Reducing Alcohol Use in First-Year University Students: Evaluation of a Web-Based Personalized Feedback Program

Diana M. Doumas and Lorna L. Andersen

The efficacy of a Web-based personalized feedback program—electronic CHECKUP TO GO (e-CHUG), aimed at reducing heavy drinking in 1st-year university students—is evaluated. Results indicated that high-risk students in the e-CHUG group reported significantly greater reductions in weekly drinking quantity, frequency of drinking to intoxication, and occurrence of alcohol-related problems. Recommendations for integrating Web-based alcohol programs into a comprehensive prevention program are discussed.

Heavy drinking represents a significant problem on college and university campuses in the United States, with more than 30% of students meeting criteria for a diagnosis of alcohol abuse (Knight et al., 2002). Furthermore, heavy drinking is associated with multiple social and interpersonal problems such as arguing with friends, engaging in unplanned sexual activity, drinking and driving, getting into trouble with the law, academic difficulties, unintended injuries, assault, and death (Abbey, 2002; Cooper, 2002; Hingson, Heeren, Winter, & Wechsler, 2005; Perkins, 2002; Vik, Carrello, Tate, & Field, 2000; Wechsler, Lee, Kuo, & Lee, 2000). Additionally, relative to the general student population, 1st-year students have been identified as a high-risk group for heavy drinking (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2002). National survey data have indicated that approximately 44% of college and university 1st-year students report at least one episode of heavy drinking (Wechsler et al., 2002), and research has indicated that students increase their alcohol use during the 1st year (Borsari, Murphy, & Barnett, 2007). In comparison with upperclassmen, 1st-year students drink more drinks, engage in heavy drinking episodes more frequently (Turrisi, Padilla, & Wiersma, 2000), and are more likely to be arrested for alcohol-related incidents (Thompson, Leinfelt, & Smyth, 2006). Taken together, these studies support the importance of providing prevention and early intervention programs for 1st-year college and university students.

Recently, peer influence has gained attention in the literature as an important social variable that may be related to the elevated levels of drinking in college and university students. According to social norming theory (Perkins, 2002), college and university students overestimate the amount of alcohol their peers consume, which leads to participation in heavy drinking as students attempt to match their drinking levels to their perceptions of peer alcohol use. Research has indicated that interventions providing normative feedback about peer drinking are associated with reductions in alcohol consumption and that changes in estimates of peer drinking mediate the intervention effects on the reductions in

Diana M. Doumas and Lorna L. Andersen, Department of Counselor Education, Boise State University. Lorna L. Andersen is now at Eastmont Middle School, Sandy, Utah. Correspondence concerning this article should be addressed to Diana M. Doumas, Department of Counselor Education, College of Education, Boise State University, 1910 University Drive, Boise, ID 83725-1721 (e-mail: dianadoumas@boisestate.edu).

drinking (Neighbors, Larimer, & Lewis, 2004; Walters, Vader, & Harris, 2007). That is, receiving normative feedback is associated with a reduction in students' perceived norms of peer drinking that is, in turn, related to a subsequent decrease in drinking behavior.

Recent reviews of the literature support the efficacy of brief interventions using motivational interviewing and personalized normative feedback for reducing high-risk drinking among college and university students (Burke, Arkowitz, & Menchola, 2003; Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Larimer & Cronce, 2007; Moyer, Finney, Swearingen, & Vergun, 2002). Motivational interviewing is a nonconfrontational, nonjudgmental approach designed to decrease drinking and drinking-related consequences (W. R. Miller & Rollnick, 2002). A central component of motivational interviewing is providing feedback regarding alcohol use. This feedback typically includes individualized feedback regarding risk status and normative feedback relative to peers (Larimer et al., 2001; Marlatt et al., 1998). Innovative approaches to implementing brief motivational interventions have also been developed. Research has indicated that mailed normative feedback significantly reduces drinking among college and university students (Agostinelli, Brown, & Miller, 1995; S. E. Collins, Carey, & Sliwinski, 2002; Walters, 2000; Walters, Bennett, & Miller, 2000). In addition, computer technology has also been used to deliver personalized feedback, with a growing number of controlled studies indicating that Web-based feedback programs are effective in reducing drinking and alcohol-related problems among college and university students (Bersamin, Paschall, Fearnow-Kenney, & Wyrick, 2007; Chiauzzi, Green, Lord, Thum, & Goldstein, 2005; Kypri et al., 2004; Neighbors et al., 2004; Walters et al., 2007).

Although recent reviews of the literature indicate that feedback, whether delivered in person, by mail, or electronically, can be an effective (Larimer & Cronce, 2007; Walters & Neighbors, 2005), use of computer programs to provide normative feedback to college and university students has many advantages (Walters, Miller, & Chiauzzi, 2005). Research has indicated that younger drinkers may respond better to electronic feedback than to in-person feedback (Kypri, Saunders, & Gallagher, 2003; Larimer & Cronce, 2002; Saunders, Kypri, Walters, Laforge, & Larimer, 2004). Additionally, whereas college and university students may be skeptical about discussing their drinking with a health practitioner, they are interested in how their drinking compares with that of their peers. Computerized interventions that provide normative feedback regarding alcohol use appeal to this curiosity and reduce apprehension associated with talking to a professional. College and university students are also avid consumers of technology. Web-based interventions may be particularly useful for 1st-year students because of the potential both to reach a wide audience and to be an engaging medium for Internet-savvy students.

As both the number of colleges and universities using Web-based programs to address alcohol use on their campuses and the number of Web-based programs available on the market increase, conducting research to reveal the efficacy of these programs becomes imperative. Although the overall literature supports the efficacy of Web-based programs providing personalized normative feedback (Larimer & Cronce, 2007), only one or two program evaluations have been published that support the effectiveness of any specific program. For example, electronic

CHECKUP TO GO (e-CHUG; San Diego State University Research Foundation, 2006) has been adopted by nearly 400 colleges and universities across the nation. To date, however, only one study has been published evaluating the efficacy of e-CHUG in reducing heavy drinking. In this study (Walters et al., 2007), the efficacy of e-CHUG was examined over 16 weeks in a volunteer sample of 106 1st-year university students reporting heavy episodic drinking. Students were randomly assigned either to the e-CHUG group or to an assessment-only control group. Results at an 8-week follow-up assessment indicated that students in the e-CHUG group reduced their drinks per week and peak blood alcohol concentration (BAC) in comparison with the students in the control group; however, at the 16-week follow-up assessment, no differences existed between the two groups. Additionally, although alcohol-related problems declined, no differences existed between the two groups on alcohol-related problems at either the 8-week or 16-week assessments.

Although Walters et al. (2007) provided evidence for the efficacy of e-CHUG in accelerating a reduction in drinking among 1st-year students, research that examined providing e-CHUG as part of 1st-year orientation or a 1st-year seminar has not been published. Because e-CHUG is being used at so many colleges and universities and is often used as part of orientation or within a 1st-year seminar, adding to the current literature regarding e-CHUG as an evidence-based strategy is important. Findings of this study will add to the sparse literature concerning a program that is being used on campuses across the nation and can help to shape decisions about alcohol prevention programs for 1st-year students.

The aim of the current study is to extend the literature by conducting a program evaluation to examine the efficacy of administering e-CHUG as part of the 1st-year seminar curriculum. To achieve our aims, we randomly assigned seminar sections of 1st-year students to one of two conditions: the e-CHUG group or an assessment-only control group. We also classified these students as high- or low-risk drinkers on the basis of students' self-reports of binge drinking collected at the baseline assessment because the majority of research examining Web-based programs has demonstrated efficacy in college and university students identified as high-risk or heavy drinkers (Bersamin et al., 2007; Chiauzzi et al., 2005; Doumas & Haustveit, 2008; Kypri et al., 2004; Neighbors et al., 2004; Walters et al., 2007). We hypothesized that students classified as high-risk drinkers in the e-CHUG group would report greater reductions in drinking and alcohol-related problems in comparison with those classified as high-risk drinkers in the control group. We also hypothesized that no differences in drinking measures would exist between students classified as low-risk drinkers in the e-CHUG group and those classified as low-risk drinkers in the control group.

Method

Participants and Procedures

Participants were recruited from the spring semester 1st-year seminar course at a large metropolitan university in the Northwest. All 1st-year students enrolled in the 16-week seminar and present during the baseline assessment were given an op-

portunity to participate in the study. Enrollment in 1st-year seminar was voluntary. The program was offered as part of the 1st-year seminar curriculum. Participants were not offered compensation for their participation. All participants were informed of the nature of the study, risks and benefits of participation, and the voluntary nature of participation. All participants were treated according to established ethical standards of the American Psychological Association (2002), and the research was approved by the university's Institutional Review Board.

Six 1st-year seminar sections ($N = 87$ students) were randomly assigned to either the Web-based personalized normative feedback intervention (i.e., e-CHUG) group or the assessment-only control group. Students who were minors (i.e., younger than the legal drinking age, rendering them ineligible to participate in an alcohol-related study; $n = 3$) were excluded from the study. Of the remaining 84 students, 80 (95%) were present at baseline assessment and participated in the study. Of these students, 28 (35%) were in the seminar sections assigned to the e-CHUG group and 52 (65%) were in the seminar sections assigned to the control group. For this sample, 59% of the students were men and 41% were women. Ages of the students ranged from 18 to 54 years ($M = 21.99$, $SD = 7.69$). A majority of the students were Caucasian (79%), followed by Hispanic (13%) and other (8%). A series of chi-square analyses and t tests confirmed that no differences existed across the two groups at the baseline assessment regarding gender, age, ethnicity, or any of the three drinking variables.

All procedures were completed by participants during the 1st-year seminar. A member of the research team (second author) was present for the baseline and 3-month follow-up assessments. All students completed online questionnaires at the baseline assessment (Week 2 of the semester) and at the 3-month follow-up assessment (Week 14 of the semester). The e-CHUG group completed the online alcohol intervention and social norming program during class. During the baseline data collection, each student was assigned a personal code. This code was used again during follow-up data collection. This code was used to identify baseline and follow-up responses from each student, as well as to calculate response rates from baseline to follow-up assessments.

Instruments

Recommendations by the NIAAA Task Force on Recommended Questions (2003) include assessing patterns of alcohol consumption in addition to the average number of drinks consumed. We used three measures to assess weekly drinking quantity, frequency of drinking to intoxication, and occurrence of alcohol-related problems. We also used a measure of binge drinking at the baseline assessment to classify 1st-year students as either high-risk or low-risk drinkers. The indicators of alcohol consumption and alcohol-related problems are widely used items selected from the higher education literature (e.g., Chiauzzi et al., 2005; Doumas & Haustveit, 2008; Larimer, Cronce, Lee, & Kilmer, 2004; Marlatt et al., 1998; Neighbors et al., 2004; Walters et al., 2007; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994; Wechsler et al., 2000; White et al., 2006).

Alcohol consumption. Typical weekly drinking quantity was assessed using a modified version of the Daily Drinking Questionnaire (DDQ; R. L. Collins,

Parks, & Marlatt, 1985). Participants are asked to indicate how much they typically drink: "Given that it is a typical week, please write the number of drinks you probably would have each day." Write-in responses are requested for each day of the week (Monday ___, Tuesday ___, etc.). Weekly drinking quantity was calculated by combining the reports for the 7 days of the week. Participants are also asked to indicate their frequency of drinking to intoxication: "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 Likert-type scale, with 1 = *0 times*, 2 = *1 to 2 times*, 3 = *3 to 4 times*, 4 = *5 to 6 times*, 5 = *7 to 8 times*, and 6 = *more than 9 times*.

Alcohol-related problems. Occurrence of alcohol-related problems was assessed using the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989). The RAPI is a 23-item self-administered screening tool used to measure problem drinking. Participants are asked the number of times in the past 3 months they experienced each of 23 negative consequences as a result of drinking. Responses are measured on a 5-point Likert-type scale ranging from 1 = *never* to 5 = *more than 10 times*. A total consequence score is created by summing the responses to the 23 items. The RAPI assesses both traditional physical consequences (e.g., tolerance, withdrawal symptoms, physical dependency) and consequences presumed to occur at higher rates in a college or university student population (e.g., missing school, not doing homework, going to school drunk). The RAPI has good internal consistency (Neal & Carey, 2004) and test–retest reliability (E. T. Miller et al., 2002) and is correlated significantly with several drinking variables (White & Labouvie, 1989). Cronbach's alpha for the current sample was .87.

Classification of high-risk and low-risk drinkers. Frequency of binge drinking was used to identify the drinking status of participants. Following the Harvard School of Public Health College Alcohol Study, binge drinking was defined as men having five or more drinks in a row and women having 4 or more drinks in a row in the past 2 weeks (Wechsler et al., 1994). This item was used as an indicator of high-risk drinking and to create a risk variable, with participants at the baseline assessment who reported one or more occasions of binge drinking classified as high-risk drinkers. This binge drinking measure has been widely used and supported as an appropriate threshold to identify high-risk drinkers (Wechsler & Nelson, 2001, 2006) and dangerous levels of drinking ("NIAAA Council Approves Definition," 2004). Using this measure, 41% of the participants were classified as high-risk drinkers (37% of the e-CHUG group and 43% of the control group) and 59% were classified as low-risk drinkers.

Intervention

Participants in the e-CHUG group, after completing the questionnaires during the baseline assessment, were directed to complete e-CHUG (http://www.e-chug.com), a brief Web-based program designed to reduce high-risk drinking by providing personalized feedback and normative data regarding drinking and the risks associated with drinking. The program is commercially available and is managed by the San Diego State University Research Foundation. The program is customized for the participating university, including providing normative data for the university

population, listing referrals for the local community, and using university colors and logos in the Web site design.

The program takes approximately 15 minutes to complete. In addition to basic demographic information, the program collects information on alcohol consumption, drinking behavior, and alcohol-related consequences. Individualized feedback is provided immediately in several domains: (a) summary of quantity and frequency of drinking, including graphical feedback such as showing the number of cheeseburgers that would be equivalent to the amount of alcohol calories consumed; (b) graphical comparison of the respondent's drinking with U.S. adult and college drinking norms; (c) estimated risk status for negative consequences associated with drinking and risk status for problematic drinking on the basis of the respondent's AUDIT score, genetic risk, and tolerance; (d) approximate financial cost of drinking in the past year; (e) normative feedback comparing the respondent's perception of peer drinking with actual university drinking normative data; and (f) referral information for local agencies.

Participants in the control group did not complete any alternative alcohol intervention program or Web-based education. After the questionnaires were completed at 3-month follow-up assessment, participants in the control group were given information to access the e-CHUG program.

Results

Attrition

Of the 80 participants, 52 (65%) remained at the 3-month follow-up assessment and completed the drinking questionnaires. For the final sample, 35% (n =18) were in the e-CHUG group (13 low-risk drinkers and 5 high-risk drinkers) and 65% (n = 34) were in the control group (24 low-risk drinkers and 10 high-risk drinkers). No difference existed in the rate of attrition across the e-CHUG and control groups, $\chi^2 = 0.06$, $p > .05$. A series of chi-square and t tests using data obtained at the baseline assessment revealed no differences in demographic variables, weekly drinking quantity, or frequency of drinking to intoxication between the participants who completed the follow-up assessment and those who did not. Regarding occurrence of alcohol-related problems, however, more problems were reported by participants who did not complete the follow-up assessment ($M = 5.92$, $SD = 6.92$) than by those who did ($M = 2.92$, $SD = 4.74$), $t(74) = 2.20$, $p < .05$.

Alcohol Consumption

Two repeated measures factorial analyses of variance (ANOVAs) were conducted to examine differences between the e-CHUG group and control group, from the baseline assessment to the 3-month follow-up assessment, for weekly drinking quantity and frequency of drinking to intoxication. The three independent variables were time (at baseline vs. at 3 months), group (e-CHUG vs. control), and risk status (high vs. low). Means for each of the dependent variables by group and risk status are shown in Table 1. Results of the ANOVAs indicated a significant interaction effect for the Time × Group × Risk Status interaction for weekly drinking

Differences in Alcohol Consumption and Alcohol-Related Consequences by Study Group and Risk Status

	Risk Status				Total Sample (N = 52)	
	High (n = 15)		Low (n = 37)			
Group and Time	M	SD	M	SD	M	SD
	Weekly Drinking Quantity					
e-CHUG						
Baseline	27.80	25.88	0.39	0.77	8.00	17.83
3 months	20.20$_a$	16.78	1.69$_b$	2.90	6.83	12.04
Control						
Baseline	26.40	18.39	1.54	3.22	8.85	15.22
3 months	30.00$_a$	20.31	1.71$_b$	3.10	10.03	17.04
	Drinking to Intoxication					
e-CHUG						
Baseline	6.00	3.77	0.46	0.72	1.53	1.13
3 months	4.70$_a$	2.68	0.73$_b$	1.09	1.73	0.88
Control						
Baseline	7.05	3.63	0.31	0.62	1.67	1.03
3 months	8.15$_c$	4.23	0.58$_b$	0.93	1.67	0.91
	Alcohol-Related Problems					
e-CHUG						
Baseline	5.40	4.67	0.85	1.95	2.00	3.20
3 months	3.80$_b$	2.78	0.62$_b$	1.05	1.83	2.43
Control						
Baseline	8.40	6.93	1.25	2.35	2.29	3.69
3 months	15.50$_c$	16.43	0.17$_b$	0.64	2.81	4.21

Note. For each drinking variable, 3 months means with different subscripts differ significantly at $p < .05$. e-CHUG = electronic CHECKUP TO GO.

quantity, $F(1, 48) = 4.14$, $p < .05$, $\eta^2_p = .08$, and for frequency of drinking to intoxication, $F(1, 48) = 4.33$, $p < .05$, $\eta^2_p = .08$. Findings indicated that high-risk students in the e-CHUG group reduced their weekly drinking quantity and frequency of drinking to intoxication significantly more than high-risk students in the control group did (see Figure 1).

Follow-up one-way ANOVAs indicated a significant difference in weekly drinking quantity, $F(3, 51) = 21.73$, $p < .001$, and frequency of drinking to intoxication, $F(3, 51) = 33.74$, $p < .001$, across the groups. Follow-up analyses using Tukey's honestly significant difference (HSD) procedure and comparing high-risk students in the e-CHUG group with high-risk students in the control group indicated no significant difference between the means for weekly drinking quantity ($p > .05$), Cohen's $d = .48$, and a significant difference between the means for frequency of drinking to intoxication ($p < .05$), Cohen's $d = .85$. Examination of the means in Table 1 indicated that high-risk students in the e-CHUG group reduced their weekly drinking quantity by approximately 30% in comparison with an *increase* of 14% for high-risk students in the control group. Similarly, high-risk students
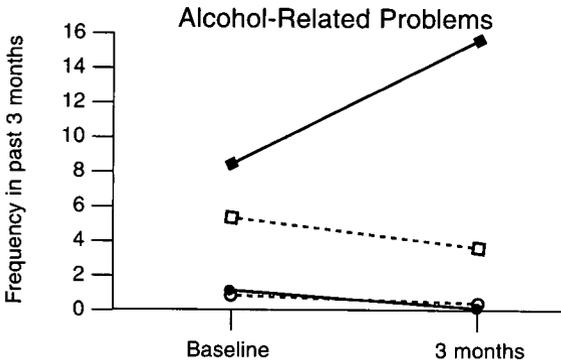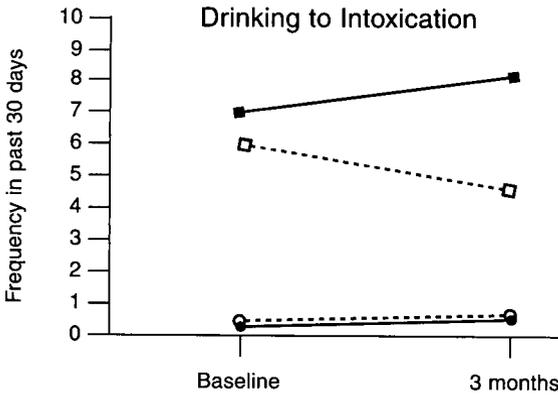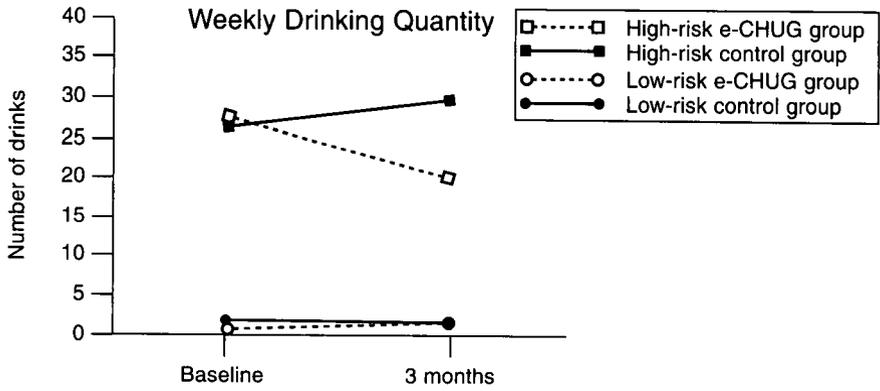
FIGURE 1

Changes in Drinking and Alcohol-Related Problems by Study Group and Risk Status

Note. e-CHUG = electronic CHECKUP TO GO.

in the e-CHUG group reduced their frequency of drinking to intoxication by approximately 20% in comparison with an increase of 16% for high-risk students in the control group. As predicted, no differences existed between the e-CHUG and control groups for low-risk students.

Alcohol-Related Problems

A repeated measures factorial ANOVA was conducted to examine differences between the e-CHUG group and control group, from the baseline assessment to the 3-month follow-up assessment, for occurrence of alcohol-related problems. The three independent variables were time (at baseline vs. at 3 months), group (e-CHUG vs. control), and risk status (high vs. low). Means for each of the dependent variables by group and risk status are shown in Table 1. Results of the ANOVA indicated a significant interaction effect for the Time × Group × Risk Status for occurrence of alcohol-related problems, $F(1, 48) = 4.80$, $p < .05$, $\eta^2_p = .09$. Findings indicated that high-risk students in the e-CHUG group reported fewer alcohol-related problems than high-risk students in the control group (see Figure 1).

A follow-up one-way ANOVA indicated a significant difference in occurrence of alcohol-related problems, $F(3, 51) = 11.61$, $p < .001$, across the groups. As hypothesized, follow-up analyses using Tukey's HSD procedure and comparing high-risk students in the e-CHUG group with high-risk students in the control group revealed significant differences between the means for occurrence of alcohol-related problems ($p < .05$), Cohen's $d = .80$. Examination of the means in Table 1 indicated a 30% reduction in reported alcohol-related problems for high-risk students in the e-CHUG group in comparison with an 84% increase in reported alcohol-related problems for high-risk students in the control group. As predicted, no difference existed between the e-CHUG and control groups for low-risk students.

Discussion

The aim of this study was to evaluate the efficacy of a Web-based personalized normative feedback program (i.e., e-CHUG) in reducing heavy drinking and alcohol-related problems among 1st-year university students. Although e-CHUG has been adopted by nearly 400 colleges and universities nationwide (San Diego State University Research Foundation, 2006), to date, only one study providing evidence to support the efficacy of e-CHUG has been published (Walters et al., 2007). The current study is the first, however, to examine e-CHUG as part of the curriculum in a 1st-year seminar. Thus, this study adds to the growing body of literature supporting the efficacy of Web-based normative feedback programs in general and provides additional support for e-CHUG because results indicated that e-CHUG was effective in reducing drinking and alcohol-related problems in this sample of 1st-year university students. Findings confirmed the hypothesis that, for 1st-year high-risk drinkers, the reductions in drinking and alcohol-related problems among students in the e-CHUG group would be significantly greater than the reductions

among students in the assessment-only control group. Students classified as high-risk drinkers who completed e-CHUG reported greater reductions in weekly drinking quantity, frequency of drinking to intoxication, and occurrence of alcohol-related problems than those classified as high-risk drinkers in the control group, whereas changes in drinking for low-risk students were similar across the e-CHUG and control groups. Specifically, high-risk 1st-year students in the e-CHUG group reported a 30% reduction in weekly drinking quantity, 20% reduction in frequency of drinking to intoxication, and 30% reduction in occurrence of alcohol-related problems in comparison with increases of 14%, 16%, and 84%, respectively, reported by high-risk 1st-year students in the control group. Post hoc analyses revealed that these differences were significant for frequency of drinking to intoxication and occurrence of alcohol-related problems. Additionally, effect size calculations between the e-CHUG and control groups for high-risk drinkers indicated a medium effect size for weekly drinking quantity ($d = .48$) and large effect sizes for frequency of drinking to intoxication ($d = .85$) and occurrence of alcohol-related problems ($d = .80$). These findings indicated that high-risk 1st-year students in the e-CHUG group reduced their drinking despite the natural trajectory of an increase in heavy drinking and associated consequences that occurred among high-risk 1st-year students who did not complete the program.

Results of this study are consistent with research indicating that Web-based normative feedback programs are effective in reducing heavy drinking in college and university students (Bersamin et al., 2007; Chiauzzi et al., 2005; Doumas & Haustveit, 2008; Kypri et al., 2004; Neighbors et al., 2004; Walters et al., 2007). In addition, the finding that e-CHUG was most effective for 1st-year students classified as high-risk drinkers parallels the literature examining Web-based feedback for college and university students. Specifically, the majority of research examining Web-based programs among college and university students has demonstrated efficacy in students identified as high-risk drinkers (Chiauzzi et al., 2005; Doumas & Haustveit, 2008; Kypri et al., 2004; Neighbors et al., 2004; Walters et al., 2007) or has indicated that reductions in drinking are greater for high-risk students (Bersamin et al., 2007) and persistent binge drinkers (Chiauzzi et al., 2005). In addition, recent research regarding young adults of college age has also indicated that risk status moderates the relationship between intervention and reductions in drinking, with high-risk drinkers who receive Web-based normative feedback reporting the greatest reductions in drinking (Doumas & Hannah, 2008).

Our results for alcohol consumption were similar to findings of previous studies examining Web-based personalized feedback. Consistent with other studies demonstrating significant differences between groups on changes in alcohol-related consequences lasting up to 6 months (Kypri et al., 2004; Neighbors et al., 2004), we also found differences in alcohol-related consequences between the e-CHUG and control groups. Walters et al. (2007), however, did not find a significant difference between the e-CHUG group and the assessment-only group at either the 8-week or 16-week assessments for alcohol-related problems. Future research needs to be conducted to clarify these discrepant findings.

Implications for College and University Counseling

Results of this study have important implications for prevention and intervention efforts aimed at reducing drinking and alcohol-related problems among 1st-year college and university students. First, 41% of the participants were classified as high-risk drinkers, indicating that nearly half of the 1st-year students in this sample, recruited at the start of the spring semester, reported binge drinking at least once in the past 2 weeks. Additionally, 1st-year students in the control group actually increased their drinking over the course of the spring semester. Although college and university counselors may believe heavy drinking naturally levels off by the end of the first year, results of this study indicate that counselors need to be aware that 1st-year students are at risk for heavy alcohol use and associated problems throughout the academic year. Thus, when working with 1st-year students, counselors need to be careful not to minimize drinking and alcohol-related problems as "typical college drinking," but to understand that drinking may become heavier and more problems may occur as the academic year progresses.

Additionally, college and university counselors may use Web-based personalized feedback programs such as e-CHUG with their individual clients. Although students may be hesitant to report alcohol-related issues to the counselor, they may be more willing to complete an online program between counseling sessions and bring the feedback to the next session to discuss with the counselor. The counselor may then use motivational interviewing strategies to help students make better choices about drinking. Similarly, e-CHUG feedback could be used in a group counseling format in which the group counselor may facilitate a discussion among group members about their feedback and strategies to reduce their drinking. Students may also be interested in other group members' feedback, and this group sharing may serve as another format for providing normative drinking information. Caution, however, should be taken when using feedback in a group format if all the students in the group are high-risk drinkers because comparison of alcohol use among heavy drinkers may reinforce overestimates of peer drinking and, in turn, high-risk drinking.

Next, although alcohol use is addressed in orientation programs, 1st-year students remain a high-risk population for drinking and alcohol-related problems. Thus, both the timing of traditional prevention strategies and type of intervention strategies used should be considered in developing programs targeting 1st-year student alcohol use. As supported by the finding that students in the control group reported increases in drinking and alcohol-related consequences over the course of the spring semester, well-placed prevention programs may need to occur throughout the academic year. Although many colleges and universities provide prevention programming during orientation or during the fall semester, the findings of this study reveal that providing prevention programs in the spring semester may be equally important. In addition, reviews of the literature indicate personalized feedback programs are generally more effective than traditional large lecture formats or educational programs in decreasing alcohol use in the college and university student population (Larimer & Cronce, 2002, 2007). Thus, prevention programs targeting 1st-year students should provide personalized feedback rather than delivering alcohol-related

information in traditional lecture-based educational formats. Web-based programs such as e-CHUG are well suited to deliver personalized feedback to large numbers of students and can be provided to students throughout the academic year without increasing costs to the college or university.

Additionally, Web-based programs such as e-CHUG should be included in a comprehensive strategy incorporating community, campus environment, and individual-level programs. For example, Sullivan and Risler (2002) suggested that college counselors should develop a multisystemic intervention approach using social marketing, risk reduction, gender-specific recovery groups, and brief motivational interventions. Although Web-based personalized feedback is a cost-effective strategy that is easy to disseminate to large groups of students, community and campus alcohol policies targeting responsible drinking and in-person interventions for high-risk populations, such as mandated students, need to be implemented as well. Thus, Web-based feedback programs should be viewed as part of a larger overall campus strategy to reduce heavy drinking. That is, Web-based programs can be used in prevention efforts targeting large numbers of students, whereas in-person evidence-based programs such as Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999) can be used with students who have been cited with campus alcohol-policy violations or who are seeking assessment or treatment for alcohol-related difficulties. In addition, Web-based programs such as e-CHUG can be used as the assessment portion of the BASICS program, thus delivering feedback immediately to the student and also eliminating the need to score assessments between sessions.

Limitations and Directions for Future Research

Although this study provides additional empirical support for Web-based personalized feedback programs in general and e-CHUG in particular, several limitations exist. First, the attrition rate, recruitment strategy, and small sample in this study limit the generalizability of the results. Although attrition rates were similar across study groups, suggesting attrition was not related to a particular group, the baseline assessment data indicated that students who did not complete the follow-up assessment reported levels of alcohol-related problems that were significantly higher than those reported by students who completed the study. Students participating in this study were also recruited from a 1st-year seminar. Students enrolled in this seminar may be different from general college and university 1st-year students, because this seminar is voluntary and may attract a particular type of student. Additionally, future research with larger, more diverse samples is recommended to replicate the findings.

Next, information in this study was obtained through self-report. Although use of self-reported data potentially leads to biased or distorted reporting, reliance on self-reported alcohol use is common practice in studies evaluating computerized interventions for college and university students (Bersamin et al., 2007; Chiauzzi et al., 2005; Doumas & Haustveit, 2008; Kypri et al., 2004; Neighbors et al., 2004; Walters et al., 2007), and research has indicated that the reliability of self-report is adequate (Marlatt et al., 1998). Additionally, because of the logistics entailed in implementing this evaluation as part of the 1st-year seminar, seminar

sections—rather than students—were randomly assigned to the two groups. Thus, 1st-year students were actually nested within seminars. In future studies, random assignment of individual students, rather than seminar sections, should be conducted.

Finally, the length of time between the baseline follow-up assessments was fairly short (i.e., 3 months). Although effects of Web-based personalized feedback programs have been shown to last for up to 6 months in university students (Neighbors et al., 2004) and 12 months in adults (Hester, Squires, & Delaney, 2005), future research should include examining the efficacy of Web-based programs implemented for 1st-year students across a longer period because a recent meta-analysis has suggested that intervention effects may decline in college and university students after 6 months (Carey et al., 2007). Similarly, directions for future research include examining drinking patterns among 1st-year students across the whole academic year, not just in the fall or spring semesters.

Conclusion

Despite prevention efforts, college and university 1st-year students remain a high-risk population for heavy drinking and alcohol-related problems. Additionally, although Web-based alcohol prevention programs have been adopted by hundreds of colleges and universities across the country, no more than one or two studies using a randomized controlled design are published regarding any specific Web-based program. Results of this study add to the growing body of literature that indicates providing a Web-based normative feedback program to 1st-year students is a promising strategy for the reduction of heavy drinking in this high-risk population. This study also provides additional evidence for the efficacy of e-CHUG in particular and is the first study to demonstrate the efficacy of e-CHUG administered as part of the 1st-year seminar curriculum in reducing alcohol-related problems for high-risk students. Because of the low cost, ease of dissemination, and growing empirical evidence associated with Web-based personalized feedback, this type of programming is ideal for colleges and universities with limited resources for prevention and intervention programming that need to target large numbers of students or that want to provide students unlimited program access across the year. Directions for future research include examining the influence of Web-based personalized normative feedback programs such as e-CHUG over longer periods, with larger samples, and with other high-risk groups such as student athletes, fraternity and sorority members, and mandated students.

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