This study evaluated the effectiveness of a web-based personalized normative feedback program, electronic Check-Up to Go (e-CHUG), in decreasing heavy drinking among 1st-year university students. Results indicated high-risk students receiving the e-CHUG program during 1st-year orientation activities reported significantly greater reductions in heavy drinking and alcohol-related consequences than did students in an assessment-only control group at a 3-month follow-up. Recommendations for integrating e-CHUG into orientation activities are discussed.

Heavy drinking represents a significant problem on college and university campuses in the United States, with over 30% of students meeting criteria for a diagnosis of alcohol abuse (Knight et al., 2002). National survey data have indicated 80% to 85% of U.S. college and university students reported drinking (O’Malley & Johnston, 2002) and 40% to 45% reported a heavy drinking episode at least once in the 2 weeks prior to the survey (Wechsler et al., 2002). Heavy drinking is also associated with multiple social problems, such as arguing with friends, unplanned sexual activity, drinking and driving, getting into trouble with the law, and academic difficulties (Abbey, 2002; Cooper, 2002; Perkins, 2002; Vik, Carrello, Tate, & Field, 2000; Wechsler, Lee, Kuo, & Lee, 2000), as well as severe consequences such as unintended injuries, assault, and death (Hingson, Heeren, Winter, & Wechsler, 2005).

The National Institute for Alcohol Abuse and Alcoholism (NIAAA; National Advisory Council on Alcohol Abuse and Alcoholism, Task Force on College Drinking, 2002) has identified 1st-year students as a high-risk group for heavy drinking relative to the general student population. First-year students drink more drinks and engage in heavy drinking episodes more frequently in comparison to upperclassmen (Turrisi, Padella, & Wiermsa, 2000). This high-risk status afforded to 1st-year students has been attributed to several factors,
including an increase in freedom, decrease in social control, and increase in stress experienced in higher education relative to high school (Arnett, 2005). Student drinking is also affected by perceptions of peer drinking (Perkins, 2002), and research indicates this influence is strongest during the 1st year (Turrisi et al., 2000). These studies support the importance of providing evidence-based programs targeting heavy drinking among 1st-year students.

Recent reviews of the literature support the efficacy of brief interventions using motivational interviewing and personalized normative feedback for reducing high-risk drinking in university and college students (Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Larimer & Cronce, 2007). Innovative approaches to implementing brief motivational interventions have also been developed, with a growing number of controlled studies indicating that web-based personalized feedback programs are effective in reducing drinking and alcohol-related consequences (Bersamin, Paschall, Fearnow-Kenney, & Wyrick, 2007; Chiauzzi, Green, Lord, Thum, & Goldstein, 2005; Doumas & Anderson, 2009; Doumas & Haustveit, 2008; Kypri et al., 2004; Neighbors, Larimer, & Lewis, 2004; Walters, Vader, & Harris, 2007). Although recent reviews of the literature have indicated that feedback—whether delivered in person, by mail, or online—can be effective (Larimer & Cronce, 2007; Walters & Neighbors, 2005), web-based interventions may be particularly useful for 1st-year students because online programming has the potential both to reach a wide audience and to be an engaging medium for students who enjoy “surfing the net.”

Providing research to support the effectiveness of web-based alcohol programs has become increasingly important with the proliferation of both the number of colleges and universities using web-based programs to address campus alcohol use and the number of these programs currently available on the market. Although the literature supports the efficacy of providing personalized normative feedback electronically (Larimer & Cronce, 2007), only one or two program evaluations have been published supporting the effectiveness of any specific program. An example of this type of online personalized feedback program is electronic Check-Up to Go (e-CHUG), which was developed by counselors and psychologists at San Diego State University to help motivate students to examine their drinking. Although e-CHUG has been adopted by over 550 colleges and universities nationwide (San Diego State University Research Foundation, n.d.), to date, only two studies have been published specifically evaluating the efficacy of e-CHUG in reducing heavy drinking in 1st-year students (Doumas & Anderson, 2009; Walters et al., 2007).

Walters et al. (2007) evaluated the efficacy of e-CHUG over 16 weeks in a volunteer sample of 106 1st-year university students reporting heavy episodic drinking. Students were randomly assigned to either e-CHUG or an assessment-only condition. 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 content relative to the control condition, but at the 16-week follow-up there were no longer differences between the two groups. Additionally, although
alcohol-related consequences declined, there were no differences between the two groups on alcohol-related consequences at either the 8-week or 16-week assessments. Similarly, Doumas and Anderson (2009) examined the efficacy of e-CHUG in reducing heavy drinking in 1st-year students using a randomized controlled design. Doumas and Anderson, however, evaluated the effectiveness of e-CHUG incorporated into the curriculum of a 1st-year seminar offered during the spring semester. Results at a 3-month follow-up assessment indicated students classified as high-risk drinkers participating in e-CHUG reduced their weekly drinking quantity, frequency of drinking to intoxication, and number of alcohol-related consequences relative to high-risk students in an assessment-only control condition. Results indicated that incorporating e-CHUG into 1st-year student activities is a promising strategy for reducing heavy drinking among such students.

Because e-CHUG is being used at so many colleges and universities and is often administered during 1st-year orientation for matriculating students, it is important to evaluate e-CHUG as a potential evidence-based strategy. The aim of the current study is to extend the literature by conducting a program evaluation to examine the effectiveness of administering e-CHUG during 1st-year students’ orientation. To achieve our aims, two orientation sections were randomly assigned to either the e-CHUG group or an assessment-only control group. We also classified students as high-risk or low-risk drinkers using reports of binge drinking at the baseline assessment. We hypothesized that 1st-year students classified as high-risk drinkers receiving e-CHUG would report greater reductions in heavy drinking and alcohol-related consequences compared with those in the control condition. We also hypothesized that there would be no differences in drinking measures between the two groups for 1st-year students classified as low-risk drinkers.

Method

Participants and Procedure

Participants were recruited from two 1st-year summer orientation sections at a large metropolitan university in the Northwest. The two orientation sections were randomly assigned by coin toss to either the e-CHUG group or assessment-only control group. All 1st-year students enrolled in the two sections and present during the baseline assessment (N = 350) were given an opportunity to participate in the study. Enrollment in 1st-year orientation was voluntary and the program was offered as part of 1st-year orientation activities. Participants were offered a chance to win a $100 VISA gift card as compensation for their participation. All participants were treated according to established American Psychological Association (2010) and American Counseling Association (2005) ethical standards, and the research was approved by the university’s institutional review board.

At baseline, 350 students (35% men, 65% women) were present and participated in the study. Of these, 167 (48%) were in the orientation section assigned to
the e-CHUG condition and 183 (52%) were in the orientation section assigned to the assessment-only control condition. Ages of the students ranged from 17 to 19 years ($M = 18.0, SD = 0.45$). Ninety percent were Caucasian, 4% Hispanic, 3% Asian American, and 3% other. A series of chi-square analyses and $t$ tests confirmed there were no differences between the two groups in gender, age, ethnicity, or any of the drinking variables at baseline.

All procedures were completed by participants during 1st-year orientation activities. Members of the research team (the four authors) joined orientation leaders to facilitate the administration of the baseline assessment and e-CHUG program. Students completed an online survey at the baseline assessment during orientation (mid-July) and were sent online surveys by e-mail for the 3-month follow-up assessment (late October). During baseline data collection, students were assigned a personal code. This code was used to identify baseline and follow-up responses for each student and to calculate response rates from baseline to follow-up assessments. All participants were informed of the nature of the study, risks and benefits of participation, and information regarding the voluntary nature of participation. The e-CHUG program was administered during orientation for the intervention group. Students in the control condition were sent information for accessing the e-CHUG program after completion of the follow-up assessment survey. Both baseline and follow-up assessment surveys took approximately 15 minutes to complete.

**Instruments**

**Alcohol consumption.** Recommendations by the NIAAA Task Force include assessing patterns of alcohol consumption in addition to the average number of drinks consumed (NIAAA, 2003). We included three measures to assess alcohol consumption: peak drinking quantity, frequency of drinking to intoxication, and typical weekly drinking quantity. These variables were selected to reflect the quantity of drinking on the heaviest drinking days on college campuses, the frequency of high-risk drinking behavior, and typical drinking behavior. Peak drinking, drinking to intoxication, and weekly drinking are standard measures of alcohol consumption and are based on widely used items in the higher education literature (e.g., Chiauzzi et al., 2005; Doumas & Anderson, 2009; Doumas & Haustveit, 2008; Doumas, McKinley, & Book, 2009; Neighbors et al., 2004; Walters et al., 2007).

First, peak drinking quantity was assessed by the question “What is the highest number of drinks that you have consumed on any given night in the past 3 months?” Second, 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 more than 9 times. Third, quantity of weekly drinking was assessed using a modified version of the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). This item asks participants 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.” A response scale is provided for each day of the week (e.g., Monday, Tuesday). Weekly drinking was calculated by combining the reports for the 7 days of the week. Previous research with adolescents and adults demonstrates nonsignificant correlations between these drinking measures and indexes of social desirability, reasonably high test–retest reliability estimates with coefficients from \( r = .85 \) to \( .90 \), and good convergence between these items and indexes of drinking quantity and frequency with coefficients of \( r = .70 \) or higher (Turrisi, 1999; Turrisi & Jaccard, 1991).

**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 used to measure problem drinking. Participants are asked the number of times in the past 3 months they experienced each of 23 consequences as a result of drinking. Responses are measured on a 5-point scale ranging from never to more than 10 times. A total consequence score is created by summing the 23 items. The RAPI assesses both traditional physical consequences and consequences presumed to occur at higher rates in a college or university student population. The RAPI has good internal consistency (Neal & Carey, 2004) and test–retest reliability (Miller et al., 2002), and is correlated significantly with several drinking variables (White & Labouvie, 1989). Cronbach’s alpha for the current sample was \( \alpha = .78 \).

**Classification of high-risk versus low-risk drinkers.** Following the Harvard School of Public Health College Alcohol Study (CAS), binge drinking was defined as having five or more drinks in a row for males (four or more for females; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). This item was used as an indicator of high-risk drinking and was used to create a risk variable, with participants indicating one or more occasions of binge drinking in the 3 months at the baseline assessment classified as high-risk drinkers. The 5/4 binge drinking measure has been widely used and supported as an appropriate threshold to identify high-risk drinkers (Wechsler & Nelson, 2001, 2006) and identified as a dangerous level of drinking (“NIAAA Council approves definition of binge drinking,” 2004). Although other studies have used the binge criteria at time frames of 1 week (Chiauzzi et al., 2005), 2 weeks (Doumas & Anderson, 2009), and 1 month (Bersamin et al., 2007; Kypri et al., 2004; Walters et al., 2007), we selected a 3-month time frame to capture longer standing drinking patterns and to provide a less stringent criteria for high-risk drinking, thus including more students in this group. Using this measure, 39% of the participants were classified as high-risk drinkers and 61% were classified as low-risk drinkers.

**Intervention**

Students in the intervention group were directed to take e-CHUG, a National Association of Student Personnel Administrators (NASPA) recognized,
evidenced-based, online alcohol intervention and personalized feedback tool developed by counselors and psychologists at San Diego State University. This brief web-based program is 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. Further details about the program, procedures and costs for subscribing to the program, and supporting research are provided on the program website (http://www.e-chug.com/). The program is customized for the participating university, including providing normative data for the specific university population, referrals for the local community, and designing the website using university colors and logos.

The personalized feedback program takes approximately 30 minutes to complete. Students first complete an online assessment consisting of basic demographic information (e.g., sex, age, weight, living situation, class standing) and information on alcohol consumption, drinking behavior, and alcohol-related consequences. Immediately following the assessment, individualized graphed feedback is provided in the following domains: Summary of quantity and frequency of drinking including graphical feedback, such as the number of cheeseburgers that are equivalent to alcohol calories consumed, graphical comparison of one’s own drinking to U.S. adult and college-drinking norms, estimated risk status for negative consequences associated with drinking and risk status for problematic drinking based on the participant’s Alcohol Use Disorder Identification Test score, genetic risk, tolerance, approximate financial cost of drinking in the past year, normative feedback comparing one’s perception of peer drinking to actual university drinking normative data, and referral information for local agencies.

Results

Overall, 82 (23.4%) of the 350 participants completed the 3-month follow-up assessment. For the final sample, 44% (n = 36) were in the e-CHUG group (n = 29 low risk; n = 7 high risk) and 56% (n = 46) were in the control group (n = 35 low risk; n = 11 high risk). There was no difference in the rate of attrition across the e-CHUG and control groups, \( \chi^2(1, N = 350) = 0.62, p = .43 \). In addition, chi-square and t tests revealed no differences in demographic variables between the participants who completed the follow-up assessment and those who did not. Participants who did not complete the follow-up assessment, however, reported higher levels of peak drinking, \( t(348) = 3.58, p < .001 \), Cohen’s \( d = .44 \); drinking to intoxication, \( t(348) = 2.60, p < .01 \), Cohen’s \( d = .32 \); weekly drinking, \( t(348) = 3.22, p < .001 \), Cohen’s \( d = .41 \); and alcohol-related consequences, \( t(348) = 2.22, p < .05, d = .29 \), than did those who completed the 3-month survey, although effect sizes were small. Only the 82 participants who completed both pretest and posttest assessments were included in the following analyses.
Alcohol Consumption

Three repeated measures factorial analyses of variance (ANOVAs) were conducted to examine differences between the e-CHUG group and the control group from baseline to the 3-month follow-up assessment for peak drinking quantity, frequency of drinking to intoxication, and weekly drinking quantity. The three independent variables were time (baseline, 3-month follow-up), group (e-CHUG, control), and risk status (high-risk; low-risk). Means for each of the dependent variables by group and risk status are shown in Table 1.

### TABLE 1

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

<table>
<thead>
<tr>
<th>Condition and Time</th>
<th>Risk Status</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Risk</td>
<td>Low Risk</td>
<td>Total Sample</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n = 18)</td>
<td>(n = 64)</td>
<td>(N = 82)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>e-CHUG</td>
<td>Peak Drinking Quantity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>9.3</td>
<td>4.4</td>
<td>0.6</td>
<td>1.0</td>
<td>2.6</td>
</tr>
<tr>
<td>3 months</td>
<td>3.9</td>
<td>2.3</td>
<td>1.0</td>
<td>2.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Control</td>
<td>7.1</td>
<td>2.6</td>
<td>0.4</td>
<td>0.9</td>
<td>2.0</td>
</tr>
<tr>
<td>3 months</td>
<td>7.9</td>
<td>6.1</td>
<td>0.7</td>
<td>1.5</td>
<td>2.4</td>
</tr>
<tr>
<td>e-CHUG</td>
<td>Drinking to Intoxication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>1.4</td>
<td>1.9</td>
<td>0.1</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>3 months</td>
<td>0.9</td>
<td>0.7</td>
<td>0.3</td>
<td>0.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Control</td>
<td>1.3</td>
<td>0.8</td>
<td>0.1</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>3 months</td>
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<td>1.2</td>
<td>0.1</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>e-CHUG</td>
<td>Weekly Drinking Quantity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>5.6</td>
<td>7.7</td>
<td>0.1</td>
<td>0.4</td>
<td>1.2</td>
</tr>
<tr>
<td>3 months</td>
<td>3.7</td>
<td>4.4</td>
<td>1.0</td>
<td>3.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Control</td>
<td>5.2</td>
<td>4.1</td>
<td>0.1</td>
<td>0.3</td>
<td>1.3</td>
</tr>
<tr>
<td>3 months</td>
<td>5.7</td>
<td>5.7</td>
<td>0.3</td>
<td>1.1</td>
<td>1.6</td>
</tr>
<tr>
<td>e-CHUG</td>
<td>Alcohol-Related Consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>4.6</td>
<td>4.7</td>
<td>0.4</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>3 months</td>
<td>0.9</td>
<td>1.6</td>
<td>0.4</td>
<td>2.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Control</td>
<td>3.6</td>
<td>3.3</td>
<td>0.2</td>
<td>0.8</td>
<td>1.0</td>
</tr>
<tr>
<td>3 months</td>
<td>2.2</td>
<td>2.4</td>
<td>0.6</td>
<td>0.3</td>
<td>0.6</td>
</tr>
</tbody>
</table>

*Note.* e-CHUG = electronic Check-Up to Go.
Results of the ANOVAs indicated a significant interaction effect for the Time × Group × Risk Status for peak drinking, $F(1, 78) = 16.41, p < .001$, $\eta^2_p = .17$, and for drinking to intoxication, $F(1, 78) = 5.59, p < .02$, $\eta^2_p = .07$. Findings indicate that high-risk students in the e-CHUG group reduced their peak drinking quantity and frequency of drinking to intoxication significantly more than did those in the control group. Because of the small sample size in the high-risk groups, we elected to use effect size calculations rather than significance testing to examine post hoc between-group pair-wise comparisons for drinking measures at the 3-month follow-up between the e-CHUG group and the control group. For high-risk students, effect size calculations indicated a large effect size between the means for the students in the e-CHUG group and control group for peak drinking, Cohen's $d = .81$, and a medium effect size for drinking to intoxication, Cohen's $d = .58$. In contrast, for low-risk students, calculations indicated small effect sizes between the means for students in the e-CHUG and control group for both peak drinking, Cohen's $d = .17$, and drinking to intoxication, $d = .32$. Calculations of the differences between baseline and 3-month follow-up means in Table 1 indicate that high-risk students in the e-CHUG group reduced their peak drinking by 58% compared with an 11% increase in the control group. Similarly, high-risk students in the e-CHUG group reduced their drinking to intoxication by 65% compared with a 15% increase in the control group (see Figure 1).

In contrast, the ANOVA for weekly drinking was not significant, although results for the Time × Group × Risk Status followed a similar pattern, $F(1, 78) = 2.23, p = .14$, $\eta^2_p = .03$. Although not statistically significant, calculations of the differences between baseline and 3-month follow-up means in Table 1 indicate that high-risk students in the e-CHUG group reduced their weekly drinking by approximately 34% compared with increases of 10% in the control group (see Figure 1).

Alcohol-Related Consequences

A repeated measures factorial ANOVA was conducted to examine differences in alcohol-related consequences between the e-CHUG group and the control group from baseline to the 3-month follow-up assessment. The three independent variables were time (baseline, 3-month follow-up), group (e-CHUG, control), and risk status (high-risk, low-risk). Means for alcohol-related consequences 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 alcohol-related consequences, $F(1, 78) = 4.63, p < .03$, $\eta^2_p = .06$. Findings indicate that high-risk students in the e-CHUG group reported fewer alcohol-related consequences than those in the control group. Effect size was used for post hoc between-group pair-wise comparisons for alcohol-related consequences at the 3-month follow-up between the e-CHUG group and control group. For high-risk students, effect size calculations indicated a large effect size between the means for students in the e-CHUG group.
FIGURE 1
Changes in Drinking and Alcohol-Related Consequences by Study Condition and Risk Status

Note. e-CHUG = electronic Check-Up to Go.
group and control group, Cohen's $d = .61$. In contrast, for low-risk students, calculations indicated a small effect size between the means for students in the e-CHUG and control group, Cohen's $d = .24$. Calculations of the differences between baseline and 3-month follow-up means in Table 1 indicate that high-risk students in the e-CHUG group reported an 80% reduction in their alcohol-related consequences compared with a 39% reduction in the control group (see Figure 1).

**Discussion**

The aim of this study was to evaluate the effectiveness of a web-based personalized feedback program (e-CHUG) in decreasing heavy drinking and alcohol-related consequences among 1st-year university students. Although e-CHUG has been adopted by over 550 colleges and universities nationwide (San Diego State University Research Foundation, n.d.), to date, there are only two published studies providing evidence to support the efficacy of e-CHUG in 1st-year students (Doumas & Anderson, 2009; Walters et al., 2007). This is the first study to examine e-CHUG as part of 1st-year orientation activities for matriculating students. Thus, this study adds to the growing body of literature supporting the efficacy of web-based normative feedback programs and provides evidence for the effectiveness of e-CHUG in particular.

Findings confirmed the hypothesis that the reductions in heavy drinking and alcohol-related consequences in the e-CHUG group would be significantly greater than reductions in the assessment-only control group for high-risk drinkers, whereas changes in drinking for 1st-year students in the low-risk group would be similar across the intervention and control groups. High-risk 1st-year students in the e-CHUG group reported a 58% reduction in peak drinking, 65% reduction in frequency of drinking to intoxication, and 34% reduction in weekly drinking compared with 11%, 15%, and 10% increases, respectively, in the control group at the 3-month follow-up. Additionally, although both groups reported a decrease in alcohol-related consequences, high-risk students in the e-CHUG group reported an 80% reduction compared with a 39% reduction in the control group. It is important to note that for high-risk students, heavy drinking decreased 34% to 65% in the e-CHUG group compared with a 10% to 15% increase in drinking in the control condition. This indicates that 1st-year students in the e-CHUG group reduced their drinking despite the natural trajectory of an increase in heavy drinking seen in the 1st-year students who did not receive the program. Additionally, students in the e-CHUG condition reported a reduction in alcohol-related consequences that were double that of students in the control group.

Results of this study are consistent with research indicating web-based personalized feedback programs are effective in reducing heavy drinking (Bersamin et al., 2007; Chiauzzi et al., 2005; Doumas & Anderson, 2009; Doumas &
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 consequences for 1st-year college and university students. First, 39% of this sample was classified as high-risk drinkers, indicating more than one third of the matriculating students in this sample reported binge drinking at least once in the past 3 months prior to the baseline survey. Additionally, 1st-year students in the control group actually increased their drinking over the course of the fall term. Coupled with prior research indicating 1st-year students increase their alcohol use over the academic year (Borsari, Murphy, & Barnett, 2007) and are at risk for alcohol-related consequences throughout the academic year (Doumas & Anderson, 2009), counselors need to remain aware that drinking may become heavier and more alcohol-related consequences may occur as the academic year progresses.

Additionally, web-based programs such as e-CHUG should be incorporated into a comprehensive strategy including community, campus environment, and individual-level programs. For example, Sullivan and Risler (2002) suggested college counselors develop a multisystemic intervention approach that includes social marketing, risk reduction, gender-specific recovery groups, and brief motivational interventions. Additionally, environmental strategies such as community and campus alcohol policies targeting responsible drinking need to be implemented. Although web-based personalized feedback is cost-effective and easy to disseminate to large groups of students, this strategy may not be effective for all students. For example, although web-based programs may be effective for students cited for campus alcohol policy violations in the short term (Doumas et al., 2009), recent research indicates that in-person brief interventions may be more effective than written or computer-based feedback for mandated students over longer periods of time (Carey, Henson, Carey, & Maisto, 2009; Doumas & Rudeen, 2009; White, Mun, Pugh, & Morgan, 2007). Thus, web-based feedback programs should be viewed as part of a larger overall campus strategy to reduce heavy drinking.
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, there are several limitations. First, the high rate of attrition significantly affects the generalizability of the results. Although attrition rates were similar across study conditions, suggesting attrition was not related to the particular study condition, students who dropped out of the study reported higher levels of alcohol consumption and alcohol-related consequences at baseline than did students who completed the study. This differential dropout pattern resulted in fewer students in the high-risk group than would have been expected. Because web-based interventions have been shown to be more effective with high-risk students (Bersamin et al., 2007; Chiauzzi et al., 2005; Doumas & Anderson, 2009; Doumas & Haustveit, 2008; Kypri et al., 2004; Neighbors et al., 2004; Walters et al., 2007), the differential attrition of these students relative to low-risk students may have dampened our effects. Similarly, because attrition resulted in small sample sizes in the high-risk groups, statistical power was decreased, affecting our ability to conduct post hoc analyses of statistical significance and thus leading to the report of effect sizes only.

Next, information in this study was obtained through self-report. Although self-report potentially leads to biased or distorted reporting, university students may not be motivated to misrepresent their alcohol use because heavy drinking is perceived as normal in the college and college setting (Borsari & Muellerleile, 2009). Self-reported alcohol use is common practice in studies evaluating web-based interventions for college and university students, and results of a recent meta-analysis support this usage, indicating that the reliability of self-reported drinking in college students is good, with little bias reported between participant and collateral reports (Borsari & Muellerleile, 2009). Future research, however, could include more objective outcomes (e.g., sanctions for campus alcohol policy violations, retention, or grade point average) in addition to self-report measures of drinking behavior and associated consequences.

An additional limitation is related to our recruitment strategy. First-year students were recruited from two 1st-year orientation sections. Students enrolled in orientation may be different from general college or university 1st-year students, because orientation was voluntary and may have attracted a particular type of student. Additionally, because of logistics in implementing this evaluation as part of the 1st-year orientation, orientation sections rather than 1st-year students were randomly assigned to the two conditions. Lack of random assignment may lead to initial differences between groups, which may affect the validity of findings. Examination of demographic variables and drinking measures revealed no baseline differences between the two groups, thus mitigating the problem of nonrandom assignment. In future studies, however, random assignment of individual students rather than orientation sections should be conducted.
Finally, the duration of the 3-month follow-up was fairly short. Although effects of web-based feedback programs have been shown to last for up to 6-months in university students (Neighbors et al., 2004), a recent dismantling study indicated that at a 6-month follow-up, motivational interviewing with personalized normative feedback was more effective in reducing university student drinking than was web-based feedback alone, and there were no differences between the web-based feedback alone and assessment-only conditions (Walters, Vader, Harris, Field, & Jouriles, 2009). Additionally, results from a recent meta-analysis suggested that intervention effects may decline after 6 months in college and university students (Carey et al., 2007). Therefore, future research should examine the efficacy of web-based programs implemented for 1st-year students across a longer period of time and preferably beyond the 1st year.

Conclusions

Despite prevention efforts, 1st-year students remain a high-risk population for heavy drinking and alcohol-related consequences on college and university campuses. Additionally, although web-based alcohol prevention programs have been adopted by hundreds of colleges and universities across the country, there are no more than one or two studies using a randomized controlled design published on any specific web-based program. Results of this study add to the growing body of literature suggesting that providing web-based personalized feedback to 1st-year students is a promising strategy for decreasing heavy drinking in this high-risk population. This study also provides additional evidence for the efficacy of e-CHUG in reducing heavy drinking and alcohol-related consequences and is the first to demonstrate the effectiveness of e-CHUG administered to matriculating students during orientation.

Because of the low cost, ease of dissemination, and growing empirical evidence associated with web-based personalized normative feedback, this type of program is ideal for colleges and universities having limited resources, needing to target large numbers of students, or wanting to provide students unlimited program access across the academic year. Directions for future research include examining the impact of web-based feedback programs over longer follow-up periods, with larger samples and with other high-risk groups such as student athletes, fraternity and sorority members, and mandated students. Furthermore, additional measures of alcohol-related consequences (e.g., campus alcohol policy violations) and academic success (e.g., retention or grade point average) could be included as more objective measures of effectiveness.

References


