

TREATMENT

Twelve-Month Follow-up Results from a Randomized Controlled Trial of a Brief Personalized Feedback Intervention for Problem Drinkers

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Abstract — **Aims:** To examine the impact of a web-based personalized feedback intervention, the Check Your Drinking (CYD; www.CheckYourDrinking.net) screener at 12-month follow-up. **Methods:** Respondents ($N = 185$) were recruited from a general population telephone survey of Ontario, Canadian adults (≥ 18 years) by asking risky drinkers if they were willing to help develop and evaluate Internet-based interventions for drinkers. Those randomly assigned to the intervention condition were provided with the web address and a unique password to a study-specific copy of the CYD. Respondents assigned to the control condition were sent a written description of the different components of the CYD and asked how useful they thought each of the components might be. Respondents were followed up at 3, 6 and 12 months. **Results:** By the 12-month follow-up, the impact of the intervention previously reported at 3 and 6 months of CYD on problem drinkers' alcohol consumption was no longer apparent ($P > 0.05$). **Conclusions:** Recognizing that many people with alcohol concerns will never seek treatment, recent years have seen an increase in efforts to find ways to take treatment to problem drinkers. The CYD is one such intervention that has a demonstrated effect on reducing alcohol consumption in the short term (i.e. 6 months). Other more intensive Internet-based interventions or interventions via other modalities may enhance this positive outcome over the short and long term among problem drinkers who would be otherwise unlikely to access treatment for their alcohol concerns. www.ClinicalTrials.gov registration #NCT00367575.

INTRODUCTION

One of the primary challenges in health behaviour change is to promote accessibility of efficacious tools and services that promote reductions in risk behaviours. When the interventions are psychosocial in nature, the Internet is one promising option. Portnoy and colleagues' (2008) recent review identified 75 research trials to-date of computer-based interventions for different health behaviours and concluded that such interventions had significant evidence for their efficacy. In the field of addictions, many people with substance abuse concerns never access any type of formal health care services. The ratio of treated to untreated problem drinkers is estimated to be anywhere between 1 in 3 and 1 in 14, even when attendance at Alcoholics Anonymous or a brief discussion with one's family doctor is counted as having received treatment (Roizen *et al.*, 1978; Hasin, 1994; Burton and Williamson, 1995; Cunningham and Breslin, 2004). There are many reasons for this unmet need. Current alcohol and drug abusers cite concerns about stigma as well as a desire to deal with their problems on their own as barriers to seeking treatment (Cunningham *et al.*, 1993; Grant, 1997). Other factors include geographic limitations (i.e. the person lives in a rural location far from any specialized addictions treatment services) or mobility issues (e.g. among the elderly or physically disabled). These barriers are not insurmountable obstacles to improving the accessibility of care to all those in need. Rather, they are a challenge to the creative development of a diversity of different treatment options that can promote the accessibility of care while maintaining treatment fidelity and quality.

There are many advantages to the Internet as a modality to promote access to efficacious health behaviour change interventions. Its use is widespread and growing, making it a potentially useful means of providing psychosocial treatments to those in need. Recent surveys indicate that between 73%

and 84% of adults in the USA and Canada use the Internet (Internet World Stats, 2009), many for accessing health-related information. Other advantages of the Internet include its accessibility and availability 24 hours a day, 7 days a week. Further, Internet-based interventions (IBIs), once developed and evaluated, can be made available at very little additional cost. IBIs can also incorporate the latest research on effective interventions. In addition, as long as the materials are amenable to translation into a no-contact format, IBIs can employ complex algorithms that allow the personalization of the intervention to a wide range of individuals. In the area of problem drinking, the majority of research conducted to-date has employed college student samples (Elliott *et al.*, 2008), but there is a rapidly growing literature demonstrating efficacy in randomized controlled trials conducted with the general population (Murray *et al.*, 2007; Doumas and Hannah, 2008; Riper *et al.*, 2008; Cunningham *et al.*, 2009).

The Check Your Drinking screener (CYD, Cunningham *et al.*, 2006) is a brief, personalized assessment feedback screener with a growing body of evidence supporting its efficacy in reducing harmful and hazardous alcohol consumption. Three small randomized controlled trials conducted by Doumas and colleagues (Doumas and Hannah, 2008; Doumas and Haustveit, 2008; Doumas *et al.*, 2009) have employed the CYD in face-to-face settings with young adults and found that use of the CYD resulted in significant reductions in alcohol consumption among young adult problem drinkers 30 days following exposure to the intervention. In addition, Cunningham and colleagues have reported on 3- and 6-month follow-up results from a randomized controlled trial where the CYD was accessed via the Internet by a general population sample in their own homes (Cunningham *et al.*, 2009). For problem drinkers in this sample, those provided access to the CYD displayed a six- to seven-drinks-per-week reduction in their drinking (a 30% reduction in quantity of drinks consumed)

relative to controls (who reported an average one-drink-per-week reduction) at both 3- and 6-month follow-ups. Low risk drinkers displayed no impact of being provided access to the CYD, suggesting that providing personalized feedback to those drinkers does not result in iatrogenic effects, i.e. increasing alcohol consumption.

While the CYD appears able to reduce drinking at a 6-month follow-up, can the impact of this brief intervention be sustained? This paper reports on 12-month follow-up results from this same trial to assess whether reductions in drinking are sustained or diminished.

METHODS

Trial design

Details of the trial can be found in the earlier publication from this trial (Cunningham *et al.*, 2009). Briefly, respondents were recruited through a general population telephone survey of the Ontario population ($N = 8467$). As part of this survey, all respondents were asked the three consumption items from the Alcohol Use Disorders Identification Test, the AUDIT-C (these items assess typical frequency of consumption, drinks per drinking day and frequency of consuming five or more drinks per occasion). The AUDIT-C has a possible score range of 0–12 with higher scores reflecting more severe drinking problems (Dawson *et al.*, 2005). Respondents were identified who met criteria for at least a minimal risk from their drinking (AUDIT-C ≥ 4). These participants ($n = 2746$) were asked, ‘The next question asks about self-help materials for drinkers that the Centre for Addiction and Mental Health may provide in the future. Would you be interested in a confidential programme that you could access on the Internet, free-of-charge, that would allow you to check your drinking and compare it to other Canadians?’ At the end of the survey, participants ($n = 810$) who were interested in the Internet programme and had home access to the Internet (100 did not) were told, ‘Researchers at the Centre for Addiction and Mental Health are currently developing self-help materials for drinkers. They are looking for regular drinkers to participate in a study to help revise and evaluate an Internet programme that would compare your drinking to other Canadians. The study would involve looking at some materials and then filling out brief surveys in three, six, and twelve months’ time. You would be paid \$60 for your participation. Would you be interested in receiving a description of this study to see if you would like to participate?’ Interested respondents ($n = 397$) provided their contact information (name, address and telephone number) and were sent a cover letter and consent form explaining the study, along with a supplementary baseline questionnaire. Those respondents agreeing to participate ($n = 185$, 47% of those indicating interest) signed and returned a copy of the consent form along with the baseline questionnaire. The baseline questionnaire included a measure asking respondents to estimate their drinking on each day of a typical week (how much do you typically drink on Monday etc.; K uhlhorn and Leifman, 1993; Romelsj  *et al.*, 1995) as well as the full AUDIT. The AUDIT includes the three AUDIT-C items plus an additional seven items to assess severity of problem drinking (Babor *et al.*, 1989; Saunders and Conigrave, 1990). See Fig. 1 for a CONSORT diagram outlining the trial design. The conduct of this study was approved by

the standing ethics review committee of the Centre for Addiction and Mental Health.

Respondents were randomized using a random numbers list without stratification into one of two conditions: (i) an Internet personalized alcohol feedback condition (intervention condition); or (ii) a no-intervention control condition. All respondents were followed up in 3, 6 and 12 month’s time to determine changes in drinking status (respondents were sent a \$20 cheque along with each of the follow-up surveys).

Intervention and control conditions

Respondents in the intervention condition were mailed a letter that provided the URL and a unique password to a project dedicated version of the CYD screener. The CYD screener is described in detail elsewhere (Cunningham *et al.*, 2006). Users of the CYD answer a brief series of questions about their drinking and then receive a final report that summarizes their responses and compares their drinking to others of the same age and sex in the general population (population data are now available for Canada, USA, Brazil and the UK). Respondents in the control condition were not provided access to the CYD but were instead mailed a list describing the components of the CYD and were asked to think about whether they thought each of the components might be useful for a problem drinker. The reader is invited to try the public access version of the CYD at www.CheckYourDrinking.net.

Analysis plan

The primary hypothesis is that respondents in the Internet personalized alcohol feedback condition will display significantly improved drinking outcomes as compared to respondents in the no-intervention control condition. Results from the 3- and 6-month follow-ups have already been reported (Cunningham *et al.*, 2009). This paper, therefore, only reports analyses comparing 12-month follow-up results to respondents’ baseline drinking. However, Fig. 2 displays the main pattern of results for the 3-, 6- and 12-month follow-ups. Two separate 2×2 ANCOVAs were conducted, the first employing number of drinks in a typical week as the dependent measure and the second employing respondents’ AUDIT-C scores. The reader should note that the outcome variables have been modified from those mentioned in the original clinical trials registration. Specifically, the outcome variable, typical weekly drinking, remains unchanged. The next three outcome variables (frequency of consumption, drinks per drinking occasion and frequency of five or more drinks on one occasion) were combined into the AUDIT-C to use as one outcome measure because this dealt with the severe positive skew observed in the individual variables. Finally, the proposed outcome measure, highest number of drinks on one occasion, was not employed because its distribution could not be adequately normalized for use in the proposed analyses. Both outcome measures (typical weekly drinking and AUDIT-C) were trimmed by replacing any outliers beyond three standard deviations with the next highest value (this resulted in drinking variables that approached normal distributional characteristics). For each of the ANCOVAs, the baseline value of the variable (drinks per week or AUDIT-C) were entered as the covariate. The two between-subject variables were intervention condition (received Internet address or control group) and baseline

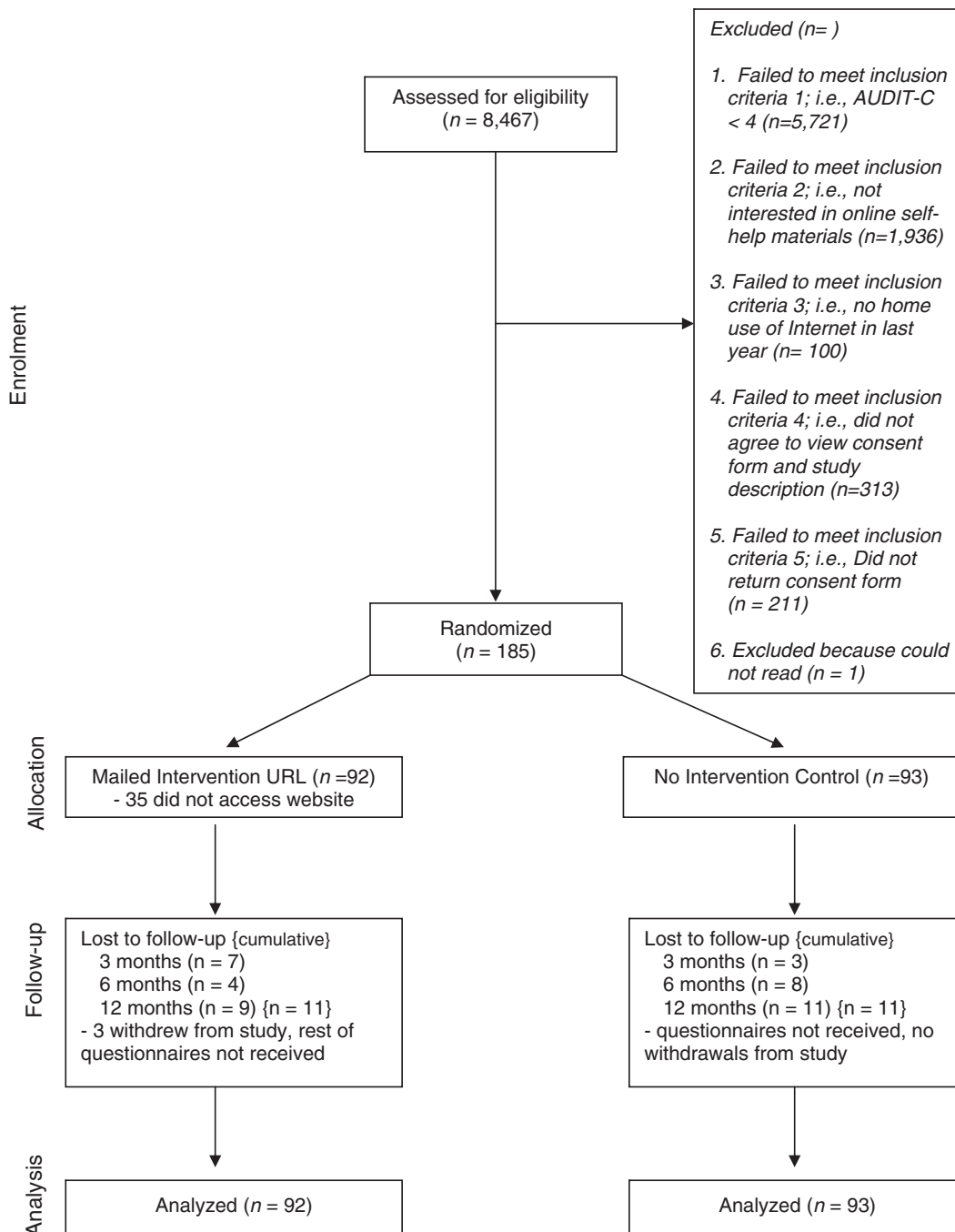


Fig. 1. Overview of the Internet-based intervention for problem drinkers trial.

problem drinking status (Problem Drinkers: score on the full AUDIT of ≥ 11 versus Low Risk Drinkers: AUDIT score of 4–10). Baseline problem drinking status was included in the analyses because previous research employing the CYD has found that this intervention only had an impact with problem drinkers (Doumas and Hannah, 2008; Doumas and Haustveit, 2008; Doumas *et al.*, 2009). An intent-to-treat analysis was employed (for the 20 respondents with missing data, their respective baseline data were used as the 12-month follow-up data).

RESULTS

Of the 185 respondents, the mean (SD) age was 40.1 (13.4) and 53% were male. Most had some post-secondary education (77.8%), about half were married (51.4%) and 62.5% were full- or part-time employed. Almost two-thirds of respondents (65.4%) reported daily use of the Internet and fully 89% of the sample reported using the Internet at least weekly. Bivariate comparisons revealed no significant differences ($P > 0.05$) in demographic or drinking characteristics at baseline between

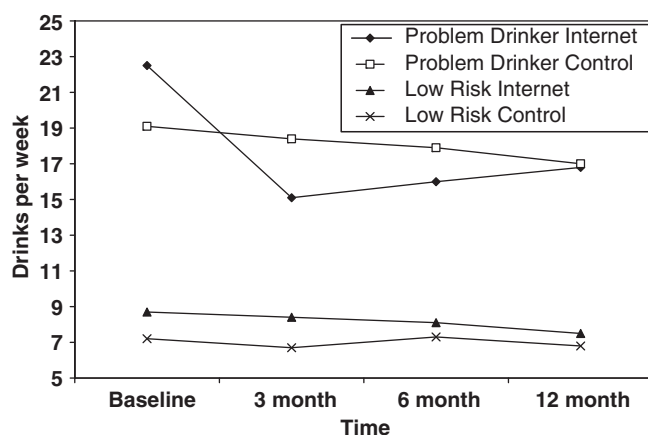


Fig. 2. Changes in typical weekly drinking from baseline through 12-month follow-up by condition and problem drinking status.

respondents in the intervention and control conditions. Follow-up rates for the trial were excellent, with 86% of respondents providing complete data at all three time points (3, 6 and 12 months). A total of 165 respondents (89%) provided both baseline and 12-month data.

A 2×2 ANCOVA was conducted of respondents' typical weekly drinking at 12-month follow-up (with baseline typical weekly drinking as the covariate). There was no significant effect of condition or of problem severity and no significant interaction between condition and problem severity ($P > 0.05$). Similarly, a separate 2×2 ANCOVA of respondents' AUDIT-C scores at 12-month follow-up revealed no significant impact of the intervention or problem severity ($P > 0.05$).

DISCUSSION

Internet-based interventions for problem drinkers are showing promising results for reducing alcohol consumption, especially among those meeting criteria for hazardous or harmful drinking (Hester *et al.*, 2005; Bewick *et al.*, 2008; Doumas and Hannah, 2008; Riper *et al.*, 2008; Cunningham *et al.*, 2009). The CYD screener, an intervention that can be used in ≤ 10 min, has shown a short-term impact on drinking at up to 6 months (Cunningham *et al.*, 2009). Results from the present study showed that after 12 months there did not appear to be any significant ($P > 0.05$) impact of being provided access to the CYD, relative to problem-drinking controls.

There were several strengths and weaknesses of the current trial. Limitations included a reliance on self-reported alcohol consumption and generalizability of the study results, given that so many potential respondents self-excluded themselves from participation in the trial. In addition, as was mentioned in the earlier publication of this trial (Cunningham *et al.*, 2009), while the study provides reliable efficacy data on the impact of providing access to the CYD, the research cannot be said to be an accurate test of the impact of actually using the CYD as one-third of respondents provided access to the CYD never actually went to the website. An intent-to-treat analysis was employed such that respondents assigned to the intervention condition were included in the analyses whether they used the CYD or not. While this analysis probably yielded a conservative test of the CYD intervention effects, our results

are nevertheless limited from the perspective that they may not reflect the true impact of actually using the CYD. Finally, it is important to note that this study cannot rule out the potential demand characteristic associated with a personalized feedback intervention. Respondents in the intervention condition are given access to a programme that provides a summary of their drinking and compares it to others in the general population. Those in the control condition are not provided with this information. Thus, it is possible that demand characteristics in the intervention condition could lead respondents to underreport their alcohol consumption. This alternative explanation merits further exploration in future research.

Strengths of the trial include a rigorous research design, excellent follow-up rates, a conservative analytic approach, the use of a no-intervention control group and the recruitment of a general population sample of problem drinkers with different levels of severity of alcohol problems. Combined with the other randomized controlled trials that also employed the CYD (Doumas and Hannah, 2008; Doumas and Haustveit, 2008; Doumas *et al.*, 2009), and other research demonstrating the efficacy of normative feedback interventions (e.g. Neighbors *et al.*, 2004; Walters *et al.*, 2005), it would appear reasonable to assert that these interventions have efficacy, at least in the short term.

What else can be done to help problem drinkers using Internet-based interventions? Many other cognitive behavioural tools would appear to be amenable to modification into an Internet format. In fact, several examples of more extensive interventions already exist, some with research evidence regarding their efficacy and others with randomized controlled trials underway or planned for the near future (e.g. Linke *et al.*, 2007; Murray *et al.*, 2007; Riper *et al.*, 2008). The eventual aim of this initiative is to provide a new array of resources for problem drinkers—Internet-based interventions of varying intensities and modalities that can be globally accessed to produce and maintain improvements in problem drinkers.

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REFERENCES

- Babor TF, De La Fuente MF, Saunders JB *et al.* (1989) *AUDIT—the alcohol use disorders identification test: guidelines for use in primary health care*. Geneva, Switzerland: World Health Organization.
- Bewick BM, Trusler K, Mulhern B *et al.* (2008) The feasibility and effectiveness of a web-based personalised feedback and social norms alcohol intervention in UK university students: a randomised control trial. *Addict Behav* **33**:1192–8.
- Burton TL, Williamson DL. (1995) Harmful effects of drinking and the use and perceived effectiveness of treatment. *J Stud Alcohol* **56**:611–5.
- Cunningham JA, Breslin FC. (2004) Only one in three people with alcohol abuse or dependence ever seek treatment. *Addict Behav* **29**:221–3.

- Cunningham JA, Humpheys K, Kypri K *et al.* (2006) Formative evaluation and three-month follow-up of an online personalized assessment feedback intervention for problem drinkers. *J Med Internet Res* **8**:e5.
- Cunningham JA, Sobell LC, Sobell MB *et al.* (1993) Barriers to treatment: why alcohol and drug abusers delay or never seek treatment. *Addict Behav* **18**:347–53.
- Cunningham JA, Wild TC, Cordingley J *et al.* (2009) A randomized controlled trial of an internet-based intervention for alcohol abusers. *Addiction* **104**:2023–32.
- Dawson DA, Grant BF, Stinson FS *et al.* (2005) Effectiveness of the derived Alcohol Use Disorders Identification Test (AUDIT-C) in screening for alcohol use disorders and risk drinking in the US general population. *Alcohol Clin Exp Res* **29**:844–54.
- Doumas DM, Hannah E. (2008) Preventing high-risk drinking in youth in the workplace: a web-based normative feedback program. *J Subst Abuse Treat* **34**:263–71.
- Doumas DM, Haustveit T. (2008) Reducing heavy drinking in intercollegiate athletes: evaluation of a web-based personalized feedback program. *Sport Psychol* **22**:213–29.
- Doumas DM, McKinley LL, Book P. (2009) Evaluation of two Web-based alcohol interventions for mandated college students. *J Subst Abuse Treat* **36**:65–74.
- Elliott JC, Carey KB, Bolles JR. (2008) Computer-based interventions for college drinking: a qualitative review. *Addict Behav* **33**:994–1005.
- Grant BF. (1997) Barriers to alcoholism treatment: reasons for not seeking treatment in a general population sample. *J Stud Alcohol* **58**:365–71.
- Hasin DS. (1994) Treatment/self-help for alcohol-related problems: relationship to social pressure and alcohol dependence. *J Stud Alcohol* **55**:660–6.
- Hester RK, Squires DD, Delaney HD. (2005) The Drinker's Check-up: 12-month outcomes of a controlled clinical trial of a stand-alone software program for problem drinkers. *J Subst Abuse Treat* **28**:159–69.
- Internet World Stats (2009) *Internet World Stats: Usage and Population Statistics* Accessed at URL: <http://www.internetworldstats.com/stats14.htm>.
- Kühlhorn E, Leifman H. (1993) Alcohol surveys with high and low coverage rate: a comparative analysis of survey strategies in the alcohol field. *J Stud Alcohol* **54**:542–4.
- Linke S, Murray E, Butler C *et al.* (2007) Internet-based interactive health intervention for the promotion of sensible drinking: patterns of use and potential impact on members of the general public. *J Med Internet Res* **9**:e10.
- Murray E, McCambridge J, Khadjesari Z *et al.* (2007) The DYDRCT protocol: an on-line randomised controlled trial of an interactive computer-based intervention compared with a standard information website to reduce alcohol consumption among hazardous drinkers. *BMC Public Health* **7**:306.
- Neighbors C, Larimer ME, Lewis MA. (2004) Targeting misperceptions of descriptive drinking norms: efficacy of a computer-delivered personalized normative feedback intervention. *J Consult Clin Psychol* **72**:434–47.
- Portnoy DB, Scott-Sheldon LA, Johnson BT *et al.* (2008) Computer-delivered interventions for health promotion and behavioral risk reduction: a meta-analysis of 75 randomized controlled trials, 1988–2007. *Prev Med* **47**:3–16.
- Riper H, Kramer J, Smit F *et al.* (2008) Web-based self-help for problem drinkers: a pragmatic randomized trial. *Addiction* **103**:218–27.
- Roizen R, Cahalan D, Shanks P. (1978) "Spontaneous remission" among untreated problem drinkers. In Kandel DB (ed). *Longitudinal Research on Drug Use: Empirical Findings and Methodological Issues*. Washington, DC: Hemisphere. 197–221.
- Romelsjö A, Leifman H, Nyström S. (1995) A comparative study of two methods for the measurement of alcohol consumption in the general population. *Int J Epidemiol* **24**:929–36.
- Saunders JB, Conigrave KM. (1990) Early identification of alcohol problems. *Can Med Assoc J* **143**:1060–9.
- Walters ST, Miller E, Chiauzzi E. (2005) Wired for wellness: e-interventions for addressing college drinking. *J Subst Abuse Treat* **29**:139–45.