9-2017

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 doi: 10.15288/jsad.2017.78.706

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Author Note

Funding for this study was provided in part by a National Institute of General Medical Sciences Grant award numbers U54GM104944, P20GM103408, and P20GM109095. The content is solely the responsibility of the authors and does not represent the official views of the National Institutes of Health. We also acknowledge support from the National Science Foundation Grants # 0619793 and #0923535 and the MJ Murdock Charitable Trust.

Abstract

Objective: The purpose of this randomized controlled study was to examine the efficacy of a brief, web-based personalized feedback intervention (the eCHECKUP TO GO) on alcohol use and alcohol-related consequences among high school seniors. **Method:** Participants (N = 221) were high school seniors randomized by class period to either a brief, web-based personalized feedback intervention (the eCHECKUP TO GO) or an assessment-only control group. Participants completed online surveys at baseline and at a 6-week follow-up. **Results:** Students participating in the eCHECKUP TO GO intervention reported a significant reduction in weekly drinking quantity, peak drinking quantity, and frequency of drinking to intoxication relative to those in the control group. Intervention effects were moderated by high-risk status (one or more episodes of heavy episodic drinking in the past 2 weeks reported at baseline) such that intervention effects were significant for high-risk students only. Results for alcohol-related consequences were not significant. **Conclusions:** Providing a brief, web-based personalized feedback intervention in the school setting is a promising approach for reducing problem alcohol use among high school seniors who report recent heavy episodic drinking.

Keywords: alcohol, web-based intervention, personalized feedback, high school seniors

Alcohol use in high school is associated with multiple alcohol-related consequences including poor school performance, being a victim of dating violence, attempting suicide, use of other substances, and negative interpersonal interactions (Arata et al., 2003; Miller et al., 2007). Among adolescents aged 12-18, alcohol use is also associated with impaired neuropsychological functioning including deficits in verbal memory, visuospatial ability, and psychomotor speed (Hanson et al., 2011; Nguyen-Louie et al., 2015). Research also indicates that risky patterns of drinking established in high school (i.e., prepartying and playing drinking games) are predictive of both heavy drinking and alcohol-related consequences in college (Kenney et al., 2010). For these reasons, it is imperative to identify efficacious interventions for high school students to disrupt patterns of heavy drinking and the associated negative consequences both during high school and in later adulthood.

According to Monitoring the Future (MTF) survey data, 66.0% of adolescents have used alcohol by the end of high school (Johnston et al., 2015). Among adolescents, high school seniors have the highest rates of alcohol use, with 37.4% of high school seniors reporting alcohol use in the past 30 days, 49.8% reporting having been drunk at least once in their lifetime, and 19.4% reporting binge drinking, defined as having had five or more drinks in a row over the past two weeks (Johnston et al., 2015). A review of preventive interventions addressing underage drinking, however, concluded that the intervention research targeting high school students and non-college youth aged 16 - $\underline{\geq}$ 20 is limited. Specifically, the authors identified only one intervention, Project Towards No Drug Abuse (TND; Sussman et al., 2002), in the "most promising evidence" category for youth in the 16 - $\underline{\geq}$ 20 age group relative to 9 interventions for children < 10 and children and teens in the 10 – 15 age group (Spoth et al., 2008). Project TND is a 12 session curriculum based on a motivation-sills-decision-making model with demonstrated efficacy in reducing substance use among high school seniors (Sussman et al., 2002). There were no interventions identified in the "mixed or emerging evidence" category for adolescents in the 16 - $\underline{\geq}$ 20 age group relative to more than 20 identified for youth age 15 and younger (Spoth et al., 2008).

Because adolescents do not readily seek treatment for alcohol problems (Glass et al., 2015; Reavely et al., 2010), it is important to identify interventions that reach high school seniors who may not otherwise seek help for alcohol-related issues. In particular, school-based interventions have the potential to reach large groups of adolescents who may not receive services elsewhere. Computer-based alcohol interventions are a promising approach for adolescents as they are cost-effective and their novelty and game-like appearance is appealing to this age group (Schinke et al., 2006). Interventions delivered through technology can improve access and treatment fidelity, while reducing costs associated with implementation (Lord & Marsch, 2011; Marsch et al., 2014). These considerations are particularly important for school-based interventions as some schools may not have the resources to implement multi-session interventions such as Project TND, or even brief, 1-2 session in-person interventions. Studies examining the efficacy of multi-module or multi-session technology-delivered interventions have shown some efficacy in reducing alcohol use among adolescents (Koning et al., 2011; Koning et al., 2013; Newton et al., 2009; Schwinn et al., 2010). Brief, one-session technology-delivered interventions, however, may be better suited to high schools which may only be able to adopt intervention programs that require little time and few resources for implementation.

The eCHECKUP TO GO (San Diego State University Research Foundation, n.d.) has recently been identified by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) *CollegeAIM* guide as a highly effective and lower cost individually-focused alcohol intervention (NIAAA, 2015). The eCHECKUP TO GO is a personalized normative feedback program based on motivational interviewing and social norms approaches. The program is designed to help students make better decisions about their drinking by providing personalized feedback about peer drinking, positive alcohol beliefs, and positive alcohol expectancies to motivate students to reduce their alcohol use. A list of protective behavioral strategies is also provided (e.g. avoid drinking games, space drinks out over time, alternate alcoholic and non-alcoholic drinks) to decrease alcohol-related consequences.

The eCHECKUP TO GO is well-suited for implementation as a brief, school-based intervention as the program is low cost, requires little training, and can be disseminated to large groups of students within one class period. Further, the eCHECKUP TO GO can be disseminated to both drinking and non-drinking students. Researchers examining the efficacy of the eCHECKUP TO GO with first year college students (drinkers and non-drinkers) found reductions in alcohol use among first year college students (Hustad et al., 2010). Further, studies examining the implementation of the eCHECKUP TO GO as part of first year orientation activities indicate a reduction in alcohol use among students identified as high-risk drinkers, with no adverse effects on those identified as low-risk drinkers, including non-drinkers (Doumas & Anderson, 2009; Doumas et al., 2011). Initial research on the efficacy of the eCHECKUP TO GO program with high school seniors indicates that the program is efficacious in reducing cognitive risk factors for drinking including perceptions of peer drinking, positive beliefs about alcohol, and positive alcohol expectancies among high school seniors (Doumas et al., 2017). This research suggests that although the program was originally designed for college students, it may also be appropriate for use among high school seniors. Further, prior research suggests that the eCHECKUP TO GO is an appropriate program for high school students, with students reporting the program is user-friendly, useful, and that they would recommend the program to other students (Doumas, 2015).

This study extends the literature by examining the efficacy of an existing evidence-based program with a new age group. This study builds upon the initial findings regarding risk factors for drinking reported by Doumas et al. (2017) by examining drinking outcomes. The current study contributes uniquely to the literature by examining the efficacy of eCHECKUP TO GO in reducing alcohol use and alcohol-related consequences among high school seniors.

Identifying effective interventions for high school seniors is particularly important as they have the highest rates of drinking among all high school students (Johnston et al., 2015). This study examines the efficacy of the program as originally designed to determine if it is efficacious in its current form or if it may need to be modified for this age group.

We hypothesized that students receiving the eCHECKUP TO GO intervention would report greater reductions in alcohol use and alcohol-related consequences relative to a control group. Additionally, several studies with college students identify eCHECKUP TO GO intervention effects for high-risk drinkers relative to low-risk drinkers (Doumas & Anderson, 2009; Doumas et al., 2011; Doumas et al., 2014; Walters et al., 2007). Based on this literature, we also hypothesized that intervention effects on drinking outcomes would be moderated by baseline high-risk drinking status.

Method

Design

This study evaluated the efficacy of the eCHECKUP TO GO with high school seniors. Classroom periods were randomized to the eCHECKUP TO GO condition or control condition. Participants completed baseline and 6-week follow-up assessments online. All study procedures were approved by the University Institutional Review Board and the School District Research Board.

Participants

Participants in this study were recruited as part of a larger study examining risk factors associated with drinking and the efficacy of the eCHECKUP TO GO with high school seniors. Participants in the current study were high school seniors recruited from one urban high school in the Northwest (see Figure 1 for the participant flow diagram). Demographic information is provided in Table 1. No significant differences were found between the intervention and control groups on any participant characteristics.

Procedure

All seniors registered at the high school were eligible to participate. Active consent was required by the students' parents in order to participate in the study. The active parental consent procedures are described in more detail in Doumas et al. (2017). Participants who received parental consent were recruited during a common core class period and were asked to assent prior to participating in the baseline survey. Class periods were randomly assigned to the intervention or control group. Students with parental consent were taken to the school's computer lab to participate in the study in early October. All participants completed study procedures on the same day. A member of the research team and a school counselor described the research study and invited the students to participate. Students who agreed to participate were given a unique personal identification number (PIN) to maintain confidentiality and a URL to access the baseline survey which took about 15 minutes to complete. Immediately after completing the baseline survey, students in the intervention group completed the 30-minute online intervention program. Students in the control group were escorted back to their classroom once they completed the baseline survey. A detailed description of administration procedures are described in Doumas et al. (2017). All participants who completed the baseline survey were invited to participate in the 6-week follow-up survey in mid-November. This survey took approximately 15 minutes to complete and instructions were similar to the baseline survey. Incentives included $100 deposited to the teachers' school accounts for supplies and a bagel or pizza party after completion of the follow-up survey.

Measures

Demographics. A brief demographic questionnaire designed for this study included basic participant characteristics (e.g., gender, race/ethnicity, age).

Alcohol Use. Alcohol use was assessed using the Daily Drinking Questionnaire (DDQ; Collins et al., 1985) and the Quantity ⁄Frequency ⁄Peak Questionnaire (QFP; Dimeff et al., 1999; Marlatt et al., 1998). Weekly drinking was assessed with the question "Given that it is a typical week, please write the number of drinks you probably would have each day." A response scale was provided for each day of the week (e.g., Monday__, Tuesday__, etc.). A drink was defined as "a 12-ounce can or bottle of beer, a 4-ounce glass of wine, or a shot of distilled spirits in a mixed drink." Weekly drinking was calculated by combining the reports for the seven days of the week. Peak drinking quantity was

assessed by the question "What is the most number of drinks that you have consumed on any given night in the past month?" Frequency of drinking to intoxication was assessed by the question "During the past 30 days (about 1 month), how many times have you gotten drunk, or very high from alcohol?" This item was rated on a 6-point scale with the anchors 0, 1 to 2, 3 to 4, 5 to 6, 7 to 8, or 9 or more times

Alcohol-Related Consequences. Alcohol-related consequences were assessed using the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989). The RAPI is a 23-item self-administered screening tool for assessing adolescent problem drinking. Participants were asked "how many times have the following scenarios happened to you while you were consuming alcohol or as a result of your drinking in the past 30 days." Responses were measured on a 5-point scale ranging from 0 (*never*) to 4 (*more than 10 times*). A total consequence score was created by summing the 23 items ($\alpha = .86$).

Classification of High-Risk vs. Low-Risk Drinkers. We also asked participants to report on the frequency of heavy episodic drinking. Heavy episodic drinking was defined as having 5 or more drinks in a row for males and 3 or more for females in the past 2 weeks. The number of drinks were based on research establishing cut-points for children and adolescents (Donovan, 2009). Participants who reported one or more episodes of heavy episodic drinking in the past 2 weeks (25.3%) were classified as high-risk drinkers. It should be noted that although the rate of heavy episodic drinking in this sample is higher than that reported by MTF (19.4%), this is likely due to differences in measurement. MTF defined binge drinking as 5 or more drinks for females and males (Johnston et al., 2015), whereas the age adjusted 3/5 measure was used in this study.

The eCHECKUP TO GO

The eCHECKUP TO GO is a 30-minute personalized feedback intervention available through the San Diego State University Research Foundation (http://www.echeckuptogo.com/). The program is customized for the participating school, including providing normative data for the specific school, referrals for the local community, and designing the website using school colors and logos. The program consists of an online assessment which includes questions regarding basic demographic information and information on alcohol consumption, drinking behavior, alcohol-related consequences, and beliefs about alcohol. Once all questions are completed, personalized feedback is given to participants via text, graphs and video recordings embedded in the program. The personalized feedback includes a summary of the student's quantity and frequency of drinking, a personal BAC (blood alcohol content) chart, and the number of cheeseburgers equivalent to alcohol calories consumed. Information about the student's alcohol-associated risk, normative feedback, and a list of personalized strategies that can be used as steps to change drinking behavior are given. The program then provides resources for services in the local community. To ensure the standardized delivery of the eCHECKUP TO GO, a member of the research team and a school counselor were given an instruction script to read to the participants. Both were present throughout the intervention to assist participants and serve as monitors, ensuring participants completed the program, kept their eyes on their own screens, and that there was no discussion among the participants.

Statistical Analyses

Prior to analysis, variables were examined for outliers at baseline and follow-up assessments and were adjusted to 3.3 SD above the mean before conducting analyses (Tabachnik & Fidell, 2007). We confirmed that students in the intervention and control groups were equivalent with respect to demographics and baseline outcomes with *t*-tests for continuous variables and chi-square tests for categorical variables. Ultimately our four study outcomes were fit with a linear mixed model with fixed effects of group (intervention or control), time (baseline or 6 weeks), and risk status (high or low), and participants as the single random effect. This approach is robust to incomplete data on participants and uses all available data, complete or incomplete, provided this data is missing at random (Stroup 2013). We confirmed no differences in baseline outcomes and group membership using *t*-tests and chi-square tests between those who completed both assessments and those who completed the baseline assessment only. We used a Kenward-Roger adjustment to the *F*-statistic for fixed effects to account for imbalance in numbers within treatment and correlated outcomes within participants (Stroup, 2013). Because class periods were randomized to treatment, we assessed the importance of incorporating additional random effects (participants nested within class and participants nested within period) using AIC_C (Burnham & Anderson, 1998) under the restricted maximum likelihood algorithm (REML) and found these additional random effects unnecessary (with within-student correlation remaining as the sole random effect). Because our interest was in the group by time interactions with risk status as a moderator, for each outcome

we used the model to explicitly estimate the group by time interaction separately for each risk status. In addition, we calculated model-based means and their differences, and used a Bonferroni step-up procedure (Hochberg, 1988) to control for the family-wise error rate for multiple comparisons. Analyses were considered significant at $p < .05$ and were conducted in SPSS version 21.0 and SAS version 9.4.

Results

Descriptive statistics for the outcome variables by group and risk status are presented in Table 2. Those with baseline assessments only did not differ from those who completed both assessments on any of our outcome variables including weekly drinking, $t(172.5) = -0.20$, $p = 0.84$, peak drinking, $t(219) = 1.59$, $p = 0.11$, drinking to intoxication, $t(196.6) = -0.27$, $p = 0.79$), and alcohol-related consequences, $t(219) = -0.65$, $p = 0.52$, or with respect to our moderator, risk-status, $\chi^2(1) = 1.54$, p = 0.22. Results from statistical models for alcohol use and alcohol-related consequences are displayed in Table 3.

Alcohol Use

We observed statistically significant interaction effects for Time x Group x Risk Status for weekly drinking, peak drinking quantity, and frequency of intoxication. As hypothesized, these results indicated a significant difference between the intervention and control group in changes in alcohol use, and that risk-status moderated effects (see Figures 2 through 4). The explicit Group x Time interaction for high-risk participants was significant for both weekly drinking and peak drinking quantity. Although not statistically significant for drinking to intoxication, we note that the decrease in drinking to intoxication for high-risk participants in the intervention group was statistically significant, 0.75 (± 0.16), $p_{adj} < .001$.

Alcohol-Related Consequences

While there was a significant decrease in alcohol-related consequences for all participants, the analysis did not reveal differences between the intervention and control groups between time periods. Neither the Time x Group nor Time x Group x Risk Status interactions were significant.

Discussion

To our knowledge, this is the first randomized controlled study to evaluate the efficacy of the eCHECKUP TO GO on reducing alcohol use and alcohol-related consequences among high school seniors. Results showed several findings favorable to students receiving the eCHECKUP TO GO intervention relative to those in the control condition on alcohol use, including weekly drinking quantity, peak drinking quantity, and frequency of drinking to intoxication. Intervention effects were moderated by risk status, such that high-risk students in the intervention group reported a greater reduction in alcohol use relative to students in the control group. These findings are consistent with the growing body of research indicating computer-based and online interventions are efficacious in reducing alcohol use in adolescents (Koning et al., 2011; Koning et al., 2013; Newton et al., 2009; Schwinn et al., 2010). Further, results are consistent with college student research suggesting online personalized feedback interventions are most efficacious for high-risk students (Bersamin et al., 2007; Chiauzzi, et al., 2005; Doumas & Anderson, 2009; Doumas et al., 2011; Doumas et al., 2014; Walters et al., 2007).

Prior research demonstrates the efficacy in reducing risk factors for alcohol use among seniors (Doumas et al., 2017). This study extends this literature by demonstrating the efficacy of the eCHECKUP TO GO in reducing alcohol use among high school seniors who report heavy drinking. High-risk students in the intervention group reported a 15%, 42%, and 33% reduction in weekly drinking, peak drinking, and drinking to intoxication, respectively, relative to a 37% increase in weekly drinking and a 7% reduction and in peak drinking and 17% reduction in drinking to intoxication in the control group. These reductions are greater than those reported in the efficacy trials for the 12 session Project TND (7%-12% reduction in past 30 day alcohol) (Sussman et al., 2002). The Project TND studies, however, reported follow-up data at one year assessments. Although more research is needed to replicate the current findings and to examine the impact of the intervention over time, results of this study suggest that the eCHECKUP TO GO is a promising approach for reducing alcohol use among high school seniors relative to Project TND.

We did not, however, find differences between the intervention and control group in changes in alcohol-related consequences. This is not consistent with prior research on the eCHECKUP TO GO with college students (Doumas & Anderson, 2009; Doumas et al., 2011). One explanation for this finding is that reductions in alcohol-related consequences may follow reductions in alcohol use, requiring a longer follow-up period to capture those effects. This possibility is supported by research indicating the efficacy of the eCHECKUP TO GO in reducing alcohol-related consequences at a three-month follow-up among first year college students (Doumas & Anderson, 2009; Doumas et al., 2011). In contrast, other researchers have found reductions in alcohol-related consequences among first year college students at a one-month follow-up (Hustad et al., 2010). These findings suggest that it is also possible that the eCHECKUP TO GO may not be as efficacious in reducing alcohol-related consequences among high school seniors compared to first year college students.

Prior research examining the efficacy of the eCHECKUP TO GO on risk factors and protective behaviors among high school seniors indicates that while the program was efficacious in reducing risk factors for alcohol use (e.g., perceptions of peer drinking, positive beliefs about alcohol, and positive alcohol expectancies), there were no significant effects on protective behaviors (Doumas et al., 2017). Coupled with the results of this study, it is possible that the program may require modification to better address protective behavioral strategies that may serve not just to reduce alcohol consumption, but to increase the use of protective behaviors students can use to reduce negative consequences associated with alcohol use. Although the majority of feedback is presented based on information collected in the assessment portion of the program, the protective behavioral strategies are introduced in the feedback section. Doumas et al. (2017) suggest one possible program modification may be to ask students which of the protective behavioral strategies they engage in currently in the assessment section and then provide graphical feedback regarding their personalized risk for alcohol-related consequences based on their responses. The list of protective strategies could then be presented again and the participants could select the strategies they would be most likely to adopt. Examining modifications to the protective behavioral strategies module may be an important next step to improve program efficacy in reducing alcohol-related consequences among this age group.

Although this study adds to the literature by providing support for the efficacy of a brief, online alcohol intervention for older teens, there are limitations. First, generalizability of the results is limited due to the single high school in the study and its associated non-Hispanic White demographic makeup. Second, although our response rate of 50.8% is at the higher end of the 30% – 60% response rates typical of other studies using active parental consent (Smith et al., 2009), we cannot be certain that the students who participated are representative of the senior population at the school. Therefore, future research with more diverse samples and using additional recruitment methods to increase the response rate is recommended. Third, we had a higher rate of attrition (32.1%) than expected. The follow-up was conducted during classroom time as the typical absence rate in the district is 5%-10%. Due to the school's scheduling constraints, however, the follow-up assessment occurred on a Friday before the week-long Thanksgiving break. Although this resulted in a decrease in study retention, there were no differences in attrition rates between the intervention and control groups. Fourth, the duration of the follow-up was relatively short. Future research should examine intervention effects for longer periods of time to assess whether or not findings are sustained throughout the academic year and through the transition to college. Fifth, the study did not include a time-matched control. Thus, students in the control group were not blinded to condition, potentially leading to desirability effects impacting study results. A final limitation is adolescent self-reported alcohol use. The reliability and validity of self-reported use for this age group, however, have been demonstrated, and self-report is common practice used in studies examining adolescent alcohol use (Flisher et al., 2004; Lintonen et al., 2004).

Results of this study have important implications for selecting intervention programs for high school seniors. This study provides preliminary support for the use of a brief, online personalized feedback intervention with adolescents in this age group. Because the progression through high school is marked by an increase in alcohol use, identifying evidence-based programing for this age group is essential. Web-based programs are well-suited for school-based programs for this age group, as they are inexpensive, require minimal training, and are easy to disseminate. Thus, schools can easily adopt programs such as the eCHECKUP TO GO, implementing the program during one class period.

In sum, results support the eCHECKUP TO GO as a promising intervention program for the reduction of alcohol use among high school seniors who are engaging in risky drinking behavior. This approach to treatment is brief, inexpensive, requires little training, and is easily disseminated. Outcome studies with longer follow-up periods are needed to examine the sustainability of intervention effects on drinking outcomes for adolescents in this age group.

Acknowledgments

The authors wish to thank Rhiannon Trull, Kristen Shearer, Jaime Johnson, and Laura Mundy for assistance in participant recruitment and data collection.

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Table 1

Demographics by Study Group

Demographics	Control Group (n = 105)	Intervention Group (n = 116)	Total Sample (n = 221)
Age in years, *M* (*SD*)	17.16 (48)	17.16 (0.42)	17.16 (0.45)
Gender			
Male	50.5%	40.4%	45.2%
Female	49.5%	59.6%	54.8%
Race/Ethnicity			
White	79.0%	83.2%	81.2%
Hispanic	8.6%	4.4%	6.4%
Asian	5.7%	3.5%	4.6%
African-American	0.0%	3.5%	1.8%
American Indian/Alaska Native	1.0%	1.8%	1.4%
Other	5.7%	3.5%	4.6%
Alcohol Use			
Never tried alcohol	23.8%	20.7%	22.2%
Use in past 30 days	41.3%	38.8%	42.1%
≥ one heavy episodic drinking episode, past two weeks	25.7%	25.0%	25.3%

Table 2

Differences in Alcohol Use and Alcohol-Related Consequences by Study Condition and Risk-Status

		Risk-Status		
		Low-Risk[a]	High-Risk[b]	Total Sample[c]
Outcomes		*M (SD)*	*M (SD)*	*M(SD)*
Weekly Drinking Quantity				
Control	Baseline	0.68 (2.61)	7.09 (5.91)	2.33 (4.66)
	Follow-Up	0.88 (1.82)	9.61 (9.43)	3.13 (6.26)
Intervention	Baseline	0.63 (1.60)	7.59 (4.88)	2.37 (4.11)
	Follow-Up	0.51 (1.42)	6.44 (4.47)	1.71 (3.35)
Peak Drinking Quantity				
Control	Baseline	0.40 (1.01)	8.22 (3.89)	2.41 (4.04)
	Follow-Up	0.73 (1.73)	7.56 (6.64)	2.49 (4.70)
Intervention	Baseline	0.69 (1.29)	8.52 (3.84)	2.65 (4.05)
	Follow-Up	0.83 (1.69)	4.88 (3.28)	1.69 (2.68)
Frequency of Drinking to Intoxication				
Control	Baseline	0.28 (0.74)	1.78 (0.75)	0.67 (0.99)
	Follow-Up	0.19 (0.44)	1.50 (1.29)	0.53 (0.94)
Intervention	Baseline	0.28 (0.54)	1.83 (0.85)	0.66 (0.92)
	Follow-Up	0.24 (0.50)	1.18 (0.73)	0.44 (0.67)
Alcohol-Related Consequences				
Control	Baseline	0.88 (2.05)	4.67 (4.02)	1.86 (3.15)
	Follow-Up	0.75 (2.31)	3.00 (4.33)	1.33 (3.09)
Intervention	Baseline	1.18 (3.14)	4.47 (5.01)	2.00 (3.94)
	Follow-Up	0.76 (2.55)	3.25 (3.97)	1.27 (3.04)

[a] Control Group $n = 78$; Intervention Group $n = 87$.
[b] Control Group $n = 27$; Intervention Group $n = 29$.
[c] Control Group $n = 105$; Intervention Group $n = 116$.

Table 3

Mixed Model Analysis of Variance Results for Outcomes

Source	Weekly Drinking Quantity		Peak Drinking Quantity		Frequency of Drinking to Intoxication		Alcohol-Related Consequences	
Random Effects (Variance Component Estimate)								
Student	6.72		3.57		0.19		5.33	
Residual	5.27		2.73		0.26		4.46	
ICC (Student)	56%		57%		42%		54%	
Fixed Effects	*F-Value*	*Pr > F*	*F-Value*	*Pr > F*	*F-Value*	*Pr > F*	*F-Value*	*Pr > F*
Group	2.14	0.15	0.84	0.36	0.58	0.45	0.14	0.71
Time	0.13	0.72	16.41	<.001**	19.70	<.001**	15.43	0.01**
Group * Time	9.92	0.01**	8.33	0.01**	1.99	0.16	0.20	0.65
Risk Status	181.07	<.001**	335.48	<.001**	189.14	<.001**	35.74	<.001**
Group * Risk Status	1.60	0.21	2.54	0.11	1.16	0.28	0.06	0.80
Time * Risk Status	0.10	0.76	28.25	<.001**	12.01	0.01**	8.58	0.00**
Group * Time *Risk Status	8.86	0.01**	7.19	0.01**	3.81	0.05*	0.23	0.63
Specific Comparisons	*t-Value*	*Pr > t*	*t-Value*	*Pr > t*	*t-Value*	*Pr > t*	*t-Value*	*Pr > t*
High-Risk Status: Group * Time	-3.50	0.01**	-3.19	0.01**	-1.93	0.06^{+}	0.53	0.60
Low-Risk Status: Group * Time	-0.18	0.86	-0.21	0.88	0.55	0.58	-0.03	0.97

Note. ICC = intraclass correlation coefficient.
$^{+}$ p < .06. *p < .05. ** p < .01. *** p < .001.

Figure Captions

Figure 1
Participant flow diagram

Figure 2
Model-based mean (± 1 model-based standard error) for weekly drinking quantity. Intervention and control participants have significantly different responses for high-risk group only.

Figure 3
Model-based mean (± 1 model-based standard error) for peak drinking quantity. Intervention and control participants have significantly different responses for high-risk group only.

Figure 4
Model-based mean (± 1 model-based standard error) for frequency of drinking to intoxication. Among high-risk seniors, the drop in frequency is statistically significant for the intervention group, but is not for the control group. Note that a decrease in one unit represents a shift to the next lowest category of frequency of drinking to intoxication.