

UCSF

UC San Francisco Previously Published Works

Title

Posttreatment low-risk drinking as a predictor of future drinking and problem outcomes among individuals with alcohol use disorders.

Permalink

<https://escholarship.org/uc/item/2k92652k>

Journal

Alcoholism: Clinical and Experimental Research, 37 Suppl 1(0 1)

Authors

Kline-Simon, Andrea

Falk, Daniel

Litten, Raye

et al.

Publication Date

2013

DOI

10.1111/j.1530-0277.2012.01908.x

Peer reviewed



Published in final edited form as:

Alcohol Clin Exp Res. 2013 January ; 37(0 1): E373–E380. doi:10.1111/j.1530-0277.2012.01908.x.

Posttreatment Low-Risk Drinking as a Predictor of Future Drinking and Problem Outcomes Among Individuals with Alcohol Use Disorders

Andrea H. Kline-Simon, Daniel E. Falk, Raye Z. Litten, Jennifer R. Mertens, Joanne Fertig, Megan Ryan, and Constance M. Weisner

Division of Research (AHK-S, JRM, CMW), Kaiser Permanente Northern California, Oakland, California; National Institute on Alcohol Abuse and Alcoholism (NIAAA) (DEF, RZL, JF, MR), Bethesda, Maryland; and Department of Psychiatry (CMW), University of California, San Francisco, San Francisco, California

Abstract

Background—Treatment for alcohol disorders has traditionally been abstinence-oriented, but evaluating the merits of a low-risk drinking outcome as part of a primary treatment endpoint is a timely issue given new pertinent regulatory guidelines. This study explores a posttreatment low-risk drinking outcome as a predictor of future drinking and problem severity outcomes among individuals with alcohol use disorders in a large private, not for profit, integrated care health plan.

Methods—Study participants include adults with alcohol use disorders at 6 months ($N = 995$) from 2 large randomized studies. Logistic regression models were used to explore the relationship between past 30-day drinker status at 6 months posttreatment (abstinent [66%], low-risk drinking [14%] defined as nonabstinence and no days of 5+ drinking, and heavy drinking [20%] defined as 1 or more days of 5 + drinking) and 12-month outcomes, including drinking status and Addiction Severity Index measures of medical, psychiatric, family/social, and employment severity, controlling for baseline covariates.

Results—Compared to heavy drinkers, abstinent individuals and low-risk drinkers at 6 months were more likely to be abstinent or low-risk drinkers at 12 months (adj. ORs = 16.7 and 3.4, respectively; $p < 0.0001$); though, the benefit of abstinence was much greater than that of low-risk drinking. Compared to heavy drinkers, abstinent and low-risk drinkers were similarly associated with lower 12-month psychiatric severity (adj. ORs = 1.8 and 2.2, respectively, $p < 0.01$) and family/social problem severity (adj. OR = 2.2; $p < 0.01$). While abstinent individuals had lower 12-month employment severity than heavy drinkers (adj. OR = 1.9; $p < 0.01$), low-risk drinkers did not differ from heavy drinkers. The drinking groups did not differ on 12-month medical problem severity.

Conclusions—Compared to heavy drinkers, low-risk drinkers did as well as abstinent individuals for many of the outcomes important to health and addiction policy. Thus, an endpoint

that allows low-risk drinking may be tenable for individuals undergoing alcohol specialty treatment.

Keywords

Low-Risk Drinking; Drinking Outcomes; Social Functioning; Alcohol

Treatment for alcohol disorders has traditionally been abstinence-oriented, but approaches that focus on “improvement” and harm reduction are of increasing interest. This is because of clinical concerns as well as recent research examining low-risk drinking outcomes (although early research on nonabstinent outcomes dates back 30 years). Today, low-risk drinking is defined as having 4 or less drinks per day and no more than 14 drinks per week for men and 3 or less drinks per day and no more than 7 drinks per week for women (National Institute on Alcohol Abuse and Alcoholism, 2004). In alcohol clinical trials, the Food and Drug Administration (FDA) has recently moved from total abstinence to no heavy drinking as the primary treatment outcome (Falk et al., 2010; Food and Drug Administration, 2006). No heavy drinking includes both abstinence and low-risk drinking. Evaluating the merits of low-risk drinking as an outcome of primary treatment is a timely effort, as currently a wider spectrum of treatments, both medication-based and psychosocial, are being developed for alcohol disorders. In addition, because of health reform, many more individuals will have access to treatment. Therefore, continuous evaluation of treatment outcomes is a priority for the field.

Most of the existing research on moderate-to-low-risk drinking has studied general population rather than clinical samples. In a longitudinal national general population sample, Dawson and colleagues (2007) examined multiple levels of drinking in relation to recurrence of alcohol use disorder symptoms over 3 years among individuals remitted from alcohol use disorders. In the follow-up period, stability was highest for abstainers; 77.2% of those abstinent at year 1 remained abstinent at year 3, while 48.3% of low-risk drinkers remained low-risk (with an additional 18.3% becoming abstinent). However, overall rates of recurrent alcohol dependence did not significantly differ between low-risk drinkers (4.0%) and abstainers (2.9%) (Dawson et al., 2007), and the likelihood of recurrent alcohol use disorder symptoms did not differ significantly for those younger than 34 years (Dawson et al., 2007).

Although low-risk drinking may be acceptable for less severe patients, little is known about whether this is an acceptable outcome for individuals with problems so severe they enter specialty treatment. Recently, studies have begun to examine such outcomes in treated populations. For example, in a secondary analysis of 2 large randomized clinical trials for the treatment for alcohol dependence, the COMBINE (Anton et al., 2006) and to piramate (Johnson et al., 2007) studies, the endpoint measure of percent subjects with no heavy drinking, was generally as sensitive as many traditional continuous outcome measures in detecting differences between medication and placebo groups (Falk et al., 2010). This measure, at the end of treatment, also predicted drinking outcomes and alcohol-related consequences up to 1 year following treatment.

Our study extends this research by examining a different population: individuals entering specialty treatment for alcohol use disorders in a large private, nonprofit, integrated health care system. We compare 12-month outcomes for individuals grouped by 3 levels of drinking 6 months after entering treatment: abstinence, low-risk drinking, and heavy drinking. Our measure of low-risk drinking was <5 drinks per day, as weekly quantity/frequency consumption information was not available. The 12-month outcomes include drinking levels and severity of medical, psychiatric, employment, and family problems. We examine the likelihood that compared to abstinent or heavy drinkers, low-risk drinkers after treatment (i) become abstinent or remain low-risk drinkers rather than becoming heavy drinkers and (ii) have severe problems.

MATERIALS AND METHODS

Study Participants

Study participants were adults drawn from 2 large randomized studies (the Day Hospital Study and the Integrated Care Study) conducted at the Kaiser Permanente Northern California (KPNC) Chemical Dependency Recovery Program in Sacramento, California. We refer to this program as alcohol and other drug (AOD) treatment. KPNC is a large, private nonprofit, integrated health care delivery system covering 33.5% of the insured KPNC region or approximately 3.3 million individuals.

The AOD treatment program provides outpatient and day treatment modalities that include supportive group therapy, education, relapse prevention, family therapy, and individual counseling in a model similar to other outpatient, private, and public programs. Both treatment modalities last for 8 weeks, with day treatment having 4 times the intensity of each service. The same aftercare (weekly group sessions) is available for both modalities. The psychiatry department provides individual and group psychotherapy and medication management.

The Day Hospital Study compared day hospital treatment to traditional outpatient treatment and recruited patients between 1994 and 1996 ($N = 1,204$) (Weisner et al., 2000b). The Integrated Care Study examined integrated delivery of medical and AOD services, and recruited patients between 1997 and 1998 ($N = 749$) (Weisner et al., 2001). Treatments for both studies were the same (day hospital and outpatient), and the average length of stay (10 weeks) were also the same. For both studies, interview data on demographics, socioeconomic status, AOD use and diagnosis, severity of related problems, and out-of-health plan services use were collected at baseline and follow-ups. Utilization data within KPNC were extracted from administrative databases throughout the follow-up period to determine readmissions. Self-report information of readmissions outside of KPNC was also collected.

Data sets were combined as in other analyses of these studies (Chi et al., 2011; Satre et al., 2004, 2007; Tsoh et al., 2011; Weisner et al., 2010a,b). Both studies recruited patients when entering treatment and had excellent recruitment rates (93 and 95%), the same medical director was present, and they did not differ in patient characteristics, program characteristics, or staffing. Patients who did not agree to be randomized but agreed to other

aspects of the study were consented, followed, and included in the analyses. Variables indicating study sample and randomization status were added to all models to test for potential study effects; they were not significant and therefore were not included in the final models.

Using a subsample of patients who met criteria for alcohol abuse or dependence at baseline and who had a 6- and 12-month follow-up ($N = 995$), we assessed 12-month posttreatment outcomes using 6-month follow-up drinking status as the main predictor variable of interest and baseline variables as covariates. We included individuals with alcohol abuse diagnoses because evidence suggests a continuum of alcohol use disorders rather than “abuse” as distinct from “dependence” (Li et al., 2007) and proposed changes to the Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V) combine abuse and dependence into 1 “alcohol use disorder” diagnosis (American Psychiatric Association, 2010).

Measures

Demographic variables measured at baseline included age, gender, ethnicity, income, employment status, and marital status. The number of 5+ drinking days at baseline was measured for the past month, and the length of time the patient stayed in treatment was measured in weeks from intake.

We examined AOD abuse and dependence based on questions from the Diagnostic Interview Schedule for Psychoactive Substance Dependence to provide a DSM-IV diagnosis for alcohol, marijuana, stimulant, painkiller, methadone, heroin, barbiturate, tranquilizer, inhalant, hallucinogen, and cocaine. A dichotomous marker indicated any drug dependence at baseline. For alcohol, we created a count variable of the number of alcohol dependence or abuse symptoms at baseline, as our sample consisted of only those with alcohol dependence or abuse symptoms.

Severity of AOD and related problems was measured by the alcohol, drug, medical, psychiatric, family/social, and employment composite scores of the Addiction Severity Index (ASI) instrument (McLellan et al., 1992) at baseline and follow-ups. Each composite score ranges from 0 (indicating no problems in the relevant domain) to 1.0 (indicating high severity). These continuous measures at baseline were included in the models as controls.

Drinking status was classified as 3 categories: (i) *abstinence* from alcohol during the prior 30 days; (ii) *low-risk drinking* defined as nonabstinence and no days of 5+ drinking during the prior 30 days; and (iii) *heavy drinking* defined as 1 or more days of 5+ drinking during the prior 30 days. These measures were created for the 6- and 12-month follow-ups.

Outcomes

Twelve-month outcomes included drinking status by level: a combined measure of abstinence and low-risk drinking (abstinence/low-risk drinking, with heavy drinking as the referent group); and the ASI measures for medical, psychiatric, family/social, and employment severity. For the ASI measures, dichotomous variables were created using a normed value based on scores in a general population membership sample of the health plan (Weisner et al., 2000a). The normed score was not available for the employment and family/

social ASI scores, thus we used the median value for our sample. Each outcome was assessed separately as a dichotomous outcome in a logistic regression model.

Analysis

Pearson chi-square analyses were used to examine relationships between drinking status at 6 months and the baseline demographic variables and ASI outcomes at 12 months. Kruskal–Wallis tests were used to compare the baseline ASI medians across the drinking groups. Logistic regression models examined the associations between alcohol measures at 6 months and the drinking status outcomes at 12 months. All models included drinking status at 6 months (abstinence, low-risk drinking, and heavy drinking—using heavy drinking as the reference group) and covariates measured at baseline, including: age, gender, drug dependence, length of treatment stay in weeks, number of alcohol dependence/abuse symptoms, and continuous measures of psychiatric and medical ASI to control for severity of problems. For models of 12-month ASI outcomes, additional covariates included corresponding continuous baseline ASI problem severity measures.

RESULTS

The sample was predominantly male (63%), middle-aged (mean = 39 years old), and consisted of whites (76%), African Americans (10%), Hispanics (9%), and others (4%). Sixty-two percent were employed with 31.6% reporting annual household incomes of more than \$40,000 and 48% were married. Thirty percent had some form of drug dependence at baseline; the average number of alcohol abuse or dependence symptoms at baseline was 7 (SD = 2), and the average number of days drinking 5+ drinks in the past 30 days at baseline was 13 (SD = 10). At baseline, 4% of the sample was abstinent, 9% were low-risk drinkers, and 87% were heavy drinkers (data not shown).

Bivariate Analysis of Baseline Demographic Variables by 6-Month Drinking Status

Abstainers had the longest length of stay in treatment, average 14 weeks ($p < 0.0001$) and the highest percentage of participants with an income over \$40,000 (45%, $p = 0.0023$). Forty-eight percent of low-risk drinkers were women (39% abstainers, 28% heavy drinkers; $p = 0.0007$). Heavy drinkers were significantly younger, average age 37 ($p = 0.0013$), more were unmarried ($p < 0.0001$), and they had the highest average number of 5+ drinking days at baseline (16; 14 low-risk drinkers, 13 abstainers; $p = 0.0005$) (Table 1).

Bivariate Analysis of Drinking Status and ASI Severity at 12 Months

At 6 months, approximately two-thirds were abstinent (66%), 14% were low-risk drinkers, and 20% were heavy drinkers ($p < 0.0001$) (Table 2). These proportions were generally maintained at 12 months, though with slightly more low-risk and heavy drinking (61% abstinent, 17% low-risk drinkers, and 22% heavy drinkers; $p < 0.0001$). The average number of heavy drinking days (5+ drinks per day) for the heavy drinking group was 8.0 (SD = 8.2) at 6 months and 7.2 (SD = 9.5) at 12 months. Of those abstinent at 6 months, 84% remained abstinent at 12 months, 9% became low-risk drinkers, and 7% became heavy drinkers. Of those who were low-risk drinkers at 6 months, 22% became abstinent, 47% remained low-risk drinkers, and 31% became heavy drinkers at 12 months (Table 3, $p < 0.0001$).

Approximately 63% of the heavy drinkers at 6 months remained heavy drinkers at 12 months.

Table 4 presents ASI severity scores at 12 months by drinking status at 6 months. Eighty percent of the abstinent group had alcohol ASI severity scores equal to or below the general population mean at 12 months compared to 52% of the low-risk drinkers and 31% of heavy drinkers ($p < 0.001$). The abstinent and low-risk drinking groups had similar rates of employment ASI scores at 12 months less than or equal to the median (55 and 54%, respectively), while only 41% of the heavy drinkers did ($p < 0.001$). Abstinent and low-risk drinking groups also had similar social and family ASI severity (abstinence: 68% less than or equal to the median; low-risk drinking: 66%), while heavy drinkers had fewer in the lower ASI category (45%, $p < 0.001$). There were no significant differences by drinking status at 6 months for medical and psychiatric ASI severity at 12 months.

Multivariate Analysis of Abstinence/Low-Risk Drinking at 12 Months

Individuals abstinent at 6 months had much higher odds of being abstinent/low-risk drinkers at 12 months than the heavy drinkers (adj. OR = 16.7, 95% CI = 10.8 to 25.7, $p < 0.0001$). While low-risk drinkers at 6 months also had higher odds of abstinence/low-risk drinking at 12 months compared to heavy drinkers (adj. OR = 3.4, 95% CI = 2.1 to 5.5, $p < 0.0001$), the magnitude was less than that of abstinent individuals.

In regard to other predictors, longer length of treatment stay predicted 5% higher odds of abstinence/low-risk drinking at 12 months (adj. OR = 1.05, 95% CI = 1.02 to 1.07). Women were 50% more likely to be in the abstinent/low-risk drinker group at 12 months than men (adj. OR = 1.5, 95% CI = 1.0 to 2.2, $p = 0.0468$) (Table 5).

Multivariate Analysis of ASI Measures at 12 Months

Compared to heavy drinking, abstinence and low-risk drinking at 6 months were both significantly associated with lower 12-month psychiatric severity (abstinence: adj. OR = 1.8, 95% CI = 1.2 to 2.6, $p = 0.0028$; low-risk drinking: adj. OR = 2.2, 95% CI = 1.3 to 3.6, $p = 0.0027$) and family/social problem severity (abstinence: adj. OR = 2.2, 95% CI = 1.5 to 3.1, $p < 0.0001$; low-risk drinking: adj. OR = 2.2, 95% CI = 1.4 to 3.5, $p = 0.0013$) (Table 5).

Compared to heavy drinkers, participants who attained abstinence at 6 months had lower employment severity at 12 months (adj. OR = 1.9, 95% CI = 1.2 to 2.8, $p = 0.0021$); however, the low-risk and heavy drinkers did not differ significantly. No differences were found between the 6-month drinking status groups on 12-month medical problem severity. Drug dependence was not significant in any of the models (Table 5).

Although the odds ratios were clearly higher for abstainers than low-risk drinkers when compared to heavy drinkers in terms of 12-month drinking outcomes, we replicated the analyses using abstinence as the reference group. As expected, low-risk drinkers at 6 months had significantly lower odds of remaining abstinent/low-risk drinkers at 12 months than abstainers (adj. OR = 0.21, $p < 0.0001$). However, low-risk drinkers and abstainers did not significantly differ in terms of psychiatric, family/social, or employment problem severity

outcomes, and they had better medical problem severity outcomes (adj. OR = 1.78, $p = 0.0114$) (not shown).

DISCUSSION

Compared to patients who were heavy drinkers at 6 months, those who attained abstinence at 6 months were much more likely to have good drinking outcomes (abstinent or low-risk drinker) at 12 months (adj. OR = 16.7) and those with low-risk drinking at 6 months also had better odds of good drinking outcomes at 12 months (adj. OR = 3.4), though to a lesser extent than those who had been abstinent at 6 months. However, in this treatment population, low-risk drinking following treatment was associated at 12 months with better outcomes on most dimensions investigated compared to those who were heavy drinkers following treatment.

At the same time, increasingly in the addiction field, health and social functioning are considered important treatment outcomes. In this study, both low-risk drinkers and those abstinent after treatment had psychiatric and family/social severity scores similar to or lower than the general population compared to the heavy drinkers. They also did not significantly differ from each other, implying that both outcomes may result in similar social functioning. Neither group had lower medical problem severity scores than the heavy drinkers. However, when using abstinence as the reference, we found that low-risk drinkers had better medical outcomes than abstainers. This is likely because individuals with chronic health problems often abstain in response to their health problems, so although they may have abstained, they continue to have medical problems in a 12-month time frame (Grant and Dawson, 1999; Mertens et al., 2003, 2008; Shaper, 1995). Also of interest, those abstinent at 6 months had lower employment severity scores at 12 months than heavy drinkers, while the low-risk drinkers did not. We note that many individuals are referred to treatment in this and other health plans by their employers, and they demand abstinence as an outcome. For example, in this health plan, many individuals employed by companies or government agencies work in transportation or other industries that conduct regular breath analysis and other drug testing; they may have lost their jobs after unsuccessful tests. Consistent with this, baseline employment severity was the lowest among the 6-month low-risk drinkers, and by 12 months the abstainers were similar to the low-risk drinkers.

In regard to other measures predicting positive outcomes, characteristics similar to those found in other alcohol studies were also important here: gender, age, and the severity of the problem being measured as an outcome in each model. The study assessed 12-month outcomes related to patients' 6-month drinking status. However, baseline characteristics were used to provide clinical guidance, as clinicians developing treatment plans and goals will take into consideration the patient's characteristics as they enter treatment. Our findings were significant when controlling for those measures. We also controlled for length of stay at treatment, which began at baseline. We found that those who were abstinent at 6 months had longer lengths of stay in treatment compared to the low-risk and heavy drinker groups ($p < 0.0001$). Abstinence model programs discourage any alcohol or drug use during treatment, and individuals who are not abstinent thus do not always remain in treatment. As noted

above, employers and other referral sources also often expect abstinence, so it is not surprising that the abstinent group had longer stays in treatment.

In the treatment population of the Project COMBINE data set, long-term outcome was determined for those abstinent, those drinking at low-risk levels, and those drinking heavily during the last 2 months of treatment (Falk et al., 2010). Heavy drinkers experienced more drinking and alcohol-related consequences than abstainers or low-risk drinkers at 1 year after treatment ended. There were no differences between the abstinent and low-risk drinking groups for all drinking outcomes (drinks per day, drinks per drinking day, and drinks per week) at 1 year except for significantly lower percent days abstinent in the low-risk group. Alcohol-related consequences at 1 year were also higher in the low-risk group, although the value in the low-risk group was closer to that of the abstinent group than the heavy drinking group.

Currently, the FDA has identified percent subjects with no heavy drinking days (daily limits) as the primary outcome measure in pivotal Phase 3 trials (Food and Drug Administration, 2006). This treatment outcome includes abstinent individuals and low-risk drinkers, and is considered a successful response to an experimental medication. The overarching question is whether low-risk drinking should be considered a successful outcome. In this study, low-risk drinkers did as well as those abstinent for many of the outcomes important to health and addiction policy and should be considered acceptable as a successful outcome by policy makers and clinical guidelines. Although patients abstinent after treatment had the best 12-month outcomes, will the field accept low-risk drinking, which we found to be related to better outcomes than heavy drinking, as an outcome that may be more practical, and will have a larger treatment audience? Would more people seek treatment if low-risk drinking was a goal of treatment? This treatment program, as well as most other U.S. programs, focuses on abstinence as the treatment goal. The field currently lacks information to determine whether results of such a treatment would be similar to those found here.

The standards for at-risk drinking have been determined by the NIAAA guidelines as a combination of weekly and daily limits (National Institute on Alcohol Abuse and Alcoholism, 2005) but the daily measure in lieu of the combined weekly/daily measure appears to be an adequate substitute (Dawson, 2000). We found significant differences in outcomes based solely on the heavy drinking cutoffs of 5 or more drinks in a day.

The study has several limitations. Telephone interview data were used across all time points, which could lead to self-report bias. Some women may have been misclassified as low-risk drinkers based on the NIAAA definition of 4+ for women and the current study's definition of 5+ for men and women. As with all longitudinal studies, there was some attrition; however, our follow-up rates were high (86% at 6 months and 87% at 12 months). We were unable to capture the actual number of drinks consumed each day other than a marker for 5+. Future research would benefit from measuring a combined variable of days drinking and number of drinks consumed on each occasion.

Future research may also consider an even less conservative harm reduction approach. For example, any reduction in number of heavy drinking days, particularly if it is associated with significant reductions in alcohol-related problems, could be considered a good outcome. In the current study, we did not find a significant difference in the number of heavy drinking days in the heavy drinking group from 6 to 12 months.

CONCLUSION

Much of the research to date has found that individuals in the general population with low severity problems and who generally do not seek treatment have good outcomes as low-risk drinkers (Dawson et al., 2007). However, this was a study of a severe population who entered treatment with many co-occurring problems. It found outcomes for low-risk drinking that may be acceptable to policy makers, families, and individuals themselves. This study suggests the need for more research, particularly on clinical interventions that is not limited to the goal of abstinence, but also includes the goal of low-risk drinking as a viable option for treatment-seeking individuals.

Acknowledgments

This study was supported by grants from the National Institute on Alcoholism and Alcohol Abuse Grant (R37 AA10359) and the National Institute on Drug Abuse (R37 DA10572). We thank Agatha Hinman, BA, for editorial assistance.

REFERENCES

- American Psychiatric Association. R 00 alcohol use disorder. DSM-5 development. 2010 Available at: <http://www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=452>.
- Anton RF, O'Malley SS, Ciraulo DA, Cisler RA, Couper D, Donovan DM, Gastfriend DR, Hosking JD, Johnson BA, LoCastro JS, Longabaugh R, Mason BJ, Mattson ME, Miller WR, Pettinati HM, Randall CL, Swift R, Weiss RD, Williams LD, Zweben A. Combined pharmacotherapies and behavioral interventions for alcohol dependence: the COMBINE study: a randomized controlled trial. *JAMA*. 2006; 295:2003–2017. [PubMed: 16670409]
- Chi FW, Parthasarathy S, Mertens JR, Weisner CM. Continuing care and long-term substance use outcomes in managed care: early evidence for a primary care based model. *Psychiatr Serv*. 2011; 62:1194–2000. [PubMed: 21969646]
- Dawson DA. US low-risk drinking guidelines: an examination of four alternatives. *Alcohol Clin Exp Res*. 2000; 24:1820–1829. [PubMed: 11141041]
- Dawson DA, Goldstein RB, Grant BF. Rates and correlates of relapse among individuals in remission from DSM-IV alcohol dependence: a 3-year follow-up. *Alcohol Clin Exp Res*. 2007; 31:2036–2045. [PubMed: 18034696]
- Falk D, Wang XQ, Liu L, Fertig J, Mattson M, Ryan M, Johnson B, Stout R, Litten RZ. Percentage of subjects with no heavy drinking days: evaluation as an efficacy endpoint for alcohol clinical trials. *Alcohol Clin Exp Res*. 2010; 34:2022–2034. [PubMed: 20659066]
- Food and Drug Administration. Medical Review of Vivitrol. Rockville, MD: U.S. Government; 2006.
- Grant, BF.; Dawson, DA. Alcohol and drug use, abuse, and dependence: classification, prevalence, and comorbidity. In: McCrady, BS.; Epstein, EE., editors. *Addictions: A Comprehensive Guidebook*. New York: Oxford University Press; 1999. p. 9-29.
- Johnson BA, Rosenthal N, Capece JA, Wiegand F, Mao L, Beyers K, McKay A, Ait-Daoud N, Anton RF, Ciraulo DA, Kranzler HR, Mann K, O'Malley SS, Swift RM. Topiramate for treating alcohol dependence: a randomized controlled trial. *JAMA*. 2007; 298:1641–1651. [PubMed: 17925516]
- Li TK, Hewitt BG, Grant BF. The Alcohol Dependence Syndrome, 30 years later: a commentary. The 2006 H. David Archibald Lecture. *Addiction*. 2007; 102:1522–1530. [PubMed: 17680851]

- McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Pettinati H, Argeriou M. The fifth edition of the addiction severity index. *J Subst Abuse Treat.* 1992; 9:199–213. [PubMed: 1334156]
- Mertens JR, Flisher AJ, Satre DD, Weisner CM. The role of medical conditions and primary care services in 5-year substance use outcomes among chemical dependency treatment patients. *Drug Alcohol Depend.* 2008; 98:45–53. [PubMed: 18571875]
- Mertens JR, Lu YW, Parthasarathy S, Moore C, Weisner CM. Medical and psychiatric conditions of alcohol and drug treatment patients in an HMO: comparison with matched controls. *Arch Intern Med.* 2003; 163:2511–2517. [PubMed: 14609789]
- National Institute on Alcohol Abuse and Alcoholism. Helping patients with alcohol problems. A health practitioner's guide. 2004 Available at: <http://www.csam-asam.org/pdf/misc/PractitionersGuideFINAL.pdf>.
- National Institute on Alcohol Abuse and Alcoholism. Helping Patients Who Drink Too Much: A Clinician's Guide, Updated 2005 Edition. Rockville, MD: U.S. Department of Health and Human Services; 2005.
- Satre DD, Blow FC, Chi FW, Weisner C. Gender differences in seven-year alcohol and drug treatment outcomes among older adults. *Am J Addict.* 2007; 16:216–221. [PubMed: 17612826]
- Satre DD, Mertens JR, Weisner C. Gender differences in treatment outcomes for alcohol dependence among older adults. *J Stud Alcohol.* 2004; 65:638–642. [PubMed: 15536774]
- Shaper AG. The “unhealthy abstainers” question is still important. *Addiction.* 1995; 90:488–490. [PubMed: 7773110]
- Tsoh JY, Chi FW, Mertens JR, Weisner CM. Stopping smoking during first year of substance use treatment predicted 9-year alcohol and drug treatment outcomes. *Drug Alcohol Depend.* 2011; 114:110–118. [PubMed: 21050681]
- Weisner C, Hinman A, Lu YW, Chi FW, Mertens JR. Addiction treatment ultimatums and U.S. health reform: a case study. *Nordisk Alkohol Nark.* 2010a; 27:685–698. [PubMed: 22135620]
- Weisner C, McLellan AT, Hunkeler EM. Addiction severity index data from general membership and treatment samples of HMO members. One case of norming the ASI. *J Subst Abuse Treat.* 2000a; 19:103–109. [PubMed: 10963921]
- Weisner C, Mertens J, Parthasarathy S, Moore C, Hunkeler EM, Hu T, Selby JV. The outcome and cost of alcohol and drug treatment in an HMO: day hospital versus traditional outpatient regimens. *Health Serv Res.* 2000b; 35:791–812. [PubMed: 11055449]
- Weisner C, Mertens J, Parthasarathy S, Moore C, Lu Y. Integrating primary medical care with addiction treatment: a randomized controlled trial. *JAMA.* 2001; 286:1715–1723. [PubMed: 11594896]
- Weisner C, Parthasarathy S, Moore C, Mertens JR. Individuals receiving addiction treatment: are medical costs of their family members reduced? *Addiction.* 2010b; 105:1226–1234. [PubMed: 20491730]

Table 1

Baseline Demographic Variables by 6-Month Drinking Status

| Variables | Mean or % | Mean or % | Mean or % | <i>p</i> -Value |
|--|---------------------------------|---|--|-----------------|
| | Abstinence (<i>N</i> = 660) | Low-risk drinking (<i>N</i> = 137) | Heavy drinking (<i>N</i> = 198) | |
| Women (%) | 39.1 | 48.2 | 28.3 | 0.0007 |
| Age, mean (SD) | 40.53 (10.8) | 39.59 (11.5) | 37.32 (10.6) | 0.0013 |
| Income (40,000+) (%) | 45.2 | 38.0 | 34.0 | 0.0023 |
| Ethnicity (%) | | | | |
| White | 77.7 | 77.4 | 76.0 | |
| African American | 8.7 | 11.0 | 10.2 | |
| Hispanic | 8.5 | 8.8 | 9.2 | |
| Other | 5.0 | 2.9 | 4.6 | ns |
| Married (%) | 51.3 | 51.8 | 34.0 | <0.0001 |
| Employed (%) | 63.3 | 65.0 | 60.5 | ns |
| Weeks in treatment, mean (SD) | 14.36 (16.8) | 4.02 (6.6) | 3.71 (5.2) | <0.0001 |
| Drug dependence (%) | 27.1 | 35.8 | 31.8 | ns |
| Alcohol abuse/dep symptoms, mean (SD) | 6.77 (2.0) | 6.96 (2.0) | 7.07 (1.9) | ns |
| Number of 5+ drinking days past month, mean (SD) | 13.20 (10.6) | 13.59 (9.9) | 16.48 (9.9) | 0.0005 |
| ASI alcohol severity, median (SD) | 0.62 (0.2) | 0.62 (0.2) | 0.70 (0.2) | ns |
| ASI medical severity, median (SD) | 0.0 (0.4) | 0.20 (0.4) | 0.0 (0.4) | ns |
| ASI psychiatric severity, median (SD) | 0.45 (0.3) | 0.47 (0.3) | 0.42 (0.3) | ns |
| ASI family/social severity, median (SD) | 0.37 (0.3) | 0.39 (0.3) | 0.42 (0.3) | ns |
| ASI employment severity, median (SD) | 0.30 (0.3) | 0.25 (0.2) | 0.37 (0.3) | 0.0063 |

ASI, Addiction Severity Index.

Table 2

Six- and 12-Month Drinking Status

| | <i>N</i> | % | <i>p</i> -Value |
|---|----------|----|-----------------|
| 30-day drinking status at 6 months (<i>N</i> = 995) | | | |
| Abstinence | 660 | 66 | |
| Low-risk drinking | 137 | 14 | |
| Heavy drinking | 198 | 20 | <0.0001 |
| 30-day drinking status at 12 months (<i>N</i> = 995) | | | |
| Abstinence | 626 | 63 | |
| Low-risk drinking | 155 | 16 | |
| Heavy drinking | 214 | 21 | <0.0001 |

Table 3

Six-Month Status Maintained at 12 Months

| | Abstinent 12 months (%) | Low-risk drinking at 12 months (%) | Heavy drinking at 12 months (%) | p-Value |
|-------------------------------|--------------------------------|---|--|----------------|
| Abstinent at 6 months | 84 | 9 | 7 | |
| Low-risk drinking at 6 months | 22 | 47 | 31 | |
| Heavy drinking at 6 months | 20 | 17 | 63 | <0.0001 |

Table 4

Normative Status on ASI Severity Scores at 12 Months by 6-Month Drinking Status

| | | Abstinence (N = 660) | Low-risk drinking (N = 137) | Heavy drinking (N = 198) | p-Value |
|-------------------|------------|----------------------|-----------------------------|--------------------------|---------|
| Alcohol (%) | ASI norm | 80.30 | 51.82 | 31.31 | <0.0001 |
| Medical (%) | ASI norm | 65.15 | 73.72 | 67.17 | ns |
| Psychiatric (%) | ASI norm | 58.64 | 62.04 | 53.54 | ns |
| Social/family (%) | ASI median | 68.03 | 65.69 | 48.48 | 0.0003 |
| Employment (%) | ASI median | 55.21 | 54.01 | 41.41 | 0.0070 |

Table 5
Logistic Regression Models of 6-Month Drinking Status on 12-Month Outcomes

| | Abstinence or low-risk drinking at 12 months (vs. heavy drinking) | | | ASI medical problem severity norm at 12 months | | | ASI psychiatric problem severity norm at 12 months | | | ASI family/social problem severity median at 12 months | | | ASI employment problem severity median at 12 months | | |
|--|---|--------------|-----------------|--|------------|-----------------|--|------------|-----------------|--|------------|-----------------|---|------------|-----------------|
| | OR | 95% CI | p-Value | OR | 95% CI | p-Value | OR | 95% CI | p-Value | OR | 95% CI | p-Value | OR | 95% CI | p-Value |
| Alcohol abstinence at 6 months | 16.65 | 10.79, 25.69 | < 0.0001 | 0.95 | 0.66, 1.37 | ns | 1.78 | 1.22, 2.59 | 0.0028 | 2.15 | 1.51, 3.07 | < 0.0001 | 1.87 | 1.25, 2.79 | 0.0021 |
| Low-risk drinking at 6 months | 3.43 | 2.13, 5.52 | < 0.0001 | 1.59 | 0.96, 2.63 | ns | 2.16 | 1.31, 3.56 | 0.0027 | 2.17 | 1.35, 3.48 | 0.0013 | 1.49 | 0.89, 2.79 | ns |
| Heavy drinking at 6 months | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Age | 1.01 | 0.99, 1.03 | ns | 0.99 | 0.97, 1.00 | 0.0448 | 1.00 | 1.00, 1.02 | ns | 1.00 | 0.99, 1.02 | ns | 0.98 | 0.97, 1.00 | 0.0396 |
| Women | 1.50 | 1.01, 2.24 | 0.0468 | 0.70 | 0.53, 0.93 | 0.0147 | 0.36 | 0.27, 0.48 | < 0.0001 | 1.04 | 0.78, 1.39 | ns | 0.78 | 0.57, 1.06 | ns |
| Drug dependence | 1.29 | 0.83, 1.99 | ns | 0.86 | 0.62, 1.19 | ns | 0.90 | 0.65, 1.25 | ns | 0.81 | 0.59, 1.11 | ns | 0.93 | 0.65, 1.32 | ns |
| ASI psychiatric problem severity | 1.11 | 0.51, 2.41 | ns | 0.36 | 0.20, 0.66 | 0.0008 | 0.04 | 0.02, 0.09 | < 0.0001 | 0.45 | 0.25, 0.82 | 0.0090 | 0.38 | 0.21, 0.72 | 0.0028 |
| ASI medical problem severity | 1.52 | 0.90, 2.54 | ns | 0.48 | 0.33, 0.69 | < 0.0001 | 1.09 | 0.74, 1.60 | ns | 1.20 | 0.82, 1.75 | ns | 0.69 | 0.46, 1.04 | ns |
| Weeks in treatment | 1.05 | 1.02, 1.07 | 0.0006 | 1.01 | 1.00, 1.02 | ns | 0.99 | 0.98, 1.00 | 0.0412 | 1.01 | 1.00, 1.02 | ns | 1.01 | 1.00, 1.02 | ns |
| Number alcohol abuse/dependence symptoms | 0.93 | 0.85, 1.03 | ns | 1.08 | 1.01, 1.16 | 0.0352 | 1.16 | 1.08, 1.26 | 0.0001 | 1.04 | 0.97, 1.12 | ns | 1.01 | 0.93, 1.09 | ns |
| ASI family/social problem severity | | | | | | | | | | 0.21 | 0.12, 0.37 | < 0.0001 | | | |
| ASI employment problem severity | | | | | | | | | | | | | 0.01 | 0.01, 0.02 | < 0.0001 |

Addiction Severity Score values: alcohol norm = 0.11; medical norm = 0.24; psychiatric norm = 0.03; social/family median = 0.19 [normed to the general population on ASI scores (Weisner et al., 2000a); median based on full sample scores].
 ASI, Addiction Severity Index.
 Bolded p-values < 0.05.