink heavily after receiving a lower level intervention (e.g., brief advice) reduced alcohol problems but not alcohol use at a 9-month assessment following a BMI relative to an assessment-only control (Borsari, et al., 2012). In contrast, White and colleagues (2007) found evidence of a long-term 'sleeper effect' following a face-to-face BMI relative to written feedback only such that mandated students' alcohol problems and weekly alcohol use remained lower 15 months post-BMI than at 4 months post-BMI. It is important to note that this longitudinal BMI intervention decay effect is not as pronounced in student volunteer samples (Baer, Kivlahan, Blume, McKnight & Marlatt, 2001; Carey, Carey, Maisto & Henson, 2006; Marlatt, et al., 1998), although discrepant findings exist (for review see Larimer & Cronce, 2007). Overall, the research suggests that mandated students may not benefit from computerized or mailed-feedback BMIs in the long term, and it is unclear if there is any added benefit of face-to-face interventions as a means to improve long-term outcomes among mandated students.

Mandated students may experience less positive long-term outcomes due to increased resistance or hostility about their drinking, low aversiveness to the referral incident and/or heavy drinking patterns (Barnett, et al., 2008), reluctance to change risky drinking practices (Barthelmes, Borsari, Hustad & Barnett, 2010) or because their alcohol use is being assessed or monitored post-sanction (Barnett & Read, 2005). Examination of individual differences variables in BMI intervention outcomes for mandated students suggest that lower readiness to change (Carey, Henson, Carey & Maisto, 2007; Fromme & Corbin, 2004) and higher social comparison tendencies (Carey et al., 2007) were associated with worse BMI outcomes (i.e., higher post intervention drinking). Elucidation of disparate long-term BMI outcomes among mandated students relative to voluntary students therefore warrants further investigation.

One such BMI intervention is the *Brief Alcohol Screening and Intervention for College Students* (BASICS; Dimeff, Baer, Kivlahan & Marlatt, 1999). BASICS includes an assessment of drinking practices and alcohol problems, and students are provided with personalized written

feedback presented in a Motivational Interviewing style (Miller & Rollnick, 2002). Unlike a one-session BMI, BASICS includes two one-hour face-to-face sessions with participant self-monitoring of alcohol use for 10-14 days between sessions. BASICS is well studied in non-mandated student samples and is associated with lower drinking and alcohol problems among heavy drinking student volunteers for up to 4 years post-intervention (Baer, et al., 2001; Marlatt, et al., 1998). Furthermore, among mandated student samples, initial feasibility studies have found BASICS reduces risky drinking and/or alcohol problems both within-groups from baseline through a 6-month follow-up (Amaro, et al., 2010) and between-groups relative to a high-risk volunteer control group up to 6-months post-intervention (DiFulvio, et al., 2012; Terlecki, et al., 2010). Overall, BASICS appears to appeal to a target group of mandated student drinkers and may offer greater long-term benefits than a standard one-session BMI for this risky group of student drinkers. Yet to our knowledge, no research has examined whether heavy drinking mandated students benefit from BASICS as much as heavy drinking student volunteers beyond 6-months post-intervention. Further, it is unclear if BASICS is able to reduce drinking and alcohol problems among mandated students in the long term. The integration of BASICS within the university judicial system may possibly be a useful method by which to identify and intervene with high-risk student drinkers who have the greatest likelihood of developing a serious alcohol use disorder during their formative school years, at least in the short term. However, given discrepant long-term BMI efficacy findings among mandated students (Barnett, et al., 2007; Carey, et al., 2011; Carey, et al., 2009), it appears that BMI needs further improvement to maximize long-term outcomes before such interventions are widely adopted on university campuses.

The present study builds on our pilot work (authors masked,) and contributes to the existing literature by examining longitudinal BASICS intervention outcomes among mandated students relative to high-risk student volunteers to determine whether these groups experience similar long-term benefits from BASICS. The current study builds on extant research by including a naturalistic high-risk comparison group upon which to model naturalistic changes in drinking behavior over time. This method helps determine whether longitudinal changes to drinking outcomes are attributable to BASICS rather than a reflection of expected changes in college

drinking over time (Del Boca, Darkes, Greenbaum & Goldman, 2004; Greenbaum, Del Boca, Darkes, Wang & Goldman, 2005). This step is especially relevant with mandated samples given that those students report significant decreases in drinking post-sanction independent of receiving any formal intervention (Hustad, et al., 2011; Morgan, White & Eun Young, 2008; White, Mun & Morgan, 2008).

Method

Design

In this randomized control trial, eligible heavy drinking students mandated and voluntary were assigned to BASICS or a control group. The volunteer control group was an assessment only (AO) condition. The mandated control group completed baseline assessments and were then informed that they were randomly assigned to a 6-week[1] wait list control (WLC). After completing the 4-week post-test, WLC participants received BASICS[2] and therefore no longer served as a control group beyond the 4-week assessment. Between-subjects factors included condition (BASICS, control) and referral group (voluntary, mandated). The design included one within-subjects factor, time of assessment (baseline, 4 weeks, 3, 6, 12 months). Intervention outcome variables included drinking frequency: (a) weekly drinking, (b) weekly drinking frequency, (c) typical drinks (number of drinks consumed on an average drinking occasion), (d) peak drinks (number of drinks consumed on a heavy occasion), and (e) alcohol problems.

Participants

Undergraduates aged 18-24 were invited to participate in an alcohol intervention study (*N* = 550). Participants identified themselves as 83.7% Caucasian, 10.1% African American, 3.9% Latino, 1.2% Asian, 0.8% other/unknown, and 0.4% American Indian. Participants were ethnically representative of the university during recruitment which included 79% Caucasian students and 21% ethnic minorities. Compared with the larger university sample, participants were more likely to be male (65% vs. 49%). Inclusion criteria for mandated and voluntary participants were: (1) drinking at least monthly and endorsing past month binge drinking (i.e., consuming > 5 drinks/occasion for men or > 4 for women) in the past year; (2) reporting at least three alcohol-related problems on 3 to 5 occasions in the past year; and (3) scoring > 6 on the Alcohol Use

Disorder Identification Test (AUDIT) which is indicative of risky drinking practices (Saunders, Aasland, Babor, De La Fuente & Grant, 1993). Mandated students were required to have a campus disciplinary referral following a recent first time alcohol policy violation. Voluntary students were required to have no history of an alcohol-related event that led to disciplinary action. Exclusion criteria included not meeting drinking inclusion criteria (*n* = 189), serious alcohol use disorder symptoms such as physiological dependence (*n* = 2), previous alcohol-related disciplinary referrals (*n* = 16), and not aged 18-24 (*n* = 4). Students who endorsed current alcohol use disorder or serious symptoms of alcohol use disorder (e.g., physiological withdrawal symptoms) were referred to appropriate longer-term treatment as BASICS is not recommended for students with moderate to severe alcohol use disorder symptoms (Dimeff et al., 1999). Of the 550 that expressed interest in study participation, 520 completed the eligibility screening appointment, 309 met eligibility criteria, and 255 enrolled in the trial. Figure 1 contains recruitment and enrollment data.

Measures

Self-reported demographic information (age, sex, ethnicity, living arrangement, year in school, Greek system involvement, previous alcohol-related disciplinary citations, and previous alcohol-related intervention) were collected. The date and reason for sanction were collected for mandated students.

Alcohol use severity. The *AUDIT* (Saunders, et al., 1993) was used to screen for baseline alcohol use severity. The 10-item self-report measure was developed by the World Health Organization to identify current hazardous drinking (Babor, Higgins-Biddle, Saunders, & Monterio, 2001). Total scores range from 0 to 40. A cut-off score of 6 or greater demonstrates 91% sensitivity and 60% specificity in the detection of high-risk alcohol use in a college sample (Kokotailo, et al., 2004). In the present sample, internal consistency was acceptable (α = .76).

Alcohol use. The Daily Drinking Questionnaire (DDQ; Collins, Parks & Marlatt, 1985) was used to assess average self-reported weekly drinking frequency and drinking quantity over the past month. The measures asks students to record the number of drinks typically consumed each day during the week and the time spent drinking each day during the last month. Scoring

produces continuous measures of the number of drinking days per week (weekly frequency) and total drinks per week (weekly quantity). The Quantity/Frequency Index (QFI; Dimeff, et al., 1999) was used to assess average alcohol consumption on typical (typical drinks) and heavy drinking (peak drinks) occasions during the past month. Each item is scored 1 (0 drink), 2 (1–2 drinks), 3 (3–4 drinks), 4 (5–6 drinks), and so on through 11 (more than 19 drinks). The QFI is effective in measuring changes in drinking patterns (Dimeff, et al., 1999).

Alcohol-related problems. The Rutgers Alcohol Problem Inventory (RAPI; White & Labouvie, 1989) is a 23-item self-report measure constructed to assess the impact of negative alcohol-related consequences on students' personal, social, and academic functioning. As a screening instrument, the RAPI timeframe was the past year. As an outcome measure (assessment and follow-up), the RAPI timeframe was the past month. Items are rated on a 5 point scale (0 = *never* to 4 = *more than 10 times*). Total scores range between 0 and 115. The RAPI coefficient was adequate in this sample (α = .86) and consistent with previous findings (Carey, et al., 2009).

Additional measures were collected to create the personalized feedback. The Drinking Norms Rating Form (Baer, Stacy & Larimer, 1991) assessed student perceptions of drinking quantity and frequency for different peer groups. The Protective Behaviors Strategy Survey (Martens, et al., 2005) assessed the occurrence of cognitions and behaviors associated with lower risk of heavy drinking (e.g., *avoid drinking games*). The Comprehensive Effects of Alcohol (Fromme, Stroot & Kaplan, 1993) assessed positive and negative alcohol outcome expectancies (e.g., *I would feel relaxed*).

Procedure

Screening and Recruitment. Students were recruited through campus advertising, the psychology research pool, and university judicial affairs. Interested participants (mandated and voluntary) attended an appointment at the university's psychology graduate training clinic to learn of study procedures, provide written consent, and to be screened for eligibility (see Participant section). Eligible participants were informed of randomized trial procedures. Students interested in the larger trial were randomized and allocated a baseline assessment appointment within one

week. BASICS participants received the BASICS feedback appointment two weeks after the baseline assessment, while WLC participants were scheduled to receive an appointment for BASICS six weeks after the baseline assessment[2]. All participants that provided follow-up data (excluding mandated students' 4-week assessment, see below) could elect to receive either course credit or one drawing into a $300 lottery for each completed assessment.

Mandated students were presented with the research study by a Judicial Affairs officer during a judicial hearing and were told their participation through the 4-week assessment would satisfy disciplinary requirements. Therefore mandated participants received no compensation for completing the 4-week follow-up. As an alternative to research participation, mandated students could attend a 3-hour alcohol education class as standard practice. Mandated students that were interested in research participation were provided with the researcher's contact details and asked to schedule the initial screening meeting within two weeks of the judicial hearing. Mandated students that did not contact the research team or did not meet the minimum drinking inclusion criteria were asked to attend the alcohol education class. The study was approved by the university's institutional review board. The confidentiality of research data was assured with a Certificate of Confidentiality from the U.S. Department of Health and Human Services.

Randomization. Computer-based urn randomization (Stout, Wirtz, Carbonari & del Boca, 1994) was employed to reduce the likelihood of differences between conditions on the following variables: baseline drinking, referral group, gender, and current Greek membership status. Given that binge drinking is associated with greater weekly alcohol use (Johnston, et al., 2013; Knight, et al., 2002) and approximately one-third of college students endorsed in past month binge drinking, binge drinking frequency (> 4 past-month episodes) was employed as a cut-off score on screening measures to minimize baseline differences in drinking. Nearly 88% (*n* = 255) of eligible students (*n* = 291) enrolled in the trial (Figure 1).

Baseline Assessment. Participants met with a trained clinical psychology graduate student for 50-minutes to complete consent forms and self-report measures using a secure online data collection service (www.hostedsurvey.com). Although computerized and pencil-and-paper formats are highly correlated (Gwaltney, Shields & Shiffman, 2008), electronic data collection was

chosen as it increased the ease and accuracy of data entry and facilitated the production of the personalized feedback form. Control conditions completed the baseline assessment and did not receive any feedback regarding their drinking behavior.

Intervention. BASICS was delivered in accordance with the manual (Dimeff, et al., 1999). BASICS participants were asked to track their daily drinking for approximately 2 weeks prior to the feedback interview using alcohol monitoring cards (Dimeff, et al., 1999). Each 50-minute feedback intervention was individually tailored based on baseline drinking data, which consisted of a collaborative review of the personalized feedback form and alcohol monitoring cards using a motivational interviewing approach (Miller & Rollnick, 2002). Each session included the following components: (a) an evaluation of typical drinking patterns as recorded on the alcohol monitoring and baseline assessments of drinking behavior; (b) a comparison of typical patterns of alcohol use and perceived norms to actual campus norms of same-age peers; (c) a review of the biphasic effects of alcohol; (d) a personalized review of drinking consequences; and (e) a review of placebo and tolerance effects of alcohol. Participants received written information on strategies to reduce heavy drinking and received a blood alcohol content (BAC) card based on the participant's gender and self-reported weight, which provides estimated BAC levels based on number of hours of drinking and number of drinks consumed (Matthews & Miller, 1979). The interventionist did not discuss referral reasons during the feedback session as this action would have made the interventionist aware of the participant referral group.

Intervention Integrity. The study interventionist and first author received BASICS training by the third author. Ongoing clinical supervision was provided by the third and fourth authors. A checklist review of the intervention fidelity of BASICS sessions was conducted by a research assistant to evaluate therapist adherence to the BASICS protocol. The following core BASICS components were addressed in 100% of the intervention sessions: (a) a review of the participant's alcohol consumption pattern; (b) a discussion of peer drinking norms patterns; (c) estimates of the participant's blood alcohol levels (BALs). The following components were reviewed at a rate of 97 to 100% of sessions: (a) a review of the participant's negative experiences with alcohol (e.g., alcohol blackouts, drinking and driving); (b) a review of the effects and consequences of alcohol

tolerance; (c) a discussion of the biphasic effects of alcohol. In terms of participant interest in BASICS, 85% of participants randomized to BASICS completed baseline self-report measures and attended the assessment interview. Ninety-six percent of BASICS participants utilized the alcohol monitoring cards to record consumption between the assessment and feedback interview indicating good intervention adherence; 98% of participants who completed BASICS also completed the 4-week assessment. No significant differences in intervention integrity were observed between mandated and voluntary BASICS sessions for component coverage, therapist adherence, or use of self-monitoring cards (all *p's* > .05).

Post-Test Assessment. Four weeks post-BASICS, participants completed post-test measures of alcohol use and related problems. The link to the online post-test measures was emailed to participants using several repeated email reminders. After completing post-test measures, the WLC group received BASICS. Volunteers who completed the post-test received research credit points for their psychology courses. After completing the post-test assessment, university judicial affairs was notified when mandated students' disciplinary requirements were met. Ninety-four percent of the 225 participants who completed the assessment interview also completed the 4-week post-test assessment (*n* = 211 total; 112 mandated, 99 voluntary).

Follow-up Assessment. Follow-up assessments were collected 3-, 6-, and 12-months post-intervention. Follow-up and post-test assessments were identical. Students who completed follow-up assessments could select compensation (e.g., extra credit points or one entry in a $300 cash prize lottery) for each completed assessment. Participant retention in the remaining three groups (mandated BASICS, volunteer BASICS, volunteer control) was adequate but declined over time. Of the 156 participants who completed the 4-week follow-up in the remaining three groups, 89% completed the 3-month assessment; 79% completed 6-month assessment, and 67% completed the 12-month assessment (see Figure 1).

Data Analysis

Attrition

Attrition bias was evaluated to determine if baseline outcomes differed between dropouts and completers. To reduce the likelihood of overestimating an intervention effect due to missing

follow-up data, an intent-to-treat strategy was employed given that study aims were to estimate trends over time rather than to obtain precise outcome estimates (National Research Council, 2010; Mazumdar, Liu, Houck & Iii, 1999). All randomized participants providing baseline assessment data were included in analyses (*n* = 225).

Primary Analyses

Multilevel longitudinal models were developed using IBM Statistical Package for the Social Sciences (Heck, Thomas & Tabata, 2010). Separate models were developed to evaluate immediate and long-term changes in outcome variables (weekly quantity, weekly frequency, typical drinks, peak drinks, and alcohol problems) over time by aggregate intervention condition (BASICS, control) and referral group (mandated, volunteer). Models were developed to control for baseline differences (gender, Greek status) and within-subject correlations for each subject, which allowed for a more tolerant method to handle attrition. Greek status was added to the initial models to control for Greek system membership-related participant attrition; however, the variable did not contribute to the model and was removed from the final models for each dependent variable.

Models were constructed with model comparisons using the full maximum likelihood estimation procedure. Models employed a random intercept for each subject and a random effect for time, which allowed study outcomes to be correlated across time points for each study subject (i.e., an individual regression line is created for each subject across all time points). However, with time added as a random factor, the models failed to converge, even with number of iterations expanded to 500. Thus, time was included as a fixed factor.

Assumptions about the expected effects of change over time among intervention and control groups influenced model development. First, the volunteer control group was expected to decrease drinking over time without receiving the intervention (Borsari & Carey, 2005; Marlatt, et al., 1998). Thus, change over time in the dependent variables within the BASICS conditions were modeled against naturalistic change over time in the volunteer control condition (i.e., slope of the volunteer control group). Next, an aggregate treatment intervention condition was added (i.e., mandated and volunteer students who received BASICS) to evaluate change in the dependent

variables over time among BASICS participants relative to the high-risk volunteer control. Second, the largest change in dependent variables was hypothesized to occur between baseline and the 4-week post-test assessment (Borsari & Carey, 2005; Marlatt, et al., 1998). Although change was hypothesized to be maintained between 4-week and 12-month follow-up among intervention groups, the slopes representing change over time within the control group was not (i.e., different slopes over time). Thus, the first model evaluated initial change in the dependent variables from baseline to 4-week post-test. The second model evaluated sustained change in the dependent variables from 4-week to 12-month post-intervention. Analyses were conducted in a step-wise manner for each predictor variable. The predictor variables were retained if the likelihood ratio indicated significant improvement in the model. Models were constructed using Level 1 (within-subjects) and Level 2 (between-subjects model) variables. Models were compared to evaluate fit.

The Level 1 within-subjects model reflected the average value of the selected dependent variable. Level 1 variables were hypothesized within-groups predictors of change in the dependent variables, such as time, condition, sex, referral group, and Greek system membership. Time was dummy coded (0 = baseline; 1 = 4-week follow-up; 3 = 3-month follow-up; 6 = 6-month follow-up; 12 = 12-month follow-up). Condition (0 = control, 1 = aggregate BASICS), sex (0 = male, 1 = female), referral group (0 = mandated, 1 = volunteer), and Greek system membership (0 = current member, 1 = former/never member) were dummy coded. Level 2 variables included between-groups predictors of change in the dependent variables, allowing for the examination of interactions between groups consistent with the study hypotheses. Between-groups predictors of the interaction of time × condition and referral group × condition were evaluated.

Results

Preliminary Analyses

Descriptive variables and primary dependent variables by intervention condition and referral group are presented in Tables 1 and 2. The control condition reported a significantly higher baseline RAPI score (M = 16.49, SD = 12.73) relative to the intervention condition (M = 12.81, SD = 9.13), controlling for sex, $F(4, 220) = 6.21$, $p < .05$, $d = .33$. No significant differences were found between referral groups on age, ethnicity, year in school, living arrangement, Greek

system membership, drinks per week, drinking frequency, typical drinks, peak drinks, or alcohol-related problems. Mandated students were more likely to be male (76.7%) relative to volunteer students (42.9%), χ^2 (1) = 27.86, $p < .001$. Sex was added as a covariate in BASICS outcome analyses given this difference.

Attrition analyses indicated that participants who did not complete the 12-month follow-up assessment were significantly more likely to be former Greek system members (71% noncompleters), χ^2 (2) = 13.80, $p < .00$, and mandated students (38% noncompleters; 18% volunteer noncompleters), χ^2 (1) = 11.70, $p < .001$. Greek system membership was evaluated as a factor in the primary longitudinal analyses (Aim 1b) and subsequent attrition analyses. Noncompleters reported significantly fewer baseline peak drinks (M = 5.41, SD = 1.93) relative to completers (M = 6.32, SD = 2.22), F(3, 221) = 7.02, $p < .01$, d = .44, controlling for sex and Greek system membership. No significant differences were found between completers and noncompleters for intervention condition assignment, age, sex, race, ethnicity, year in school, living situation, or baseline intervention outcomes (all p's > .05; d's .02 - .14).

Primary Analyses

Table 3 presents fixed effect estimates and significance tests for the model showing short-term changes in drinking variables over time by aggregate intervention condition. The main effect of time was significant, indicating that without receiving any formal intervention, participants consumed 2.32 fewer drinks per week, decreased peak drinking approximately 1 drink per occasion, and achieved a 2.61 lower RAPI score from baseline to the 4-week post-test (all p's < .05). Within-groups effects of time were calculating using baseline and 4-week assessment scores of outcomes variables (Table 2). Small to medium within-groups effect sizes (Cohen, 1988) were observed in the AO control (quantity, d = .31; frequency, d = .20; typical, d = .22; peak, d = .12; RAPI, d = .41). Within-groups effect of time in aggregate BASICS conditions were of medium to large effect (quantity, d = .91; frequency, d = .51; typical, d = .38; peak, d = 1.08; RAPI, d = 1.05).

Assignment to intervention significantly predicted further lower values for drinks per week, typical drinks, and peak drinks from baseline to the 4-week follow-up beyond what was observed within the control group (all p's < .01). Assignment to intervention was associated with marginally

significant reductions in post-test alcohol problems ($p < .10$) and did not significantly predict reductions in drinking frequency. Specifically, intervention assignment was associated with consuming 5.14 fewer drinks per week, 1-2 fewer drinks per typical occasion, 2-3 fewer drinks per peak occasion, and 2.56 points lower total RAPI score at the 4-week post-test. These estimates are above and beyond control group predictions. We calculated between-groups effects from mean scores of variables across aggregate intervention groups relative to AO control at the 4-week assessment. Medium to large effect sizes were observed (quantity, $d = .59$; frequency, $d = .41$; typical, $d = .76$; peak, $d = .92$; RAPI, $d = .87$). Men consumed 4.16 more drinks per week, 1 drink more per typical condition, 1-2 drinks more per peak occasion, and reporting 2.56 more alcohol problems than women. Referral group was not a significant predictor of short-term change over time for any alcohol-use variable nor was the interaction between referral group and intervention condition significant. Fixed effects estimates further confirm the lack of baseline differences between intervention and control groups among alcohol-consumption related variables (i.e., the BASICS intercept did not significantly differ from the control intercept).

Estimated model fit indices are presented in Table 4. Fit comparisons (i.e., Δ -2 *log L* estimates) between the full Level 2 models and the intercepts only models showed that the addition of the between-groups effect significantly predicted changes in the dependent variables over time better than did intercepts only or time alone. Specifically, Level 2 models significantly contributed to better estimates of weekly drinking (i.e., 2381.407-2254.106 = 127.301, Δ $df = 6$, $p < .05$), typical drinks (1348.282 - 1283.849 = 64.433, Δ $df = 6$, $p < .01$), peak drinks (1453.355 - 1352.239 = 101.116, Δ $df = 6$, $p < .01$), and alcohol problems (2449.718 - 2317.709= 132.009, Δ $df = 6$, $p < .01$), were better estimated by the addition of Level 2 predictors than was time alone. Weekly drinking frequency was not better predicted by the addition of Level 2 predictors as no significant intervention effect was detected.

Long-term intervention efficacy and change over time was tested in a second model among the remaining 3 groups (mandated BASICS, voluntary BASICS intervention, voluntary control; $n = 169$), controlling for sex and baseline Greek status membership. Separate models were run for each intervention outcome variable. Level 1 within-groups variables were identical to

the short-term intervention effect model described above. However, for this model, two alternative Level 2 models were constructed. Model A was constructed to establish intervention efficacy over time regardless of referral group. Condition was dummy-coded (0 = volunteer control, 1 = aggregate BASICS). Model B was conducted with participant referral group and intervention condition was dummy-coded (0 = volunteer control, 1 = volunteer BASICS, 2 = mandated BASICS) to evaluate whether referral group affected long-term intervention efficacy over time.

Models predicted significant additional decreases in weekly drinks, drinking frequency, typical drinks, peak drinks, and alcohol problems over time (4-week post-test to 12-month follow-up) within the control group (see Table 3). Being male predicted heavier weekly drinking (i.e., males consume 3.17 more drinks per week, 1-2 more drinks on typical and peak occasions), and more frequent drinking (i.e., ½ an occasion more per week), but did not predict significantly greater alcohol problem severity.

Model A. Evaluation of the control slope presented in Table 3 suggests students decreased drinking by nearly one drink per assessment period (i.e., 0.86 drinks), 0.13 fewer drinking occasions per week, 0.27 fewer typical drinks, 0.32 fewer peak drinks, and 0.88 lower RAPI score. Thus, among the 4 post-intervention assessment periods, three different contrasts are made to calculate change in the variable from the 4-week post-test to the 12-month follow-up assessment (i.e., -0.86 drinks per week x 3 = -2.58 additional fewer drinks over time).

Comparison of the BASICS slope to the control slope for each dependent variable provides information regarding the condition × time interaction. Predicted change over time between BASICS and control group can thus be estimated by adding the estimated BASICS slope to the estimated control slope. Models indicated a sustained condition × time interaction such that over time, condition produced significant change in typical drink consumption (0.27), peak drink consumption (0.29), and RAPI score (1.35) over the 12-month assessment period (all p's < .05). The intervention × time interaction only approached significance for weekly drinking (p < .10). Specifically, relative to the control group, the BASICS group was predicted to consume 1-2 fewer drinks on typical drinking occasions, 3-4 drinks on peak drinking occasions, score 6.92 points lower on the RAPI, drink on 1 occasion less per week, and consume 6.11 fewer drinks per week.

The BASICS condition was expected to maintain significantly different slopes from the control group through the 12-month follow-up. For measures of typical and peak alcohol consumption, the slope for BASICS condition approached zero, which suggests that intervention gains were maintained over time. Further, the BASICS slopes for weekly drinking continued to be marginally negative over time for weekly drinking (i.e., -0.86 + 0.76 = -0.10). In sum, BASICS participants continued to make significant reductions in their drinking from 4-week through 12-month follow-up assessment. Between-groups effects were calculated across aggregate intervention and AO control group using mean outcome scores from the 12-month assessment. Small to large effect sizes were observed (quantity, d = .38; frequency, d = .08; typical, d = .11; peak, d = .42; RAPI, d = .56).

Fit analyses indicated that Model A Level 2 predictors described changes to the dependent variables over time significantly better than did time alone for the following variables: weekly drinking (Δ *-2 log L* = 223.267; Δ *df* = 5, $p < .01$), drinking frequency (Δ *-2 log L* = 183.534; Δ *df* = 5, $p < .01$), typical drinks (Δ *-2 log L* = 217.073; Δ *df* = 5, $p < .01$), peak drinks (Δ *-2 log L* = 233.815; Δ *df* = 5, $p < .01$), and alcohol-problems (Δ *-2 log L* = 106.784; Δ *df* = 5, $p < .01$).

Model B. An alternative Level 2 predictor model was constructed to evaluate the effect of BASICS over time on the dependent variables while taking into account the effect of participant referral group. The purpose of Model B was to further evaluate Level 2 effects of condition and condition × time interactions by referral group (i.e., mandated BASICS vs. volunteer BASICS). In Model A, both BASICS groups were modeled against the volunteer control group. The fit of Model B was evaluated against the fit of Model A to determine if the addition of referral group to the model explained any additional variance concerning outcomes over time. See Figure 2 for predicted means of outcome variables between referral groups over time.

Results indicate that across all outcome variables, referral group and the interaction of referral group × condition did not significantly contribute to the model. Specifically, the change in intercept from volunteer BASICS to mandated BASICS did not significantly differ for total drinks, drinking frequency, typical drinks, peak drinks, or alcohol-problems (see Table 3). Volunteer BASICS students reported consuming 6.39 fewer drinks per week, 1-2 fewer drinks per typical

occasion, 2-3 fewer drinks per peak occasion, reducing drinking frequency by approximately one occasion per week, and scoring 6.30 points lower on the RAPI. Mandated BASICS students followed a similar pattern of consuming 7.03 fewer drinks per week, 1-2 fewer drinks per typical occasion, 2-3 fewer drinks per peak occasion, reducing drinking frequency by approximately one occasion per week, and scoring 4.87 lower on the RAPI. Fit evaluation of Model B relative to Model A indicated that the addition of referral group in Model B marginally improved prediction of alcohol problems only (Δ *-2 log L* = 3.721, Δ *df* = 1, $p < .10$). Referral group did not significantly contribute to model fit for weekly drinks, drinking frequency, typical drinks, or peak drinks (see Table 4). Between-groups effects were calculated across mandated and voluntary BASICS conditions using mean 12-month outcome scores. Small effects were observed (quantity, $d = .17$; frequency, $d = .25$; typical, $d = .07$; peak, $d = .16$; RAPI, $d = .02$).

Discussion

This randomized clinical trial examined the long-term impact of BASICS among heavy drinking mandated students relative to equally heavy drinking volunteer students. The study was unique in that it included a naturalistic control group and a mandated student control group to ensure that changes in drinking behavior observed over time were attributable to the intervention and not due to normal changes in drinking over time (Del Boca, et al., 2004; Greenbaum, et al., 2005) or to the disciplinary process itself (Hustad, et al., 2011; White, et al., 2008). Results of the present study are encouraging as BASICS resulted in sustained long-term reductions in drinking and alcohol-related problems among both mandated and volunteer BASICS groups.

Regarding the short-term outcomes, BASICS produced significant decreases in weekly drinking, typical alcohol consumption, and peak alcohol consumption. Differences in alcohol consumption between BMI and control groups were of medium to large effect size. BASICS participants also reported fewer alcohol problems, with a large effect, relative to control. Importantly, referral group status did not significantly impact the models, suggesting that mandated students responded to BASICS comparably to their heavy drinking volunteer counterparts. The present findings are in line with our pilot data that found BASICS to be associated with lower weekly alcohol consumption and less peak drinking among mandate and

voluntary students (authors masked, 2010). The present findings extend pilot findings by suggesting that BASICS is also associated with significantly less alcohol consumption on typical drinking occasions, which is likely due to increased power of our larger sample size. In both studies, the difference in alcohol-related problems at 4-week follow-up was only marginally significant (although of large effect size). This finding may be due in part to the short assessment window (i.e., 4-weeks), during which time students continued to experience alcohol-related problems such as university sanctions, financial difficulties involved with legal fees, threat of academic difficulties if expelled for alcohol policy violations, etc.

The longitudinal component of the study demonstrated that reductions in typical drinks and peak drinks were sustained at the 12-month follow-up for both mandated and volunteer BASICS participants with medium to large within-groups effect sizes. Furthermore, there was a trend for BASICS participants to continue to reduce their drinking over the 12-month assessment period relative to controls, regardless of referral status. However, it should be noted that differences in weekly drinking quantity remained only marginally significant at 12-months post-intervention, which is likely due to the finding that the control group also reported lower drinking over time. Repeated assessment of alcohol use and alcohol problems might have raised control participants' awareness of ongoing risky or heavy drinking behaviors independent of receiving intervention.

In contrast to previous research (Barnett, et al., 2007; Carey, et al., 2011; Carey, et al., 2009) our data suggest that mandated students maintained significant long-term decreases in alcohol problems following the intervention which is consistent with Borsari et al. (2012) and White et al. (2007)'s findings. Thus, the current study's findings provide some support that sustained decreases in drinking may be necessary to reduce long-term alcohol problems among mandated students as alcohol problems were only marginally significant at the short-term follow-up. However this contention remains to be tested as Borsari et al. (2012) found mandated students reported lower alcohol problems at a 9-month assessment without having significant reductions in drinking. The finding that mandated students reported lower long-term alcohol problems after BASICS is of particular interest in light of the current study's recruitment process. Recent research suggest heavier and presumably more problematic mandated drinkers are most likely to

self-select a face-to-face BMI as a mandated treatment option and they also experience better BMI outcomes (Carey, et al., 2013). Research also suggests that autonomous health behavior change is more likely to be sustained than is forced change (Markland, Ryan, Tobin & Rollnick, 2005), which may partially account for positive long-term findings in the current study.

All participants reported only modest reductions in drinking frequency at 4-weeks and 12-months. This finding suggests that students do not necessarily drink less frequently after intervention. Rather, students consume fewer drinks per drinking occasion, which may equate to lower BAC levels when drinking and less risk of experiencing adverse consequences such as alcohol tolerance (Weiss & Porrino, 2002). For example, BASICS participants were predicted to consume 3-4 fewer drinks per peak occasion relative to controls. Thus, a 150-lb male consuming 6 drinks in a two hour peak occasion would experience a BAC of 0.13. This high BAC level is associated with motor impairment and legal intoxication. Post-BASICS, a 3-4 drink reduction would produce a BAC of 0.03 - 0.05, which is associated with mild cognitive effects and also remains within the legal limits in most states ("National Highway Traffic Safety Administration," 2005). Thus, our findings that BASICS participants, regardless of referral status, reported lower alcohol problems at 12-months may be a product of reduced cognitive or motor impairment during drinking episodes due to lower BAC, although this hypothesis cannot be confirmed by the current data given that we did not record time spent drinking per drinking episode. Given the variability in college drinking, future studies should consider collecting data on time spent drinking to accurately estimate pre- and post-intervention BAC.

Taken together, we did not find evidence that mandated students' drinking behavior at 12-months post-intervention had returned to high pre-intervention levels, which had been reported in similar studies using mandated samples (see Barnett, et al., 2007; Carey, et al., 2011; Carey, et al., 2009). Rather, drinking remained improved from baseline up to 12-months, especially for peak and typical occasion drinking. One possible explanation for the disparate findings is that the current study recruited heavy and problem drinkers in both referral groups. Thus, unlike in previous studies, our mandated sample did not include lighter and non-problem drinking students who received a disciplinary referral. Recent findings suggest that heavier drinking mandated

students have greater BMI outcomes relative to lighter drinking students (Carey, et al., 2013). In Carey et al. (2013), adjudicated students who self-selected into a BMI reported baseline drinking of 15.45 drinks per week and 5.58 drinks per occasion, whereas students that self-selected alcohol education reported 12.16 drinks per week and 4.16 drinks per occasion. In the current study, mandated students reported an average of 18.14 baseline drinks per week and 6.20 drinks per heavy drinking occasion (see Table 2). Thus, the provision of BASICS-like BMIs may be beneficial in disciplinary settings for at-risk heavy drinking students and/or recurrent high-risk alcohol policy offenders who have previously attended alcohol education classes and continue to experience alcohol problems. The use of a stepped care model using a BMI as the final intervention step may also effectively reduce alcohol problems among high-risk mandated student drinkers in a more cost-effective manner (Borsari, et al., 2012). Further research is warranted to determine predictors of heavy drinking relapse among mandated students, especially within a disciplinary setting.

Based on the present findings and the extant literature, we offer the following practice recommendations. First, consistent with prior work (Hustad, et al., 2011; Morgan, et al., 2008), disciplinary action alone was associated with modest within-groups reductions in drinking and problems. Thus, ‘getting caught’ appears to act as a lower impact intervention for some student drinkers. However, receiving BASICS intervention produced significant reductions in alcohol use and related problems above and beyond the impact of disciplinary action, suggesting heavy-drinking mandated students who choose to undergo a brief treatment may receive the greatest benefit from a BASICS referral. The provision of BASICS-style programs within a disciplinary setting is recommended to reduce heavy drinking among at-risk students, especially given present findings that mandated and volunteer students report similar long-term benefits. Second, BASICS might be more efficacious among heavier versus lighter drinking students even in disciplinary settings (Carey, et al., 2013). Thus, it is recommended that potentially at-risk students are screened for alcohol risk severity using empirically derived brief screening tools (e.g., AUDIT) and that such scores are used to inform treatment referral decisions (i.e., higher risk students may be most likely to benefit from BASICS). Third, the current study employed the original BASICS

model, which included two face-to-face sessions (assessment, feedback) with self-monitoring of drinking between sessions. Similar BMI outcome studies have employed condensed single session interventions where feedback is provided remotely (via mail or email) and often without the use of self-monitoring cards. Although Barnett et al. (2007) found no differences in outcomes among students who were randomized to receive or not receive a 1-month booster session following a one-session BMI. Adherence to the original model is considered a strength of the current study as may be one possible reason for the slightly larger observed effect sizes and better long-term intervention outcomes among mandated students.

The present study's findings must be considered in light of its limitations. First, the data collected was largely based on self-report which is biased, however research indicates that self-report is more accurate than collateral data in the assessment of college drinking (Borsari & Carey, 2005; Marlatt et al., 1998; Smith et al., 1995; Chermak et al., 1998). Furthermore, the expense of collateral data does not appear to be off-set by corresponding benefits (Babor et al., 2000; LaForge et al., 2005). Lastly, non-self-report measures of alcohol use are not available or useful for assessing college drinking behavior (e.g., biomarkers).

Our heavy drinking inclusion criteria likely excluded minority students who tend not to drink as heavily as Caucasian students (O'Malley & Johnston, 2002). Our full sample was fairly representative of diversity within the full student body; however, mandated participants were significantly more likely to be white males. Thus, the present findings should be interpreted with caution when generalizing to females and more diverse university student populations. Future investigation of the BASICS efficacy for ethnic and racially diverse universities warrants investigation.

Participant attrition poses a significant problem to longitudinal research. Several methods were applied to minimize the impact of attrition on study results and therefore improve the strength and validity of our findings. Intent-to-treat analyses were conducted to ensure that all students that provided baseline data were included in the analyses so as not to introduce survivor bias. Secondly, analyses were conducted to evaluate baseline differences between responders and non-responders to ensure that those most likely to benefit from a brief intervention (i.e., heavy

drinkers) did not withdraw from research participation. Analyses of completers relative to noncompleters indicated that students who were lighter drinkers and former/never Greek system members were more likely to withdraw from participation. Thus, the intervention appeared to appeal to the target population of heavy drinkers, although findings might not generalize to less heavy drinking mandated students and lighter drinking students in general. Lower mandated BASICS (66%) vs. voluntary BASICS (76%) student retention through the 12-month follow-up may have influenced the nature and strength of our findings, although an intent-to-treat strategy was employed. However, current study retention at 12-months (mandated BASICS, 64%; volunteer BASICS, 69%; volunteer control, 62%) was lower than with previous BMI outcome research among mandated student drinkers (70%; Carey et al. 2009) and heavy drinking volunteers assigned to a BMI (75%; Carey et al. 2006). In our sample, mandated BASICS sample was referred from the general student body, whereas, the voluntary sample was primarily recruited through the Psychology research participant pool. Psychology students may have been more incentivized to complete follow-up measures to receive extra credit points toward psychology courses rather than earn a lottery drawing entry. Thus, lottery-based remuneration may be inferior to fixed payments for longitudinal participant retention, although this contention warrants investigation. Lack of fixed payments in the current study, therefore, represents a design limitation. Additional research investigating mandated student attrition in longitudinal trials may inform future prevention efforts and may further refine intervention protocols within this population.

In our sample, mandated students were able to either self-select into a research study evaluating BASICS or elect to complete treatment as usual (alcohol education) to fulfill disciplinary requirements. Given the relation between autonomy and sustained behavioral change, it could be that students who elected to receive BASICS were more amenable to behavior change, which may have resulted in greater intervention outcomes in the current study. Developing a better understanding of baseline characteristics of students who elect to undergo brief intervention relative to alcohol education or related classes could be an important step in this line of research.

An additional limitation was that the study interventionist was not blind to study hypotheses. Studies using one primary interventionist run the risk of unintentionally biasing

intervention delivery, which may have been the case in the current study given that the effect sizes were slightly larger than in previous studies. The current design would have been strengthened were the interventionist blind to study hypotheses.

We employed an intent-to-treat strategy using LOCF as a method of handling missing data. Recent research suggests that multiple imputation may be a superior method of data imputation given that it produces more precise model estimates (National Research Council, 2010). However multilevel models are generally robust to missing data (Quene & van den Bergh, 2004; Tabachnick & Fidell, 2007) and LOCF remains an acceptable approach to estimate trends overtime (Enders, 2010), which was the aim the current study.

In conclusion, study findings suggest that BASICS-style BMIs appear to be as efficacious for reducing risky alcohol use among heavy drinking mandated as for volunteer students. This is a unique study that utilized a heavy drinking volunteer group as a comparison group to help reduce the risk of misinterpreting naturalistic or disciplinary event-related reductions in drinking behavior as intervention effects among mandated students. The present study contributes to the literature concerning efficacious BMIs that could potentially be utilized within a standardized disciplinary process for handling alcohol policy violators on university campuses. Additional research evaluating the feasibility, costs, and effectiveness of BASICS style programs operated by the campus judicial system, as well as individual difference variables related to intervention outcomes, will be important next steps in this line of research.

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Footnotes

[1] To ensure that 4-week post-test measures were collected at the same time for BASICS and WLC conditions, WLC participants completed the 4-week assessment six weeks after completing the baseline assessment. This period took into account the two week period between the baseline assessment and feedback interview for BASICS participants plus the four week waiting period to the 4-week assessment.

[2] The study's wait-list period did not exceed the University's alcohol education class wait-list. Therefore, we believe WLC participants experienced no greater risk of continued alcohol-related harm than if they did not participate.

Table 1

Baseline demographics characteristics

Variable	Mandated Students		Volunteer Students		
	BASICS (*n* = 58)	Control (*n* = 56)	BASICS (*n* = 57)	Control (*n* = 54)	*p*
Demographics					
Sex, male, %	72.4[a,b]	80.4[c,d]	49.1[a,c]	40.7[b,d]	.00
Race, White, %	92.2	91.1	82.5	88.9	.44
Residence, off-campus, %	70.7	66.1	86.0	70.4	.40
Age, years, mean (SD)	20.12 (1.53)	20.14 (1.69)	20.24 (1.73)	20.00 (1.47)	.64
Greek-system membership, %	43.1	46.4	29.8	40.7	.38
Class (fresh./soph.), %	48.3	44.6	47.4	46.3	.44
Screening variable					
AUDIT score	11.60 (4.98)	12.59 (5.40)	12.49 (4.44)	12.79 (5.22)	.62
Reason for referral					.74
Drunk in public					
n	20	13			
%	34.5	23.2			
Underage possession					
n	10	15			
%	17.2	26.8			
DUI					
n	11	10			
%	19.0	17.9			
In the presence of alcohol					
n	5	7			
%	8.6	12.5			
Emergency room					
n	3	4			
%	5.2	7.1			
Assault					
n	3	1			
%	5.2	1.8			
Vandalism					
n	0	1			
%	-	1.8			
Other					
n	6	5			
%	10.3	8.9			

Notes: In a given row, values that share the same superscript letter indicate a significant between-groups difference. Fresh./soph. = freshman/sophomore; AUDIT = Alcohol Use Disorder Identification Test; DUI = driving under the influence.

Table 2

Baseline and follow-up drinking variables scores over time among mandated and volunteer students assigned to BASICS or a control group

	Mandated Students		Volunteer Students	
Variable	BASICS (*n* = 58)	Control (*n* = 56)	BASICS (*n* = 57)	Control (*n* = 54)
Drinking variables				
Quantity				
Baseline	18.21 (10.76)	18.07 (11.99)	17.13 (8.28)	16.78 (7.83)
4-week	10.53 (7.38)	13.32 (9.04)	9.61 (7.06)	14.44 (7.50)
3-month	10.83 (8.95)	-	8.91 (5.86)	13.49 (6.74)
6-month	11.60 (7.85)	-	8.33 (5.41)	14.42 (6.48)
12-month	10.29 (9.06)	-	8.94 (6.40)	11.94 (4.59)
Frequency				
Baseline	3.24 (1.20)	3.27 (1.51)	3.37 (1.25)	3.57 (1.60)
4-week	2.64 (1.27)	3.00 (1.58)	2.73 (1.15)	3.25 (1.58)
3-month	2.77 (1.35)	-	2.51 (1.21)	2.98 (1.56)
6-month	3.14 (1.53)	-	2.37 (1.06)	3.24 (1.70)
12-month	2.61 (1.41)	-	2.31 (1.89)	2.58 (1.37)
Typical drinks				
Baseline	4.48 (1.94)	5.16 (2.43)	4.77 (2.06)	4.67 (1.83)
4-week	3.27 (1.34)	4.31 (2.43)	3.04 (1.54)	4.29 (1.55)
3-month	3.35 (1.49)	-	2.96 (1.22)	3.60 (1.45)
6-month	3.55 (1.59)	-	2.89 (1.14)	4.07 (1.59)
12-month	3.29 (1.58)	-	3.19 (1.45)	3.41 (1.52)
Peak drinks				
Baseline	6.22 (2.64)	6.18 (2.24)	5.98 (1.82)	5.78 (1.93)
4-week	4.11 (1.69)	5.34 (2.34)	3.82 (1.78)	5.56 (1.75)
3-month	4.17 (1.83)	-	3.69 (1.73)	4.88 (1.62)
6-month	4.53 (1.98)	-	3.50 (1.55)	5.22 (1.77)
12-month	4.06 (1.81)	-	3.78 (1.62)	4.65 (1.74)
Alcohol problems				
Baseline	11.89 (9.08)	16.19 (13.28)	13.74 (9.17)	16.80 (12.25)
4-week	5.09 (4.26)	9.50 (7.95)	5.62 (6.03)	12.19 (10.49)
3-month	6.94 (7.35)	-	7.89 (7.74)	8.77 (7.48)
6-month	7.32 (7.05)	-	8.67 (9.77)	11.16 (8.53)
12-month	6.26 (6.58)	-	6.43 (7.25)	10.50 (7.93)

Notes: Values represent original mean scores (standard deviations) on measures of alcohol use and alcohol-related problems.

Table 3

Fixed effect estimates and significance tests of linear models for drinks per week, drinking frequency, typical drinks, peak drinks, and alcohol-related problems

Variable	Drinks per week *β*(SE)	Drinking frequency *β*(SE)	Typical drinks *β*(SE)	Peak drinks *β*(SE)	Alcohol problems *β*(SE)
Estimates of intervention effects at the 4-week post-test assessment (n = 225)					
Intercepts	19.53 (1.77)**	3.58 (0.30)**	4.86 (0.36)**	6.45 (0.39)**	14.55 (1.94)**
Gender (0 = Male, 1 = Female)	-4.16 (1.14)**	-0.22 (0.19)	-0.58 (0.23)**	-1.11 (0.25)**	-2.61 (1.25)*
Control slope	-2.32 (1.09)*	-0.33 (0.19)†	-0.39 (0.28)	-0.32 (0.08)**	-4.72 (1.21)**
BASICS intercept	-0.09 (1.50)	-0.25 (0.25)	0.08 (0.31)	0.10 (0.35)	-3.11 (1.64)†
Referral group intercept (0 = mandated, 1 = volunteer)	-0.28 (1.35)	0.13 (0.23)	0.15 (0.27)	-0.01 (0.29)	0.70 (1.48)
Intervention slope	-5.14 (1.32) **	-0.27 (0.22)	-1.08 (0.34)**	-1.94 (0.38)**	-2.56 (1.47)†
Estimates of intervention effects at the 12-month follow-up assessment (n = 169)					
Intercepts	17.44 (1.24)**	3.59 (0.24)**	4.86 (0.26)**	6.34 (0.30)**	12.91(1.39)**
Gender (0 = Male, 1 = Female)	-3.17 (0.90)**	-0.37 (0.18)*	-0.55 (0.19)**	-0.82 (0.22)**	-0.84 (0.91)
Control slope	-0.86 (0.37)*	-0.13 (0.65)*	-0.27 (0.07)**	-0.32 (0.08)**	-0.88 (0.43)*
Intervention intercepts					
Model A					
BASICS	-6.11 (1.30)**	-0.70 (0.26)**	-1.51 (0.28)**	-2.05 (0.33)**	-6.92 (1.55)**
Model B					
BASICS, volunteer	-6.39 (1.44)**	-0.75 (0.28)**	-1.59 (0.30)**	-2.16 (0.35)**	-6.30 (1.62)**
BASICS, mandated	-7.03 (1.09)**	-0.86 (0.22)**	-1.75 (0.23)**	-2.40 (0.26)**	-4.87 (1.10)*
Intervention slope	0.76 (0.44) †	0.09 (0.08)	0.27 (0.08)**	0.29 (0.22)**	1.35 (0.52)**

Note. ** $p < .01$. * $p < .05$. † $p < .10$. BASICS = Brief Alcohol Screening and Intervention for College Students. Model A refers to the model in which both BASICS groups were combined and entered as a single BASICS condition. Model B refers to the model in which the mandated BASICS and volunteer BASICS groups were entered as separate factors.

Table 4

Estimated model fit indices

Model	Drinks per week -2 log *L*	Weekly frequency -2 log *L*	Typical drinks -2 log *L*	Peak drinks -2 log *L*	Alcohol problems -2 log *L*
Estimates of intervention effects at the 4-week post-test assessment (n = 225)					
Intercepts (df = 1)	2381.407	1154.719	1348.282	1453.355	2449.718
Level 1 (df = 5)	2237.633	1091.532	1292.959	1375.493	2326.200
Level 2 (df = 7)	2254.106	1092.079	1283.849	1352.239	2317.709
Estimates of intervention effects through the 12-month follow-up assessment (n = 169)					
Intercepts (df = 1)	3773.157	1922.159	2020.934	2243.973	3804.644
Level 1 (df = 4)	3566.468	1739.096	1817.723	2026.970	3707.306
Level 2					
Model A (df = 6)	3549.890	1738.625	1803.861	2010.158	3697.860
Model B (df = 7)	3547.544	1739.550	1804.480	2010.123	3694.139

Note. Model A refers to the model in which both BASICS groups were combined and entered as a single BASICS condition. Model B refers to the model in which the mandated BASICS and volunteer BASICS groups were entered as separate factors.

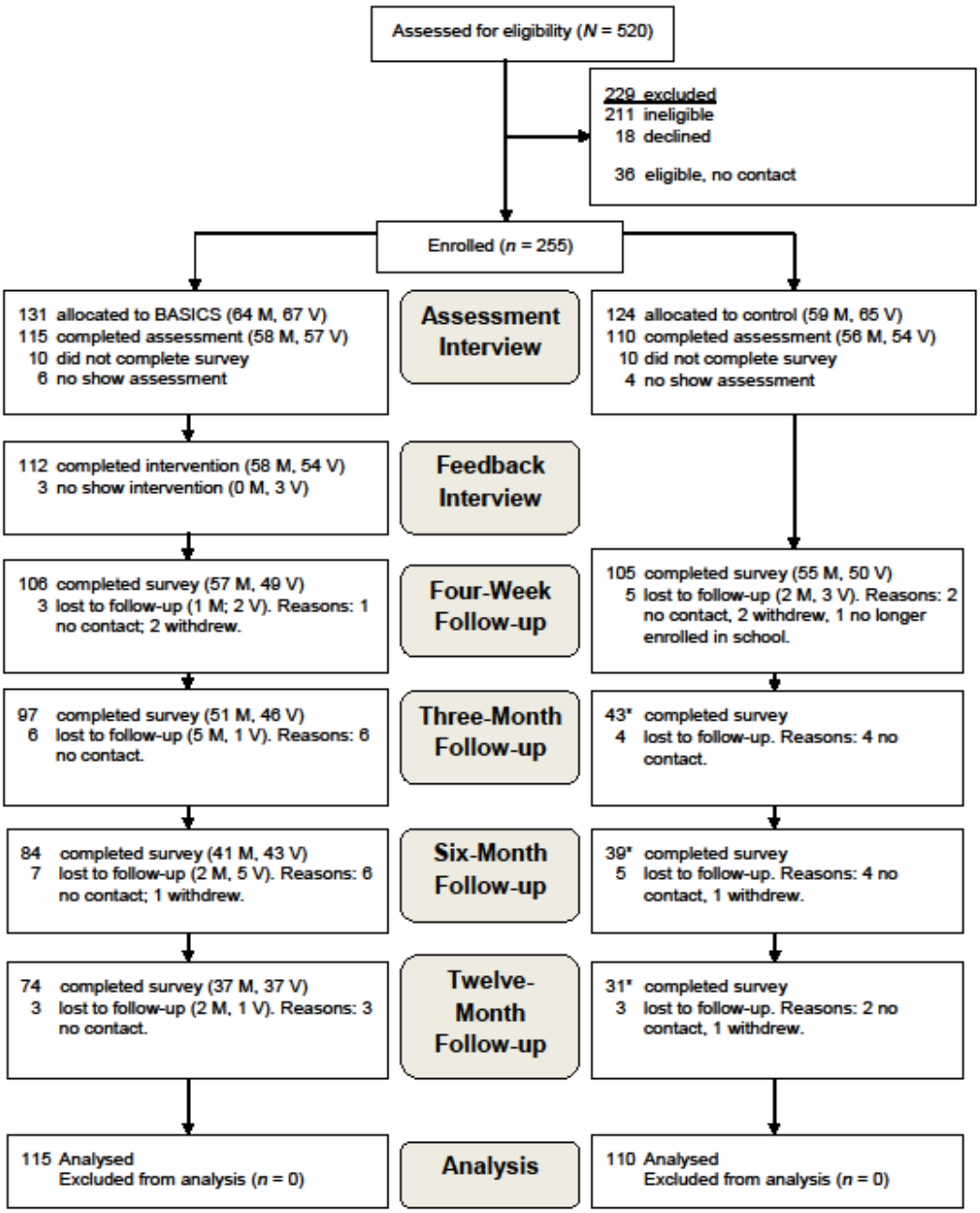

Figure 1: CONSORT diagram for screening and study procedures. V = voluntary students. M = mandated students. *The mandated control group received BASICS after providing 4-week follow-up and therefore no longer served as a control group.

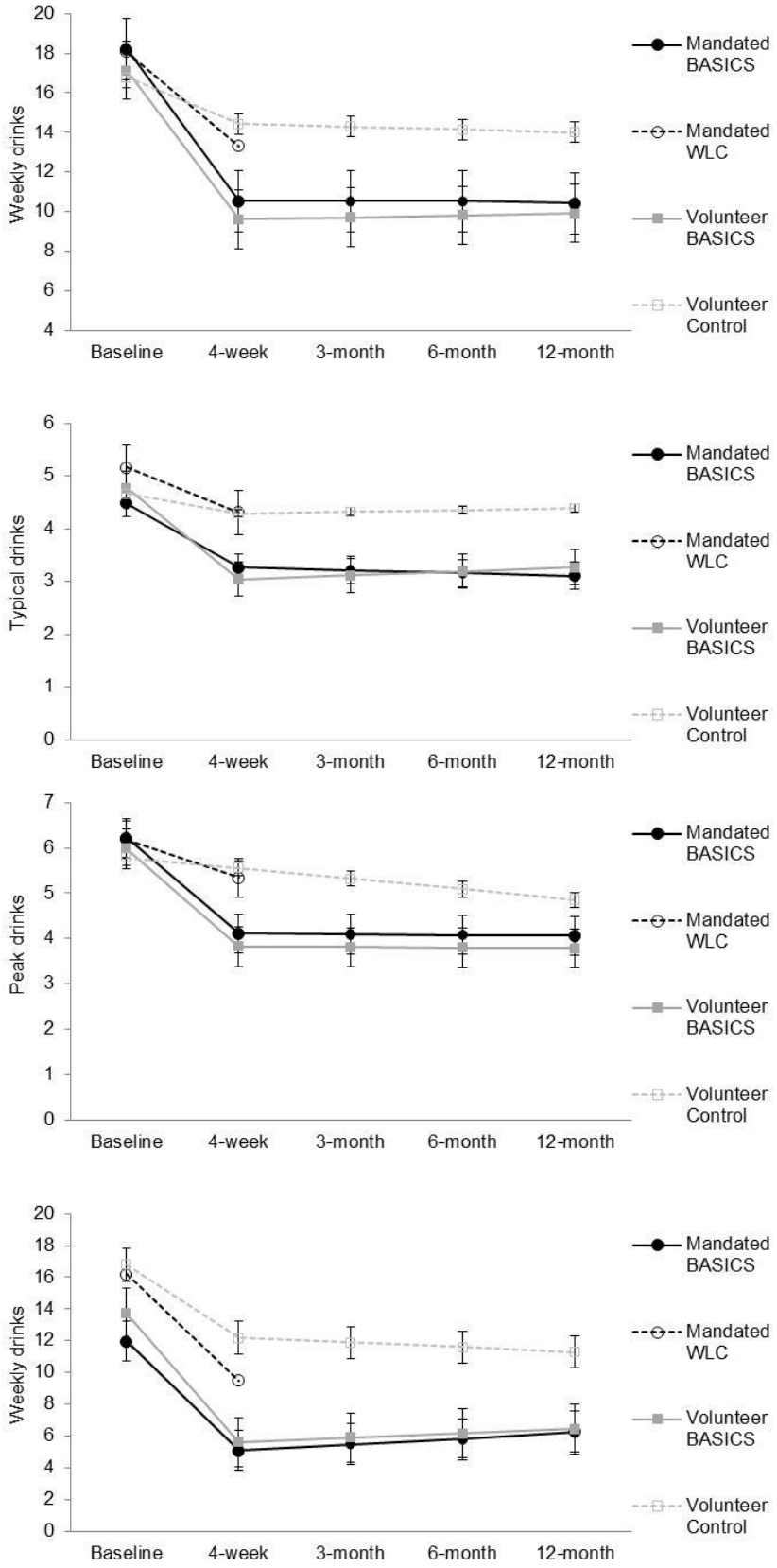

Figure 2: Modeled mean scores of alcohol use outcome variables by group and assessment period. Error bars represent standard error.