

7-2008

Pathways to change: the effect of a Web application on treatment interest.

Daniel Z Lieberman

Suena H Massey

Follow this and additional works at: https://hsrc.himmelfarb.gwu.edu/smhs_psych_facpubs

 Part of the [Mental and Social Health Commons](#), [Psychiatry Commons](#), and the [Psychiatry and Psychology Commons](#)

APA Citation

Lieberman, D., & Massey, S. (2008). Pathways to change: the effect of a Web application on treatment interest. *The American journal on addictions / American Academy of Psychiatrists in Alcoholism and Addictions*, 17 (4). <http://dx.doi.org/10.1080/10550490802138525>

This Journal Article is brought to you for free and open access by the Psychiatry and Behavioral Sciences at Health Sciences Research Commons. It has been accepted for inclusion in Psychiatry and Behavioral Sciences Faculty Publications by an authorized administrator of Health Sciences Research Commons. For more information, please contact hsrc@gwu.edu.

Pathways to change: the effect of a Web application on treatment interest

Daniel Z. Lieberman, M.D.

Department of Psychiatry and Behavioral Sciences
George Washington University School of Medicine

Suena W. Huang, M.D.

Department of Psychiatry and Behavioral Sciences
George Washington University School of Medicine

Please address correspondence to:

Daniel Z. Lieberman, M.D.

2150 Pennsylvania Avenue, NW Rm 8-421

Washington, DC 20037

(202) 741-2899

(202)741-2891 (fax)

dliberman@mfa.gwu.edu

Abstract

Most individuals with drinking problems do not receive treatment, generally because they do not perceive the need for it. It is difficult to access this population of problem drinkers in order to encourage treatment-seeking. A web-based program was written designed to increase motivation for change. The program guided non-treatment-seekers through a multi-stage assessment, and provided them with feedback. Level of interest in treatment was measured pre- and post-intervention. Compared to baseline, after the intervention significantly more individuals rated themselves “very interested” in participating in some form of traditional treatment (19% vs. 28%), and their focus on a specific modality increased.

Keywords: Treatment-seeking, Internet, Motivation

Am J Addict. 2008 Jul-Aug;17(4):265-70. doi: 10.1080/10550490802138525.

Introduction

Efforts aimed at reducing the disease burden of harmful drinking often focus on the development and implementation of new forms of treatment. However, the number of individuals who ever receive treatment (approximately 1.6 million) is far less than the number who actually need treatment (approximately 19.4 million) ¹. The most common reason that individuals requiring care do not receive it is that they do not recognize the need for change. Therefore, regardless of efficacy considerations, converting problem drinkers into treatment-seekers is an essential first step in reducing the morbidity associated with this illness ².

Efforts to improve help-seeking are often guided by the health belief and service utilization model which emphasizes the influence of barriers and incentives such as economic and geographic factors as well as social influences and dysfunction in daily living ³. Interventions to facilitate referral and treatment have included outreach programs ⁴, reducing waiting time for treatment access ⁵, and role induction and preparation for treatment ⁶. For patients with substance use disorders, person-related barriers such as shame and problem recognition appear to be most relevant ⁷. Consequently, an intervention designed to enhance internal motivation would be a useful way to enhance early help-seeking.

Because of the magnitude of this problem, illustrated by the large percentage of individuals with alcohol use disorders who do not receive treatment, low cost approaches are needed. In order to explore one approach to this problem, a Web application was written that delivered an automated intervention based on the principles of motivational enhancement therapy ⁸. The application guided users through a series of evaluation instruments and rating scales, and then provided feedback based on the results. Because it was easily accessible, completely anonymous, and did not require a commitment to long-term treatment or behavior change, this application was able to reach a hidden population of problem drinkers who did not access traditional forms of treatment (Lieberman and Huang, in press). The current study was designed to evaluate whether use of this low intensity intervention increased the participants' interest in receiving formal treatment for their drinking.

Methods

Application

Individuals with current drinking problems who accessed a Web application designed to increase their motivation for change ⁹ were evaluated for their level of interest in four modalities of treatment before and after completing the program. The Internet application was modeled on the Drinkers' Check-up, which is a component of motivational interviewing, a form of psychotherapy that facilitates behavior change ⁸. The Drinkers' Check-up involves a multi-step assessment that encourages a patient to see how alcohol consumption is negatively affecting his or her life. It is hypothesized that this experience increases awareness of, and concern about, these consequences ¹⁰. The process is non-judgmental, non-threatening, and objective. This approach allowed non-treatment-seeking drinkers to be recruited for the study.

An open source application was developed to present the questionnaires and determine feedback. The source code is freely available for use and modification under a Creative Commons license (<http://creativecommons.org/licenses/by-nc-sa/3.0/>), and can be obtained from the corresponding author. The application guided participants through a series of questionnaires which included the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) ¹¹, the Alcohol Use Disorders Identification Test (AUDIT) ¹², the Family Tree Questionnaire ¹³, and the Decisional Balance Questionnaire ¹⁴. Participants were also asked to provide non-identifying demographic information, history of alcohol use, and history of treatment.

Assessment Instruments

The SOCRATES evaluates a patient's readiness to change in the context of the transtheoretical model of health behavior change ¹⁵. Patients are scored based on their recognition of having an alcohol problem (recognition subscale), their level of concern about whether alcohol is having a negative effect on their lives (ambivalence subscale), and the degree to which they have initiated behavior change (steps subscale). Patients are given statements to read, and then asked to rate each statement on a five-point Likert scale, ranging from strongly disagree to strongly agree. A calculated composite score ranges from -4 to 76, with higher scores indicating greater motivation for change.

The range of possible subscale scores are recognition: 7-35, ambivalence: 4-20, and steps: 8-40. Miller and Tonigan evaluated the psychometric properties of the SOCRATES in a sample recruited from a multisite study that included outpatients and aftercare patients who had been diagnosed with alcohol abuse or alcohol dependence. They reported adequate internal consistency for each subscale in a test-retest study (alphas = .87–.96) ¹⁶. Temporal stability was also supported in this sample; 2-day test-retest correlations ranged from .83 to .99.

The AUDIT is a ten-item questionnaire designed to distinguish light drinkers from those with problem drinking. The screening instrument has been shown to detect problem drinking with a high degree of accuracy ¹⁷. Using a cutoff score of 8, the sensitivity to detect current drinking problems is 92%, and the specificity is 94% ¹⁸. The items included in the AUDIT were chosen to reflect three dimensions of drinking: alcohol intake (items 1–3), alcohol dependence, such as difficulty in controlling drinking, neglect of alternative interests, and physiological withdrawal (items 4–6), and adverse consequences (items 7–10). Possible scores range from 0 to 40, with higher scores indicating greater risk for problem drinking.

The Family Tree Questionnaire provides patients with a consistent set of cues for identifying blood relatives with alcohol problems by using a family tree diagram. Patients are asked to classify relatives into one of the following categories: never drank, social drinker, possible problem drinker, definite problem drinker, no relative (applicable only for siblings), or don't know/don't remember ¹⁹. The test-retest reliability of the Family Tree Questionnaire to detect drinking problems of family members was examined in a sample of 60 male volunteer university undergraduates. The instrument was completed twice with an average of 4 months between administrations. Test-retest scores of the number of problem drinkers reported by a subject were significantly correlated for first degree and for second degree relatives. The reliability of the classification of an individual family member was also found to be satisfactory ¹⁹.

Subjects

Individuals who found the site spontaneously, or responded to a search engine advertisement, were eligible to participate in the study. This strategy allowed us to collect a sample of problem drinkers self-selected for some interest in learning more about their drinking. Inclusion criteria were broad. Study participants were required to have current drinking problems as measured by an AUDIT score of 8 or more, enough experience with the Internet to find the site, and the ability to successfully navigate the simple user interface. Participants registered for the study anonymously, and provided no identifying information. Internet Protocol (IP) addresses, which can potentially be used to identify a user, were not recorded by the application. Informed consent was obtained by having potential participants read an information screen, and then click a link to indicate whether or not they chose to participate. The study was approved by the George Washington University institutional review board.

Dependent Measure

Before starting the program, participants were asked to rate their level of interest in four modalities of treatment/fellowship using a five point Likert scale. Users were asked, “Are you interested in [specific modality] for the future?” Anchors were provided at 1, 3, and 5: not at all, a bit, and very interested. The four modalities were “going to Alcoholics Anonymous meetings,” “individual therapy,” “group therapy,” and “taking a medication that can help people who want to stop drinking.” The same questions were asked at the end of the feedback module, and the pre- and post-intervention results were compared.

Focus of interest on one specific modality was also assessed by calculating the difference between the top choice and the other three choices both pre- and post-intervention.

Because all data from the Internet application was provided anonymously, the degree of correlation between certain variables was analyzed and compared to correlations found in previous studies of non-anonymous patients. Identifying similar correlations in the data collected via the Internet application would support the likelihood that the participants entered information with some degree of accuracy rather than capriciously. Relationships between the following variables were measured:

The three subscales of the SOCRATES, number of drinks per week, current severity of alcohol problems, age of initiation of drinking, and age of first drinking problems.

Analysis

Summary statistics are presented as means and standard deviations for continuous variables, and percentages for discrete variables. The t-test was used to compare the level of interest between the treatment modalities, characteristics of subjects who developed a high level of interest in treatment, and the change in the degree of separation between a user's top choice and the other choices. Chi-square was used to compare the number of users with high or moderate interest in at least one modality pre- versus post-intervention. Pearson's correlation was used to evaluate characteristics within the online group that have been previously found to be associated with one another. Differences between genders were also analyzed as a measure of putative validity.

Results

Between December 2005 and May 2006, 244 Internet users completed the motivational Web application. Table 1 presents the demographic and clinical characteristics of the participants in the study. Because subjects participated in the study via an automated web application, diagnostic interviews were not performed. Problem drinkers were identified based on a cut off score of 8 on the AUDIT²⁰. The average score of 18 placed participants well above this level, and the item responses indicated that they suffered significant levels of alcohol-related morbidity. For example, 74 percent of the participants reported experiencing a blackout in the past year, and 43 percent reported that this occurred at least monthly. A quarter of participants responded affirmatively to the question, "Have you or someone else been injured as a result of your drinking?" Finally, almost two-thirds (64%) of the participants reported having failed to do what was normally expected of them because of drinking in the past year, with about a third (32%) reporting that this happened at least monthly.

Prior to the intervention, each of the four treatment options was given an average rating of between 2 and 3 out of 5 on the interest scale. In general, there was a low level of interest in this untreated sample. However, the number of users expressing a high level of interest in at least one of the

modalities increased significantly after using the Web application (Figure). The number of users who were very interested in at least one of the modalities increased by 48 percent (46 vs. 68, chi-square=5.43, $df=1$, $P=.02$), and the number of users who were at least somewhat interested in one or more of the modalities increased by 30 percent (69 vs. 90, chi-square=3.99, $df=1$, $P=.046$). In percentage terms, prior to beginning the motivational assessment 19 percent were very interested in treatment, and 28 percent were at least somewhat interested. At program completion these percentages increased to 28 percent and 37 percent respectively.

Users also became more focused on a single treatment option following use of the program. The difference between their top treatment choice and the other choices widened from 1.02 points to 1.24 points on the Likert scale ($P=.024$).

Twenty-five of the subjects converted to having high interest in at least one modality after initially rating none of the modalities “high interest” at the beginning of the study. These converters differed from the non-converters in a number of ways, as shown in Table 2. Converters had significantly higher recognition and ambivalence subscale scores on the SOCRATES. They also reported consuming more drinks per week, and they scored higher on the AUDIT.

Findings that have been observed in other populations were tested in this population in order to help evaluate the validity of the data collected from anonymous study participants. The recognition subscale score correlated with drinks per week ($r=.17$, $P=.009$), and with the AUDIT score ($r=.62$, $P<.001$). The number of drinks per week also correlated with the AUDIT score ($r=.34$, $P<.001$). Each of the three subscales of the SOCRATES was significantly correlated with the other two. Men reported consuming more drinks per week than did women (39 vs. 25, $P<.001$), and they reported an earlier age of onset of problem drinking (24 vs. 29, $P=.005$). Age of first use of alcohol was positively correlated with age of onset of problem drinking ($r=.26$, $P<.001$). Additionally, in this population Cronbach’s alpha reliability, which measures internal consistency of test items, was high for the ratings scales (AUDIT: alpha=0.78, items=10; SOCRATES: alpha=0.93, items=19)

Discussion

The Web application mimicked a motivational intervention by: 1) providing feedback from assessments concerning the impact of substance use on functioning; 2) providing direct advice when indicated about the need to consider change, and how it might be accomplished; 3) providing alternative approaches from which the user could choose to achieve change; 4) decreasing the attractiveness of substance use through increasing awareness of the negative consequences and risks associated with it; and 5) allowing the user to identify the consequences of substance use (positive and negative) that had the most personal meaning.

Use of the Web-based program increased reported interest in treatment. Compared to baseline, significantly more participants rated themselves as “very interested” in treatment after completing the program. Focus on a specific modality also increased following use of the program. Subjects rated their level of interest in four different modalities. The difference in interest between the top choice, and the other choices significantly widened following program completion. Although the change was relatively small, progression from a more diffuse interest in a number of options to a more focused interest on a single option may have relevance for treatment-seeking behavior.

Users who did not report being very interested in any of the modalities before the intervention, but rated themselves as very interested in at least one modality following the intervention (converters) had higher AUDIT scores than those who did not. The AUDIT measures three dimensions of alcohol-related pathology, and it is possible that the greater magnitude of problems that were presented to them in their feedback session resulted in greater changes in interest levels. It is also possible that the users who had high AUDIT scores were already close to resolving their ambivalence in favor of change, and therefore responded to a small “motivational nudge.” The finding of greater AUDIT scores among the converters supports other studies that report that substance-related problems have been consistently associated with the likelihood of treatment seeking^{21, 22}.

Converters more strongly endorsed recognition statements on the SOCRATES compared to non-converters. An example of a recognition statement is, “If I don’t change my drinking soon, my problems are going to get worse.” One of the strategies of motivational interviewing is termed “developing discrepancy.” Participants who found themselves agreeing with recognition statements

on the SOCRATES may have subsequently found it more difficult to deny interest in treatment due to the development of cognitive dissonance⁸.

The most important difference between the converters and the non-converters was the higher level of ambivalence in the former group. Patients who strongly endorse ambivalence items tend to wonder if they are having problems and are open to reflection on this topic. An example of an ambivalence statement from the SOCRATES is, “Sometimes I wonder if my drinking is hurting other people.” Ambivalence is characteristic of the contemplation phase of the transtheoretical model of change. One of the goals of motivational interviewing is to use ambivalence to help patients identify personal reasons for behavior change.

Limitations of the data include questions about the psychometric properties of the self-report instruments. It is possible that questionnaires that have been adapted to be presented on a computer via the Internet will elicit different information compared to the same questionnaires used in a traditional research setting for which they were originally designed. Additionally, the sample in this study was significantly different from the samples used to evaluate the validity and reliability of the instruments that were used. A primary purpose of this study was to reach a population that is not typically seen in clinical or research settings, which introduced a degree of uncertainty regarding the performance of the self-report instruments.

There is also uncertainty of the validity of information collected from anonymous participants. Lending credibility to the data, a number of findings noted in independent studies were confirmed in our analysis. For example, Hingson and colleagues found that persons who start to drink at an early age are more likely to develop alcohol dependence at younger ages²³, a relationship also observed in the data from the online group. The number of drinks consumed per day was significantly correlated with severity of alcohol related problems, and recognition of having an alcohol problem²⁴⁻²⁶. Men reported significantly more drinks per week than women, and an earlier age of onset of problem drinking²⁷. Consistent with the finding that women experience alcohol-related pathology at lower levels of consumption, there were no significant differences between the AUDIT scores of men and women²⁸. Although the three subscales of the SOCRATES measure different components of motivation, one would expect to observe a correlation between them related to position on the stages

of change continuum. This correlation was present in our data suggesting that the SOCRATES questions were answered with some degree of thoughtfulness and accuracy by the participants.

Excessive drinking is a stigmatized behavior, and under-reporting of alcohol use is a potential problem in self-report data. Additionally, it is possible that users felt pressure to overstate their interest in treatment as a result of social desirability factors. The privacy associated with the Internet data collection technique used in the study may have reduced this problem to some degree. In general, there tends to be less distortion on computerized versions of interviews than on face-to-face interviews when stigmatized behaviors are involved²⁹. In one study, for example, injecting drug users who were interviewed using an audio-computerized system reported significantly more drug, sex, and HIV risk behaviors compared to those who received a standard face-to-face interview³⁰.

Another potential limitation is that the application measured interest rather than actual help-seeking behavior. Because we chose to maintain the anonymity of subjects, following them longitudinally in order to identify those who actually received some form of treatment would have been difficult. However, intention itself has been found to be a central factor for utilization of alcohol-specific formal help³¹.

Unless patients have been coerced into treatment, or their problem drinking has been identified in the course of treatment of some other illness, by the time they take the steps necessary to receive alcohol-specific care, their level of motivation for change is fairly high. The transtheoretical model of change would place them in the action stage. Problem drinkers in the earlier contemplation stage, who are beginning to weigh the advantages and disadvantages of change, might benefit most from a motivational intervention that would reduce treatment delay. Unfortunately, this group of individuals are perhaps the most difficult to reach with the resources of the traditional healthcare system.

The currently available healthcare system is designed to provide intensive treatment to highly dependent drinkers, while presenting formidable barriers to treatment initiation. Although severely dependent drinkers have the greatest need for treatment, those with less serious illnesses make up the majority of problem drinkers, and experience most of the alcohol-related harm³². Barriers include embarrassment, pride, not wanting to share problems, and the stigmatizing effect of traditional forms

of treatment ³³. Although access to the Internet is not universal, the so-called “digital divide” is narrowing over time ³⁴. Those who have access to the Internet routinely use it as a first source of information on a variety of subjects, including health and medical information ³⁵. Combining personalized information with a motivational intervention that is available on demand may be an effective way of providing an intermediate step that can hasten the initiation of definitive treatment.

References

1. Substance Abuse and Mental Health Services Administration (SAMHSA). Office of Applied Studies. Results from the 2005 National Survey on Drug Use and Health. Rockville, MD 2006.
2. Dawson DA, Grant BF, Stinson FS, Chou PS. Estimating the effect of help-seeking on achieving recovery from alcohol dependence. *Addiction*. 2006;101:824-834.
3. Rosenstock IM. Why people use health services. *Milbank Q*. 1966;44:94-127.
4. Fisk D, Rakfeldt J, McCormack E. Assertive outreach: an effective strategy for engaging homeless persons with substance use disorders into treatment. *Am J Drug Alcohol Abuse*. 2006;32:479-486.
5. Capoccia VA, Cotter F, Gustafson DH, Cassidy EF, Ford JH, Madden L, et al. Making "stone soup": improvements in clinic access and retention in addiction treatment. *Jt Comm J Qual Improv*. 2007;33:95-103.
6. Katz EC, Brown BS, Schwartz RP, King SD, Weintraub E, Barksdale W. Impact of role induction on long-term drug treatment outcomes. *J Addict Dis*. 2007;26:81-90.
7. Saunders SM, Zygowicz KM, D'Angelo BR. Person-related and treatment-related barriers to alcohol treatment. *J Subst Abuse Treat*. 2006;30:261-270.
8. Miller WR, Rollnick S. *Motivational Interviewing*. 2nd ed. New York, NY: The Guilford Press; 2002.
9. Lieberman DZ. Clinical characteristics of individuals using an online alcohol evaluation program. *Am J Addict*. 2005;14:155-165.
10. Miller WR, Sovereign RG, Krege B. Motivational Interviewing with Problem Drinkers: II. The Drinker's Check up as a Preventive Intervention. *Behavioral Psychotherapy*. 1988;16:251-268.
11. Miller WR. *Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES)*. Albuquerque, NM: Center on Alcoholism, Substance Abuse, and Addictions; 1992.
12. Babor TF, Grant M. From clinical research to secondary prevention: International collaboration of the Alcohol Use Disorders Identification Test (AUDIT). *Alcohol Health Res World*. 1989;13:371-374.
13. Mann RE, Sobell LC, Sobell MB. Reliability of a family tree questionnaire for assessing family history of alcohol problems. *Drug Alcohol Depend*. 1985;15:61-67.

14. Carey KB, Maisto SA, Carey MP, Purnine DM. Measuring readiness-to-change substance misuse among psychiatric outpatients: I. Reliability and validity of self-report measures. *J Stud Alcohol*. 2001;62:79-88.
15. Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *American Journal of Health Promotion*. 1997;12:38-48.
16. Babor TF, de la Fuente JR, Saunders J, Grant M. *The Alcohol Use Disorders Identification Test: Guidelines for use in Primary Health Care*. Geneva, Switzerland: World Health Organization; 1992.
17. Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. *Addiction*. 1993;88:791-804.
18. Vogel-Sprott M, Chipperfield B, Hart DM. Family history of problem drinking among young male social drinkers: reliability of the Family Tree Questionnaire. *Drug Alcohol Depend*. 1985;16:251-256.
19. Conigrave KM, Hall WD, Saunders JB. The AUDIT questionnaire: choosing a cut-off score. Alcohol Use Disorder Identification Test. *Addiction*. 1995;90:1349-1356.
20. Marlatt GA, Tucker JA, Donovan DM, Vuchinich RE. Help-seeking by substance abusers: the role of harm reduction and behavioral-economic approaches to facilitate treatment entry and retention. *NIDA Research Monograph*. 1997;165:44-84.
21. Bannenberg AF, Raat H, Plomp HN. Demand for alcohol treatment by problem drinkers. *J Subst Abuse Treat*. 1992;9:59-62.
22. Hingson RW, Heeren T, Winter MR. Age of alcohol-dependence onset: associations with severity of dependence and seeking treatment. *Pediatrics*. 2006;118:755-763.
23. Glanz J, Grant B, Monteiro M, Tabakoff B. WHO/ISBRA Study on State and Trait Markers of Alcohol Use and Dependence: analysis of demographic, behavioral, physiologic, and drinking variables that contribute to dependence and seeking treatment. International Society on Biomedical Research on Alcoholism. *Alcohol Clin Exp Res*. 2002;26:1047-1061.
24. U.S. Department of Health and Human Services. Epidemiology of alcohol use and alcohol-related consequences, in Ninth Special Report to the U.S. Congress on Alcohol and Health. Washington, DC: U.S. Department of Health and Human Services; 1997.
25. Hupkens CL, Knibbe RA, Drop MJ. Alcohol consumption in the European community: uniformity and diversity in drinking patterns. *Addiction*. 1993;88:1391-1404.

26. Gomberg ES. Women and alcohol: use and abuse. *J Nerv Ment Dis.*1993;181:211-219.
27. Frank JB, Weihs K, Minerva E, Lieberman DZ. Women's mental health in primary care. Depression, anxiety, somatization, eating disorders, and substance abuse. *Med Clin North Am.*1998;82:359-389.
28. Freyer J, Coder B, Bischof G, Baumeister SE, Rumpf HJ, John U, et al. Intention to utilize formal help in a sample with alcohol problems: a prospective study. *Drug Alcohol Depend.* 2007;87:210-216.
29. Humphreys K, Tucker JA. Toward more responsive and effective intervention systems for alcohol-related problems. *Addiction.* 2002;97:126-132.
30. Cunningham JA, Sobell LC, Sobell MB, Agrawal S, Toneatto T. Barriers to treatment: why alcohol and drug abusers delay or never seek treatment. *Addict Behav.* 1993;18:347-353.
31. Smith R. Closing the digital divide. *BMJ.* 2003;326:238.
32. Fallows D. *How Women and Men Use the Internet.* Washington, DC: Pew Internet & American Life Project; 2005.

1. Substance Abuse and Mental health Services Administration (SAMHSA). Office of Applied Studies. *Results from the 2005 National Survey on Drug Use and Health.* Rockville, MD 2006.
2. Dawson DA, Grant BF, Stinson FS, Chou PS. Estimating the effect of help-seeking on achieving recovery from alcohol dependence. *Addiction.* Jun 2006;101(6):824-834.
3. Rosenstock IM. Why people use health services. *Milbank Mem Fund Q.* Jul 1966;44(3):Suppl:94-127.
4. Fisk D, Rakfeldt J, McCormack E. Assertive outreach: an effective strategy for engaging homeless persons with substance use disorders into treatment. *Am J Drug Alcohol Abuse.* 2006;32(3):479-486.
5. Capoccia VA, Cotter F, Gustafson DH, et al. Making "stone soup": improvements in clinic access and retention in addiction treatment. *Jt Comm J Qual Patient Saf.* Feb 2007;33(2):95-103.
6. Katz EC, Brown BS, Schwartz RP, King SD, Weintraub E, Barksdale W. Impact of role induction on long-term drug treatment outcomes. *J Addict Dis.* 2007;26(2):81-90.
7. Saunders SM, Zygowicz KM, D'Angelo BR. Person-related and treatment-related barriers to alcohol treatment. *J Subst Abuse Treat.* Apr 2006;30(3):261-270.
8. Miller WR, Rollnick S. *Motivational Interviewing.* Second edition ed. New York: The Guilford Press; 2002.
9. Lieberman DZ. Clinical characteristics of individuals using an online alcohol evaluation program. *Am J Addict.* Mar-Apr 2005;14(2):155-165.
10. Miller WR, Sovereign RG, Krege B. Motivational Interviewing with Problem Drinkers: II. The Drinker's Check up as a Preventive Intervention. *Behavioral Psychotherapy.* 1988;16:251-268.

11. Miller WR. Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES). Albuquerque, NM: Center on Alcoholism, Substance Abuse, and Addictions; 1992.
12. Babor TF, Grant M. From clinical research to secondary prevention: International collaboration of the Alcohol Use Disorders Identification Test (AUDIT). *Alcohol Health & Research World*. 1989;13:371-374.
13. Mann RE, Sobell LC, Sobell MB. Reliability of a family tree questionnaire for assessing family history of alcohol problems. *Drug Alcohol Depend*. 1985;15:61-67.
14. Carey KB, Maisto SA, Carey MP, Purnine DM. Measuring readiness-to-change substance misuse among psychiatric outpatients: I. Reliability and validity of self-report measures. *Journal of Studies on Alcohol*. 2001;62(1):79-88.
15. Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot*. Sep-Oct 1997;12(1):38-48.
16. Miller WR, Tonigan JS. Assessing drinkers' motivation to change: the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES). *Psychology of Addictive Behaviors*. 1996;10:81-89.
17. Babor TF, de la Fuente JR, Saunders J, Grant M. *The Alcohol Use Disorders Identification Test: Guidelines for use in Primary Health Care*. Geneva, Switzerland: World Health Organization; 1992.
18. Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. *Addiction*. Jun 1993;88(6):791-804.
19. Vogel-Sprott M, Chipperfield B, Hart DM. Family history of problem drinking among young male social drinkers: reliability of the Family Tree Questionnaire. *Drug & Alcohol Dependence*. 1985;16(3):251-256.
20. Conigrave KM, Hall WD, Saunders JB. The AUDIT questionnaire: choosing a cut-off score. Alcohol Use Disorder Identification Test. *Addiction*. Oct 1995;90(10):1349-1356.
21. Marlatt GA, Tucker JA, Donovan DM, Vuchinich RE. Help-seeking by substance abusers: the role of harm reduction and behavioral-economic approaches to facilitate treatment entry and retention. *NIDA Res Monogr*. 1997;165:44-84.
22. Bannenberg AF, Raat H, Plomp HN. Demand for alcohol treatment by problem drinkers. *J Subst Abuse Treat*. 1992;9(1):59-62.
23. Hingson RW, Heeren T, Winter MR. Age of alcohol-dependence onset: associations with severity of dependence and seeking treatment. *Pediatrics*. Sep 2006;118(3):e755-763.
24. Glanz J, Grant B, Monteiro M, Tabakoff B. WHO/ISBRA Study on State and Trait Markers of Alcohol Use and Dependence: analysis of demographic, behavioral, physiologic, and drinking variables that contribute to dependence and seeking treatment. International Society on Biomedical Research on Alcoholism. *Alcohol Clin Exp Res*. Jul 2002;26(7):1047-1061.
25. U.S. Department of Health and Human Services. *Epidemiology of alcohol use and alcohol-related consequences, in Ninth Special Report to the U.S. Congress on Alcohol and Health*. Washington, DC: U.S. Department of Health and Human Services; 1997.
26. Hupkens CL, Knibbe RA, Drop MJ. Alcohol consumption in the European community: uniformity and diversity in drinking patterns. *Addiction*. Oct 1993;88(10):1391-1404.
27. Gomberg ES. Women and alcohol: use and abuse. *J Nerv Ment Dis*. Apr 1993;181(4):211-219.

28. Frank JB, Weihs K, Minerva E, Lieberman DZ. Women's mental health in primary care. Depression, anxiety, somatization, eating disorders, and substance abuse. *Med Clin North Am.* Mar 1998;82(2):359-389.
29. Richman WL, Kiesler S, Weisband S, Drasgow F. A meta-analytic study of social desirability distortion in computer-administered questionnaires, traditional questionnaires, and interviews. *Journal of Applied Psychology.* 1999;84(5):754-775.
30. Perlis TE, Des Jarlais DC, Friedman SR, Arasteh K, Turner CF. Audio-computerized self-interviewing versus face-to-face interviewing for research data collection at drug abuse treatment programs. *Addiction.* 2004;99(7):885-896.
31. Freyer J, Coder B, Bischof G, et al. Intention to utilize formal help in a sample with alcohol problems: a prospective study. *Drug Alcohol Depend.* Mar 16 2007;87(2-3):210-216.
32. Humphreys K, Tucker JA. Toward more responsive and effective intervention systems for alcohol-related problems. *Addiction.* Feb 2002;97(2):126-132.
33. Cunningham JA, Sobell LC, Sobell MB, Agrawal S, Toneatto T. Barriers to treatment: why alcohol and drug abusers delay or never seek treatment. *Addict Behav.* May-Jun 1993;18(3):347-353.
34. Smith R. Closing the digital divide. *Bmj.* Feb 1 2003;326(7383):238.
35. Fallows D. *How Women and Men Use the Internet.* Washington, DC: Pew Internet & American Life Project; 2005.

Table 1. Demographic and clinical characteristics of participants

N	244
Percent female	51%
Average age in years (SD)	40 (11.6)
Unemployed	11%
Age of first drink (SD)	16 (4.3)
Age of onset of problem drinking (SD)	26 (12.8)
Father with a drinking problem	31%
First degree relative with a drinking problem	50%
Drinks per week (SD)	32 (24.8)
AUDIT score (SD)	18 (7.5)
Hispanic	5%
Asian	1%
Black	2%
Pacific Islander	2%
White	94%

Figure. A comparison of the number of individuals reporting being "Very interested" and "Somewhat interested" in at least one treatment modality before and after intervention (n=244).

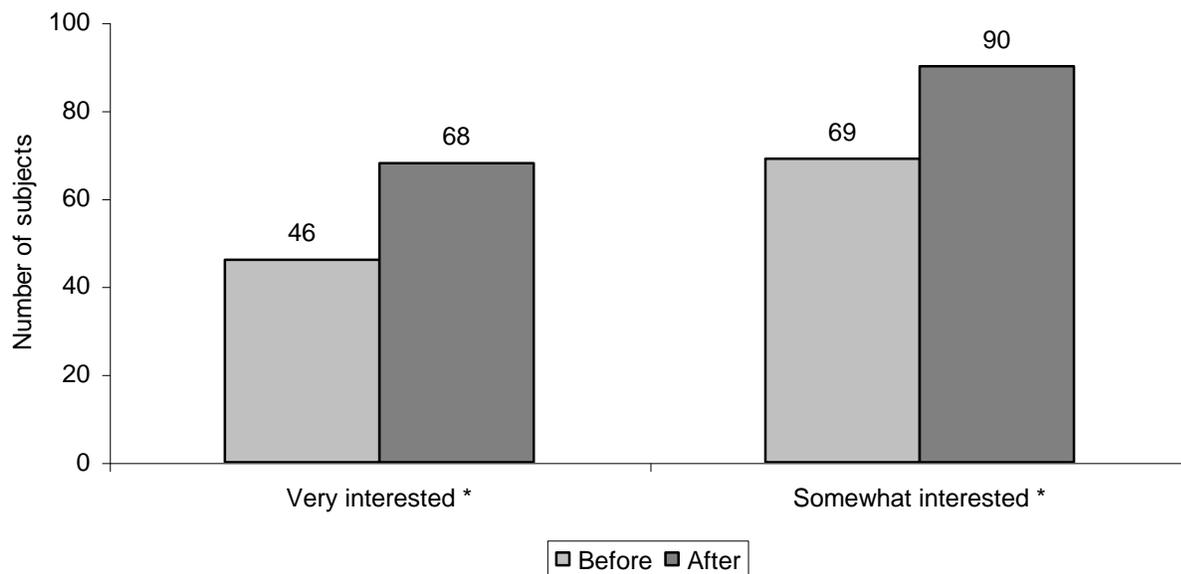


Table 2. A comparison of selected SOCRATES subscales and the AUDIT in individuals who converted to having high interest in at least one modality and those who did not. Standard deviations follow the value in parentheses.

	Converters	Nonconverters	<i>P</i>
Recognition (SOCRATES)	25 (5)	20 (6)	< .001
Ambivalence (SOCRATES)	15 (2)	13 (4)	.001
Drinks per week (AUDIT)	43 (27)	28 (21)	.002
Total AUDIT score	22 (6)	16 (7)	< .001