

Wired for wellness: e-Interventions for addressing college drinking[☆]

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Received 3 January 2005; received in revised form 12 May 2005; accepted 27 May 2005

Abstract

In an effort to address problematic drinking among American college students, there has been increasing interest in the use of technology. This article reviews evidence for the efficacy of computer and internet interventions and provides information on five commercially available alcohol education and intervention programs that target college drinkers. Most programs use a mix of educational, skills-based, and motivational strategies to present material. All programs include assessment questions and provide personalized drinking feedback or other information that is customized to each user. Despite limited outcome research, there appear to be a number of advantages to computer and internet programs that focus on alcohol reduction. Future studies will need to determine how to best make use of technology to reach larger numbers of students with an effective, individual approach. © 2005 Elsevier Inc. All rights reserved.

Keywords: College; Computer; Internet; Alcohol; Prevention

1. Introduction

Alcohol use has been a persistent problem at many American universities. Approximately two thirds of students drink some alcohol in a given month and more than half of drinkers report at least one heavy episode (O'Malley & Johnston, 2002; Wechsler et al., 2002). This pattern is associated with lower grade point averages, higher rates of intoxicated driving, a greater incidence of violence, and a substantial economic cost to colleges and the community (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002; Hingson, Heeren, Winter, & Wechsler,

2005; Jennison, 2004). In response, colleges have instituted prevention and intervention programs ranging from universal efforts targeting the entire student body (Perkins, 2002; Weitzman, Nelson, Lee, & Wechsler, 2004) to selective programs for students who have already evidenced problems with alcohol (Fromme & Corbin, 2004; Larimer et al., 2001). In this effort, there has been increasing interest in the use of multimedia technology to provide prevention messages. The attraction for those who work in college health settings is the possibility of delivering a low-cost, structured intervention to a large number of students. Indeed, college students are already the most “wired” of all demographic groups: 85% own their own computer and 86% have gone online (Pew Internet and American Life Project, 2002). Many students already use the internet to find health information. In a recent survey of 15- to 24-year-olds, two thirds reported that they had received health information online and one quarter sought information about drug or alcohol problems (Kaiser Family Foundation, 2001). Students also act upon the information they receive: 70% of health information seekers discuss it with a friend and 40%

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report changes in health behavior (Kaiser Family Foundation, 2001).

When asked, most college students say that they want unassisted or minimal instruction about alcohol (Black & Coster, 1996). Unfortunately, there is the least empirical support for interventions that provide generic education and information about alcohol (Larimer & Crouce, 2002; Walters & Bennett, 2000). Computerized interventions may be a cost-effective way to provide more personalized and perhaps more effective messages to students. In addition, because many of these interventions have emerged recently from federal grant funds, they tend to include motivational, attitudinal, and skills-training components, which have better empirical support than educational approaches (Larimer & Crouce, 2002; Walters & Bennett, 2000). Indeed, there may be some advantages to computer interventions that make students—and even those who meet criteria for hazardous drinking—more likely to respond to this modality (Kypri, Saunders, & Gallagher, 2003). First, computer-based programs can offer assessment and screening, allowing students to determine their own need for more formal interventions. For instance, based on a series of screening questions, a program could make suggestions about what resources a student might find helpful. Second, the private, nonjudgmental quality of this format may increase honest responses. Compared with paper-and-pencil questionnaires, computerized assessments tend to increase disclosure in areas such as high-risk sexual behavior, excessive alcohol use, marijuana use, and family problems (Paperny, Aono, Lehman, Hammar, & Risser, 1990; Turner et al., 1998). Third, multimedia technologies enable users to control their learning environment, move at their own pace, and receive information on demand (Cheiten & Walters, 1995). Fourth, computer interventions can tailor information, providing a unique experience to thousands (if not millions) of users. Using a series of database algorithms, computer programs can customize information based on sex, stage of change, drinking demography, or other variables. Indeed, tailored interventions appear to be more engaging and effective than static text (Atkinson & Gold, 2002; Paperny et al., 1990; Strecher et al., 1994). For instance, Strecher et al. (1994) compared individualized, computer-generated smoking messages with generic health information. After 6 months, 31% of the experimental group versus 7% of the control group reported quitting. Finally, it is possible that computer interventions might actually be more effective than face-to-face interactions for some types of students. For instance, having high-risk adjudicated students complete an initial intervention online might minimize some of the difficulties often encountered with aggregating such students into a group (O'Leary et al., 2002; Walters, Ogle, & Martin, 2002). Students can receive information over the computer without feeling that they have to strongly defend an opinion in front of their peers, and interactions between users can be monitored for appropriateness and relevance.

In an early effort to address adolescent substance use, Skinner et al. developed an internet-based health promotion program called TeenNet (<http://www.teennetproject.org>). The site addresses multiple health areas (e.g., sexuality, tobacco, substance abuse) through an online community, interactive games, and a self-assessment. For emerging adults, there are several well-known websites such as Go Ask Alice (<http://www.alice.columbia.edu>) and Facts on Tap (<http://www.factsontap.org>) that provide information on college health. However, despite their popularity, we were unable to find published outcome data on these sites.

Early attempts to educate students about alcohol used CD-ROM technology. For instance, the interactive CD-ROM program, Alcohol 101, was developed by researchers from the University of Illinois in conjunction with the Century Council, an association of American alcohol distilleries. The program uses a variety of interactive features—games, videos of high-risk drinking scenarios, a blood alcohol concentration (BAC) estimator, and information about impaired driving and high-risk sexual behavior. Reis, Riley, Lokman, and Baer (2000) compared knowledge among students receiving Alcohol 101, an alternative education group, and a no-treatment control. Students receiving Alcohol 101 gained significantly more knowledge about risky sexual practices related to alcohol use and alcohol-related violence. Students who received the program also reported a greater intent to use strategies to remain safe at parties, although no behavioral outcomes were reported. Sharnier (2001) compared Alcohol 101 with a teacher-centered motivational speech and found no significant differences between these groups in terms of knowledge or self-reported alcohol consumption and consequences. In a longitudinal study, Miller (2000) compared the effects of Alcohol 101 delivered in groups, the Alcohol Skills Training Program (ASTP; a peer-facilitated skills intervention), and two assessment-only conditions. After 1 year, lighter drinkers who had received either Alcohol 101 or ASTP showed an increase in knowledge but no increase in alcohol-related problems, suggesting a preventive effect for this subgroup. However, satisfaction ratings and motivation to change were lowest among those who participated in Alcohol 101.

There is also a literature on computer interventions that provide feedback (Walters & Neighbors, 2005). Based on the work of several authors (e.g., Baer, Kivlahan, Blume, McKnight, & Marlatt, 2001; Marlatt et al., 1998), Dimeff and McNeely (2000) created and tested a CD-ROM program called the Multi-Media Assessment of Student Health (MMASH). Students visiting a student health center were randomly assigned to either MMASH or a treatment-as-usual control. After completing a computerized assessment, students received a personalized report of their drinking habits and risks and discussed the report with a health care provider. At 30-day follow-up, students receiving MMASH reported fewer episodes of heavy

drinking and alcohol-related problems. More recently, Neighbors, Larimer, and Lewis (2004) tested the efficacy of computerized normative feedback among heavy-drinking college students. Participants were randomly assigned to feedback or assessment only. Students in the feedback condition were provided with a printed summary of their drinking, their perceptions of typical student drinking, and actual student drinking. At 6 months, students in the feedback condition reported greater changes in perceived norms as well as reductions in consumption relative to students in the comparison condition. Kypri et al. (2004) likewise found 6-month reductions in personal problems over control as a result of receiving personalized feedback in a student health center. Finally, one project that used an online assessment with mailed feedback found a reduction in the number of heavy-drinking episodes of the intervention group in comparison with the control group. Even abstainers who received feedback were more likely to delay the initiation of drinking if they received feedback (M. Larimer, personal communication, May 17, 2004).

2. Methods

During Summer 2004, we attempted to identify commercially available computer and internet programs that specifically targeted alcohol consumption among college students.

Table 1
Alcohol 101 Plus

Program	Alcohol 101 Plus
Sponsor/Contact	The Century Council 1310 G St., NW, Suite 600 Washington, DC 20005 Tel: 202-637-0077 http://www.alcohol101plus.com
Cost of intervention	Free
Target population	College-age students, including first-year students, fraternities and sororities, athletes and judicial offenders
Date first available	3/03
Description of program	CD-ROM program, interactive games, pop-up messages, and video scenarios where users make decisions for characters. Interactive knowledge test of alcohol's effects on the body, friends, sex, and other areas. Also includes a virtual bar where users can receive feedback on a night of simulated drinking. Some content targeted to at-risk populations (student athletes, Greeks, first-time students, and judicial offenders).
Scope	More than 40,000 copies distributed. Data on actual use unavailable.
Outcome studies	Uncontrolled evaluation at 25 colleges of original Alcohol 101 showed a positive impact on knowledge and intent-to-use strategies.
Future directions	Outcome study in progress

Table 2
Alcohol Response-Ability

Program	Alcohol Response-Ability
Sponsor/Contact	BACCHUS and GAMMA National Office PO Box 100430 Denver, CO 80250-0430 Phone: (303) 871-0901 http://www.bacchusgamma.org/alcoholresponseability.asp
Cost of intervention	\$35.00 per student
Target population	College students who have violated campus alcohol policy
Date first available	1/02
Description of program	Four-hour (6 modules) linear course developed as a sanction for alcohol policy violations. Includes an individual drinking assessment, information on BAC levels, addiction, family issues, suggestions for reducing risk, and referral information. Test questions after each module. Campus customization includes local contacts, logos, handouts, and an administrator facilitation manual. Alternate version for student athletes. Administrators can obtain aggregate student data.
Scope	Seventy-two campuses, as sanction for campus alcohol policy violations.
Outcome studies	Self-report data from completers—93% learned new information; 79% found feedback helpful; 95% would try suggestions; 83% more likely to make safe decisions. Campuses reported reduction in sanctions and recidivism after implementing the course.
Future directions	Continue to offer course and document results on an annual basis.

We queried colleagues who attended the U.S. Department of Education's 18th National Meeting on Alcohol and Other Drug Abuse and Violence Prevention in Higher Education as well as through general email correspondence and placed an announcement on the American Psychological Association Division 50 (Addictions) listserv requesting information about programs that met our criteria. We excluded computer interventions that were not specifically marketed to college audiences (e.g., <http://www.alcoholscreening.org>, <http://www.drinkerscheckup.com>) and those that were not commercially available. Based on our search criteria, we identified six programs. The first author contacted a representative from each program, asked for access to their site, and requested information about scope, intent, and outcome studies related to the program. We recontacted programs in Spring 2005 to obtain updated information. Five programs provided information for this review: (1) Alcohol 101 Plus (<http://www.alcohol101plus.com>); (2) Alcohol Response-Ability (<http://www.bacchusgamma.org>); (3) Electronic Check-Up to Go (e-CHUG; <http://www.e-chug.com>); (4) myStudentBody (<http://www.mystudentbody.com>); and (5) Under the Influence (<http://www.underinfluence.com>). One program, AlcoholEdu (<http://www.alcoholedu.com>) declined to participate. Tables 1–5 summarize the

Table 3
Electronic Check-Up to Go

Program	Electronic Check-Up to Go (e-CHUG)
Sponsor/Contact	San Diego State University Counseling and Psychological Services San Diego, CA 92182-8229 Phone: 619-594-5220 http://www.e-chug.com
Cost of intervention	\$745 annual fee per campus, no per-student fee
Target population	College students, as adjunct to counseling intervention, judicial sanctions, and student orientation programs
Date first available	8/02
Description of program	Assessment and feedback on consumption, risk factors, negative consequences, and normative comparison. Campus customization includes logos, norms, and referral information. Partnerships with CHOICES workbook program (http:// www.changecompanies.com) and Under the Influence (http://www.underinfluence.com). Administrators can obtain aggregate data.
Scope	Two hundred colleges
Outcome studies	One randomized trial, program reduced drinking over control at 4 weeks, with no improvement when CHOICES or Alcohol 101 Plus was added. Second randomized trial of freshman students, program reduced drinking over control at 8 weeks but control group also declined at 16 weeks.
Future directions	Updated version released May 2005, including improved graphics, format, and administrator access to data.

descriptive information provided to us by each of the program respondents.

3. Results

The five programs varied substantially in terms of theoretical orientation, content, and presentation style. They ranged in length from only brief assessment and feedback (e-CHUG) to a 4-hour course on alcohol and other drugs (Alcohol Response-Ability). Most programs used a mix of informational, skills-based, and attitudinal material. One program (Alcohol 101 Plus) used CD-ROM technology whereas the others were delivered via the internet. All programs provided personalized information to users either as part of the intervention (Alcohol Response-Ability, myStudentBody, Under the Influence) or as the actual intervention itself (e-CHUG). One program (Alcohol 101 Plus) provided feedback to users about a simulated drinking episode. Most programs provided some empirical data (e.g., satisfaction, knowledge, intent to use safe drinking skills), although only two (e-CHUG and myStudentBody) had been involved in a controlled outcome study that measured changes in drinking behavior (Chiauzzi, Green, Lord, Thum, & Goldstein, 2005; Walters, Matson, & Harris, 2005).

Table 4
myStudentBody: Alcohol

Program	myStudentBody: Alcohol
Sponsor/Contact	Inflexxion, Inc. 320 Needham St., Suite 100 Newton, MA 02464 Phone: 800-848-3895 http://www.mystudentbody.com
Cost of intervention	Varies, depending on size of student population
Target population	College students
Date first available	1/03
Description of program	Interactive website, tailored material based on gender and drinking practices. Includes assessment and feedback on alcohol beliefs, risky behaviors, lifestyle factors, and consequences. Some customization to local campus. Interactive tools (e.g., peer stories, BAC calculator, state alcohol laws, budget calculator, alcohol–medication interactions), social norms information, and expert answers to questions. Administrators can obtain aggregate data.
Scope	Sixty colleges
Outcome studies	Randomized trial of binge drinking students, MSB students reduced drinking frequency over control at 3 months, especially among women and persistent heavy drinkers.
Future directions	Companion sites targeting tobacco use, mental health awareness, and STD prevention. Future sites focused on body image/nutrition and drug prevention.

Based on the information provided by the programs, these computer and internet interventions are being used in a variety of contexts, including (1) freshman orientation

Table 5
Under the Influence

Program	Under the Influence
Sponsor/Contact	3rd Millennium Classrooms 6507 Grove Creek Drive San Antonio, TX 78256 Phone: 888-810-7990 www.3rdmilclassrooms.com
Cost of intervention	\$8–\$12 per student
Target population	Disciplinary version used as sanction for campus alcohol violators. Alternate version, AlcoholWise, focused on first-year students, athletes, and Greek-letter organizations.
Date first available	12/00
Description of program	Four, six, or seven lessons (depending on course); information on alcohol and health, BAC, high-risk behavior, other drugs, and tips for moderate drinking. Includes integrated e-CHUG assessment, survey, test questions after each module, and 30-day follow up. Customized campus page option. Administrators can obtain aggregate data.
Scope	Seventy-eight colleges
Outcome studies	In progress
Future directions	High school course under development

classes, (2) disciplinary or sanctioned students, (3) high-risk groups (e.g., fraternities, sororities, athletic teams), and (4) more general prevention efforts. Two of the programs also reported that they are being formally integrated with individual or group counseling approaches.

4. Discussion

Although evidence for their effectiveness is still preliminary, the five commercially available programs that we reviewed have already been adopted by hundreds of colleges and universities nationwide and are accessed by tens of thousands of students annually. From the reports offered by the various programs as well as our own review of their program content, we were able to draw four conclusions.

First, most programs still appear to rely heavily on educational content, providing text information about the physical, social, and behavioral effects of alcohol. Part of the reason for this may be that as first-generation interventions, informational approaches are more easily translated onto the computer. This approach is also consistent with the bulk of college alcohol prevention programs that may still use a mix of educational lectures, films, and presentations. However, at the same time, most computer programs do integrate some motivational (e.g., normative comparisons, risk factors), attitudinal (e.g., alcohol expectancies), and skills-based (e.g., BAC calculation, drink refusal) strategies. In addition, informational content is often presented via interactive games or quizzes rather than as static text. This hybrid approach may improve overall effectiveness but makes it difficult to determine the active components of an intervention.

Second, like the alcohol literature in general, there appears to be no clear relationship between effectiveness and length of intervention. For example, [Neighbors, Larimer, and Lewis \(2004\)](#) found reductions in drinking as a result of a simple one-page printout. This also mirrors the larger college ([Larimer & Cronce, 2002](#); [Walters & Bennett, 2000](#)) and adult ([Miller, Wilbourne, & Hettema, 2003](#)) alcohol intervention literature, where the length of the intervention is not a predictor of outcome.

Third, one striking commonality of these programs was the inclusion of personalized drinking feedback. That is, all programs ask questions about drinking and provide personalized information about consumption, personal risk, or advice on moderating drinking. In contrast to general educational approaches, feedback has good support in the college treatment literature, both when delivered face to face as part of a brief motivational interview ([Borsari & Carey, 2000](#); [Marlatt et al., 1998](#)) and through mail ([Agostinelli, Brown, & Miller, 1995](#); [Collins, Carey, & Sliwinski, 2002](#); [Walters, 2000](#); [Walters, Bennett, & Miller, 2000](#)). To structure the feedback, *myStudentBody* and *Alcohol Response-Ability* use an initial assessment to provide

personalized drinking information throughout the intervention. *e-CHUG* uses feedback as the actual intervention, whereas *Under the Influence* presents a feedback report (generated by *e-CHUG*) before beginning the course. Using a different approach, *Alcohol 101 Plus* allows users to participate in a virtual bar simulation over the course of one night and provides BAC feedback based on which beverages each user has consumed. In addition to information provision, feedback seems to be one of the most consistent features of these automated programs and one that they are uniquely qualified to deliver.

Finally, at the present time, these automated interventions still reflect, in large part, the contributions of mailed self-help and in-person approaches. For instance, much of the content of these programs could easily appear in a printed educational or self-help workbook. The advantage of the computer with respect to information provision may be the ability to provide much more information upon demand. Students can choose to access information on specific topics (e.g., alcohol poisoning, alcohol–medication interactions, strategies for moderating drinking), listen to peers give testimonials, or print out informational handouts. Students can also calculate their BAC for a given episode or receive information about state alcohol laws, all of which would be difficult in nonautomated formats. Some programs offer ways to tailor the experience, for instance offering a choice between narrators who will guide each participant through the program, providing gender-specific suggestions, and allowing each participant the ability to choose the normative subgroup with which he or she would like his or her drinking to be compared (e.g., freshman, athletes, Greek affiliated). Future programs will undoubtedly include more sophisticated “branching,” providing many more possibilities based on response. Although the technology is certainly available to provide a more dynamic and customized experience, the limiting factor at this point may be lack of information on what kinds of approaches or information are most effective for what kinds of users. For instance, although we have the ability to tailor information to females, Hispanics, or athletes, we know less about what information might be most helpful to what subgroup. Similarly, we do not know much about how the layout, presentation, and delivery of the information add to (or detract from) its effectiveness.

Like the college treatment literature in general, there is a lack of quality research on the topic. Most studies have used convenience samples, survey questionnaires, or uncontrolled research designs. In contrast, only a few have used randomized, controlled research designs. No studies appear to have followed up students beyond 6 months or to have measured changes at a campus-wide level. Similarly, we have almost no information about how these interventions compare with face-to-face approaches. Thus, a panoply of questions remains: What approach is most relevant or interesting to college students? Does the type of information or length of the program make a difference? Does real time

information or feedback have a greater effect than feedback mailed a week later? Does the program layout (e.g., color, graphics) have an impact? How are computer messages best integrated with face-to-face efforts? Because of the tremendous reach of computer and internet interventions, future studies will need to consider how to best make use of technology to reach larger numbers of students with an effective, individual approach.

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