

UCSF

Postprints from TRC

Title

Five-year alcohol and drug treatment outcomes of older adults versus middle-aged and younger adults in a managed care program

Permalink

<https://escholarship.org/uc/item/96t7j603>

Journal

Addiction, 99(10)

ISSN

0965-2140

Authors

Satre, Derek D
Mertens, Jennifer R
Arean, Patricia A
et al.

Publication Date

2004-10-01

Peer reviewed

Five-year alcohol and drug treatment outcomes of older adults versus middle-aged and younger adults in a managed care program

Derek D. Satre^{1,2}, Jennifer R. Mertens^{2,3}, Patricia A. Areán¹ & Constance Weisner^{1,2}

Department of Psychiatry, University of California, San Francisco, CA,¹ Division of Research, Kaiser Permanente Northern California, Oakland, CA, USA² and Department of Psychiatry and Mental Health, University of Cape Town, South Africa³

Correspondence to:

Derek D. Satre
University of California San Francisco
401 Parnassus Avenue
Box 0984-OVS
San Francisco
CA 94143
USA
Tel: (415) 476 7382
Fax: (415) 476 7719
E-mail: dereks@lppi.ucsf.edu

Submitted 23 June 2003;
initial review completed 24 September 2003;
final version accepted 7 June 2004

ABSTRACT

Aims This study compared 5-year treatment outcomes of older adults to those of middle-aged and younger adults in a large managed care chemical dependency program. We examined age group differences in individual, treatment and extra-treatment factors, which may influence long-term outcome.

Design Seventy-seven per cent of original study participants completed a telephone interview 5 years after out-patient chemical dependency treatment at Kaiser Permanente. This sample ($N = 925$) included 65 patients aged 55–77, 296 patients aged 40–54 and 564 patients aged 18–39 (age at baseline).

Measurements Measures at follow-up included alcohol and drug use, Addiction Severity Index (ASI), Alcoholics Anonymous Affiliation Scale, social resource and self-reported health questions. Mortality data were obtained from contact with family members of patients as well as automated health plan records.

Findings Older adults were less likely to be drug-dependent at baseline than younger and middle-aged adults, and had longer retention in treatment than younger adults. At 5 years, older adults were less likely than younger adults to have close family or friends who encouraged alcohol or drug use. Fifty-two per cent of older adults reported total abstinence from alcohol and drugs in the previous 30 days versus 40% of younger adults. Older women had higher 30-day abstinence than older men or younger women. Among participants dependent only on alcohol, there were no significant age differences in 30-day abstinence. In logistic regression analysis, age group was not significant. Variables associated with greater age that independently predicted 30-day abstinence in the logistic regression model included longer retention in treatment and having no close family or friends who encouraged alcohol or drug use at 5 years; female gender was also significant.

Conclusions Results indicate that older adults have favorable long-term outcome following treatment relative to younger adults, but these differences may be accounted for by variables associated with age such as type of substance dependence, treatment retention, social networks and gender. Age differences in these characteristics inform intervention strategies to support long-term recovery of older adults and provide direction for investigation of how age affects outcome.

KEYWORDS Alcohol and drug treatment, Alcoholics Anonymous, long-term outcomes, managed care, older adults.

INTRODUCTION

Consequences of alcohol and drug abuse and dependence among older adults include many significant physical and mental health problems (National Institute on Alcohol Abuse and Alcoholism 2000). An increase in the proportion of older adults in the US and European populations, along with substantial drug and alcohol use among cohorts approaching old age, is expected to increase the need for effective interventions for older individuals (Osterling & Berglund 1994; Beresford 1995; Gfroerer *et al.* 2003). However, there have been few outcome studies of older adults. It is not known how well older patients maintain abstinence over time, whether outcomes differ by gender or whether older adults have post-treatment support needs different from those of other patients. Such information could inform chemical dependency (CD) services for older patients. In addition, private and managed-care settings have received little attention, in spite of being significant providers of treatment for older adults (Edmunds *et al.* 1997).

In a previous paper, we investigated 6-month treatment outcomes for older adults (Satre *et al.* 2003). We found that patients aged 55 and over had a 30-day abstinence rate of 55%, versus 59% of those aged 40–54, and 50% of those aged 18–39. Other studies have also found that older adults have short-term outcomes equivalent to those of younger adults (Rice *et al.* 1993) or possibly better (Oslin, Pettinati & Volpicelli 2002). Long-term studies have generally found that older age is associated with better treatment outcome or remission from alcohol and drug problems (Vaillant 1996; Hser *et al.* 1997; Lemke & Moos 2003). We also found this effect when age was measured continuously in the present sample at 5 years, although older adults were not examined as a distinct group (Weisner *et al.* 2003). We expected to find higher abstinence rates among older adults in the age group analysis conducted in this study. However, we anticipated that the effect of age on abstinence would not be significant when individual, treatment and extra-treatment factors were controlled, because these factors would explain the effects of greater age on outcome.

This study examines ways in which older age may contribute to better treatment outcomes. We use a theoretical model that conceptualizes outcome as influenced by individual characteristics (e.g. demographic factors and substance use diagnosis), treatment characteristics (e.g. treatment intensity and length of stay) and extra-treatment factors (e.g. recovery-oriented and other social network factors) (Weisner *et al.* 2001b). For example, older adults generally have less illicit drug use, fewer psychiatric symptoms, longer stays in treatment and are more likely to be married than younger adults; these

factors are associated with better outcome (Blow *et al.* 1992; Moos, Mertens & Brennan 1993; Satre *et al.* 2003). Older women may have higher abstinence rates than older men, based on 6-month outcomes (Satre, Mertens & Weisner in press). To understand better long-term treatment outcome of older adults, we test a model that examines the effects of these factors on abstinence 5 years post-treatment.

This long-term follow-up study addresses significant gaps in the literature on alcohol and drug treatment of older adults. Community studies have included longitudinal analysis of substance use and heavy drinking in samples that include older adults (Wannamethee & Shaper 1988; Doll *et al.* 1994; Vaillant 1996; Kerr, Fillmore & Bostrom 2002). Long-term outcomes have been reported in a sample drawn from multiple US Veterans Administration treatment centers (Lemke & Moos 2003). However, to our knowledge, this is the first long-term study of older adults based on a private CD program, and the first to report long-term outcomes of older women. In addition, few studies have included outcome measures other than abstinence (Blow *et al.* 2000). We examine abstinence, heavy episodic drinking and addiction-related consequences. We also examine age differences in social networks and 12-Step utilization at 5 years, to inform support strategies for older CD patients.

METHODS

Participants

Study participants were men and women aged 18 and older admitted between April 1994 and April 1996 to treatment at the Kaiser Permanente Sacramento Chemical Dependency Recovery Program (CDRP). Northern California Kaiser Permanente (KP) is a large (3 million membership), group-model health maintenance organization (HMO). CD services in the health plan are provided internally, rather than through external contracts. Patients were referred to treatment through several sources, including medical providers, employers and employee assistance programs (EAPs), and self-referred. Compared to other patients, older adults were more likely to report that a physician suggested treatment, but less likely to report that an employer suggested treatment (Satre *et al.* 2003). This program was available to the general KP adult membership. Patients with dementia, mental retardation, or active psychosis were not eligible. There were no additional exclusion criteria for the study other than these program exclusion criteria. This program is similar to other abstinence-based, group-model private and public programs (Institute of Medicine 1990; Schmidt & Weisner 1993).

We recruited patients entering treatment. Of the 1312 patients contacted for the study, 1204 agreed to participate (92%). Sixty-two per cent of patients were randomized to two treatment conditions (63% of older adults, 60% of middle-aged adults and 63% of younger adults, with no significant differences). Non-randomized patients either chose not to be randomized (for reasons such as work-place requirements or time availability) or staff clinical judgement was made that an individual required a particular treatment condition (for further discussion of effects of randomization, see Weisner *et al.* 2000b). Patients who refused study participation still received treatment in the program.

We used an 'intent-to-treat' design, including all those recruited at intake, whether or not they agreed to be randomized or actually began treatment ($N = 1204$). Of the 1204 individuals who completed an intake interview, 916 returned to initiate treatment (76%) with no significant differences by age group (Satre *et al.* 2003). Patient data were obtained from an interview conducted at intake and 5-year follow-up telephone interviews. Mortality rates were obtained from KP automated records or from family members at follow-up. Institutional review board approval was obtained from the Kaiser Research Foundation Institute and the University of California, San Francisco. Patients were included in the 5-year follow-up regardless of whether they remained in the health plan. All patients who completed the 5-year follow-up ($N = 925$) were included in this analysis, representing 77% of the baseline sample of 1204 patients.

Treatment programs

The original study assigned patients to either a day hospital or a traditional out-patient program. Treatment philosophy was based on total abstinence. In both programs, sessions included supportive group therapy, education, relapse prevention and family oriented therapy. Individual counseling, physician appointments and pharmacotherapy were available as needed. Patients were expected to attend regular 12-step meetings off-site. Patients received random breathalyzer and urine screens weekly during the first 4 weeks and monthly thereafter for 1 year (Weisner *et al.* 2000b).

The rehabilitation phase for both the day hospital and out-patient programs lasted 8 weeks. During the first 3 weeks, day hospital patients attended daily for 6 hours; in the out-patient program, patients attended a 1.5-hour session 3 days per week. During weeks 4–8, the programs had similar treatment intensity (four 1.5-hour sessions in day hospital and three 1.5-hour sessions in traditional out-patients). Aftercare began in the 9th week and consisted of one out-patient session per week for 10 months.

Patients were considered to have dropped out if they missed 7 continuous days during the first 8 weeks (i.e. the rehabilitation phase), or 30 continuous days after the first 8 weeks (i.e. during aftercare), based on attendance data from KP's automated registration database (Selby 1997). Treatment length was measured in weeks, and truncated at 52 weeks (1 year). Although the intended length of stay was the same, the mean length of stay was 10.5 weeks for patients in day hospital and 8.5 weeks for those in out-patient treatment. (For more information on the program and treatment retention, see Mertens & Weisner 2000; Weisner *et al.* 2000b.) There were no age differences in assignment to treatment condition. However, we control for the effects of treatment condition in this analysis.

Measures

Individual characteristics

Demographic variables derived from the baseline interview included age group (18–39, 40–54 and 55 years and over), gender, ethnicity (white, African American, Hispanic, other), education, employment and income (less than \$40 000 per year or at least \$40 000 per year). To assess alcohol and drug dependence, we used questions from the Diagnostic Interview Schedule for Psychoactive Substance Dependence to provide a DSM-IV diagnosis for alcohol and drug (11 substance types) dependence (American Psychiatric Association 2000). For each substance, we established whether three of seven dependence symptoms were present during the previous 30 days (Weisner *et al.* 2000b, 2001a). We classified patients as alcohol-dependent, drug-dependent, both drug- and alcohol-dependent or as not dependent if they did not meet the criteria. Motivation was measured at intake by asking patients whether they identified abstinence as their treatment goal. The goal to abstain was related to positive outcomes at 6 months (Weisner *et al.* 2000b).

Treatment

Readmissions were identified using KP's automated administrative data systems and (for out-of-plan services among those who lost KP membership) responses from the 5-year interviews. 'Readmission' was defined as having at least three visits (with no more than 30 days' gap between each visit) to a CD program between 1 and 5 years after intake. Readmissions outside KP were captured via patient self-report. We do not intend readmission to represent a relapse; for example, readmissions can also measure visits of brief support to maintain abstinence (Weisner *et al.* 2003).

Extra-treatment factors

These variables were obtained at 5-year follow-up. To measure social networks, we used questions developed to assess relationships conducive to and detracting from recovery (Kaskutas 1995). We asked each patient to estimate the number of people with whom he or she associates who: (1) is available to talk with the patient about personal problems (close friends), (2) is available to provide practical support (practical helpers), (3) actively supports the patient's efforts to reduce his or her drinking or drug use (recovery helpers) and (4) encourages the patients to use alcohol or drugs (recovery discouragers). Because responses to 'how many friends and family members do you have that encourage alcohol or drug use' were strongly skewed, with 85% of the sample responding '0', this measure was dichotomized. These social network variables have been predictive of abstinence outcome (Weisner *et al.* 2003), but psychometric properties have not been established.

To measure 12-Step participation, patients completed the Alcoholics Anonymous Affiliation Scale (Humphreys, Kaskutas & Weisner 1998). This nine-item scale is internally consistent across diverse demographic groups and health service settings and has a unifactorial structure. Seven items are scored dichotomously, and two items are scored in categories. The scale is scored continuously from 0 to 9. We adapted the measure to include participation in 12-Step groups other than Alcoholics Anonymous (AA) (e.g. Narcotics Anonymous, Marijuana Anonymous). We selected three of the highest factor-loading scale items to report separately to examine depth of 12-Step involvement: considering yourself a 12-Step member, ever having called a 12-Step member for help and number of 12-Step meetings attended during the last year (Humphreys *et al.* 1998). Number of 12-Step meetings attended was skewed towards zero, with 65% of the sample reporting no 12-Step attendance the prior year (with no difference by age group). To examine frequency of 12-Step attendance we eliminated these individuals from the analysis, resulting in a subsample of 319 (193 younger, 105 middle-aged and 21 older adults). As an indicator of availability of support from the treatment program, KP membership at 5 years was measured using a self-report question (yes/no).

Outcomes

To assess addiction severity 5 years post-treatment, patients were administered an abbreviated form of the Addiction Severity Index (ASI). The abbreviated version comprises all questions that are included on the ASI composite scales, but omits some items that are not included. The ASI measures seven problem severity

areas: alcohol, drug, medical, employment, psychiatric, and family/social and legal problems. Information on frequency, severity and duration of these problems is obtained during the patient's life-time and during the prior 30 days. The composite score obtained in each area indicates problem severity in the 30 days prior to the interview (Weisner, McLellan & Hunkeler 2000a). The measure yields continuous scores from 0 (no problem) to 1.0 (extreme problem) for each domain (McLellan *et al.* 1992). Validity and reliability of the ASI has been found across patient age ranges (McLellan *et al.* 1985). However, we omitted the ASI employment scale from the analysis: because the majority of older adults are retired, scale items show disproportionate severity for older adults. As an alternative we use employment status (yes/no). The ASI was administered at baseline and 5 years.

The abstinence measure was total abstinence from drugs and alcohol over the preceding 30 days at the 5-year interview. All ASI items on past 30-day use had to be negative. Self-report measures of drug and alcohol use can be accurate (Midanik 1988; Chermack *et al.* 1998), and this has been found for older adults as well, based on comparison of self-report and collateral sources (Tucker *et al.* 1991). Patient self-reported abstinence in our sample at 6 months was validated with urinalysis and breathalyzer testing (Weisner *et al.* 2000b).

To measure stability of abstinence, we also asked patients to report longest period of abstinence in the previous 5 years and whether they were abstinent during the entire previous year. To assess heavy episodic drinking, we asked non-abstinent patients (those who reported drinking in the previous year) if they had had five or more drinks in one day in the prior year (yes/no), and how frequently they did so (four categories from once a month or less, to four or more times per week).

Patients' ASI medical scores at 5 years were used to measure health status. Patients were also asked 'in general, would you say your health is excellent, very good, good, fair or poor', and responses scored from 1 to 5. This measure is predictive of future health care utilization (Bierman *et al.* 1999) as well as morbidity (Weisen *et al.* 1999) and mortality (Idler & Benyamini 1997; Burstrom & Fredlund 2001). We also asked patients if they had smoked any cigarettes in the previous month. Because smoking is associated with numerous health problems, we included it as a proxy measure of health status. Smoking cessation was encouraged in the CD program, but was not included as a treatment component.

We used the ASI measure of whether patients had experienced a significant period of serious anxiety or depression in the previous month (two yes/no questions) not resulting from drug or alcohol use to measure mood status at follow-up.

Procedures

All patients completed in-person baseline interviews at intake. One-hour interviews were conducted by research staff. Interviewers explained the treatment options, asked participants to accept random assignment, and obtained informed consent. Research staff conducted follow-up telephone interviews from the Division of Research, Oakland, 5 years after the 8-week rehabilitation phase of treatment on all individuals who completed baseline interviews.

Data analyses

Participants were divided into three age groups: under 40, 40–54 and 55 and over at baseline. These categories are comparable to those used in previous studies (Lemke & Moos 2003; Satre *et al.* 2003). We examined mortality and follow-up participation rates by age, using χ^2 tests. We used baseline alcohol ASI scores to compare patients who were deceased to those not deceased at 5 years as an indicator of possible alcohol-related mortality, using the *t*-test. Age effects were examined using χ^2 tests of significance for categorical variables, with *post-hoc* χ^2 tests. Overall differences in 5-year abstinence by substance dependence diagnosis were examined; because most older patients were alcohol-dependent (80%) or did not meet dependence criteria (15%), we tested abstinence rates by age group in these two categories.

We used univariate analysis of variance (ANOVA) for continuous variables, with *post-hoc* Dunnett's tests to examine differences between discrete age groups. No adjustments were made for multiple comparisons (Rothman 1990). Analysis of patient outcome was conducted on all participants from the baseline sample who were followed, regardless of whether patient-started treatment or length of stay. The relationship of randomization status to 30-day abstinence was examined using χ^2 tests. ASI composite scores at 5 years were compared by age using ANOVA.

The effect of individual, treatment and extra-treatment factors on abstinence during the preceding month was examined using logistic regression. To determine variables to include in the analysis we tested the individual, treatment, and extra treatment factors that had significant age group differences ($P < 0.05$), for their association with abstinence at 5 years, using ANOVA and χ^2 tests. Factors associated with older age group as well as abstinence were included in the regression model. Treatment condition (day hospital) was included as a dichotomous variable in the model, to control for possible effect of greater treatment intensity.

Due to the small number of women in the older age group ($n = 17$), analyses by gender were limited to our

primary outcome measure (abstinence) using χ^2 tests. However, because the abstinence rate among older women was substantially higher than that of older men and younger women, we conducted *post-hoc* analyses to investigate why older women had the highest abstinence rates. To do so, we used χ^2 and *t*-tests to examine gender differences on key variables (those that were associated with abstinence) in the older adult group.

RESULTS

Participants in the 5-year follow-up

Of the baseline sample of 1204, 77% completed the 5-year follow-up interview ($N = 925$). Individuals who did not respond to the 5-year interview were more likely to be male and to have low incomes at baseline, and were less likely to have begun treatment (Weisner *et al.* 2003). Before controlling for mortality, there were no significant differences in 5-year participation rate by age group (73% of older, 78% of middle-aged and 77% of younger adults who completed the baseline sample). However, these percentages were related differentially to mortality. Based on KP records, mortality rates at 5 years were 11% of older adults ($n = 10$), 5% of middle-aged adults ($n = 19$) and 1% of younger adults ($n = 8$), χ^2 (2, $N = 1204$) = 34.4, $P < 0.001$. In the sample as a whole, baseline ASI alcohol score was significantly higher among deceased patients (mean = 0.625, SD = 0.26) than those not deceased at 5 years (mean = 0.442, SD = 0.32), $t = 3.4$, $P < 0.001$. Among deceased patients there was no age difference in baseline alcohol score. When participation rates were calculated based on the sample still living at 5 years, 82% of older adults, 82% of middle-aged adults and 78% of younger adults were participants (not significant).

Individual characteristics by age group

At baseline patients ranged in age from 18 to 77, with a mean age of 37.1 (SD = 10.8). In the older group, there were 39 patients aged 55–60, 17 patients aged 61–65, seven patients aged 66–70 and two patients aged 71–77. Table 1 shows results of age group comparisons in demographic characteristics and dependence diagnosis. Older adults were more likely to be diagnosed with alcohol dependence than either middle-aged adults or younger adults, and less likely to be diagnosed with drug dependence or combined drug and alcohol dependence ($P < 0.01$).

Treatment

Significant overall age differences were found for length of stay in treatment (Table 1). Older adults stayed in treat-

Table 1 Baseline demographic characteristics, substance diagnoses and treatment measures by age group.

	Age group at baseline (years)			F or χ^2
	18–39 (n = 564)	40–54 (n = 296)	55 + (n = 65)	
Age at baseline (mean and SD)	30.4 (6.3)	45.1 (3.8)	61.6 (6.0)	
Gender (%)				7.2**
Male	61	69	74	
Female	39	31	26	
Ethnicity (%)				21.7**
White	74	73	92 ^{ab}	
Black	11	16	2	
Hispanic	10	9	3	
Other	5	2	3	
Education (%)				57.8***
Some college	17	40	35	
High school	65	53	52	
<High school	17	8	13	
Employed	56	65	33 ^{ab}	22.8***
Income (% earning > 40 K)	40	56	48	20.2***
Abstinence goal (%)	70	80	78	9.0*
Dependence diagnosis (%)				
Alcohol only	29	60	80 ^{ab}	117.4***
Drug only	40	14	3 ^{ab}	87.6***
Alcohol and drug	22	13	2 ^{ab}	22.2***
Criteria not met	10	14	15	NS
Length of stay (weeks)	6.2 (11.5)	11.4 (16.7)	12.4 (18.4)	16.8***
Readmitted (%)	39	43	31	NS

n = 912–925. Significance of overall group differences was tested using chi-square and ANOVA. Results of post-hoc age group comparisons: ^asignificantly different from younger; ^bsignificantly different from middle-aged ($P < 0.01$). * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

ment longer than the younger adult group, $P = 0.03$. There were no differences in the percentage of patients readmitted between the initial treatment episode and 5-year follow-up.

Extra-treatment factors

Table 2 shows the results of age group comparisons of social networks, marital status and recovery support. Older adults reported fewer close friends than either younger adults, $P < 0.001$ or middle-aged adults, $P = 0.001$. Older adults were less likely than younger adults to report having family or friends who encouraged use (8% versus 17%), $P = 0.04$. Age group differences were found in marital status, with older adults more likely to be married than younger adults, $P = 0.002$.

Measures of 12-Step affiliation are reported in Table 2. There was no age effect on the AA Affiliation Scale score. However, older adults were less likely than middle-aged adults to have ever considered themselves a member of a 12-Step group, $P = 0.015$. Only 19% of older adults reported ever having called a 12-Step member for help in recovery versus 42% of middle-aged adults, $P < 0.001$

and 47% of younger adults, $P < 0.001$. Age differences were found in KP membership at 5 years (91% of older adults, 80% of middle-aged adults and 59% of younger adults), $P < 0.001$.

Outcomes

Table 3 shows 5-year outcomes of the sample by age. Older adults were more likely than younger adults to report abstinence from alcohol and drugs during the preceding month, $P = 0.04$. Older adults were also more likely than younger adults to report abstinence during the preceding year, $P = 0.02$. Among those who reported drinking in the previous year ($N = 559$), 62% reported heavy episodic drinking (five or more drinks in one day), with no age difference in occurrence (yes/no) or frequency.

Baseline diagnostic groups had differing rates of 30-day abstinence (total abstinence from alcohol and drugs) at 5 years; 50% of alcohol-dependent only, 40% of drug-dependent, 37% of alcohol- and drug-dependent and 40% those who did not meet dependence criteria, $\chi^2 (3, N = 917) = 11.08, P = 0.011$. Among patients with base-

Table 2 Extra-treatment support factors at 5 years, by age group (*n* = 925).

	Age group at baseline (years)			F or χ^2
	18–39 (<i>n</i> = 564)	40–54 (<i>n</i> = 296)	55 + (<i>n</i> = 65)	
Number of close friends	5.2 (5.5)	5.1 (7.1)	3.0 (3.3) ^{ab}	4.1*
Number of practical helpers	6.9 (6.8)	7.2 (8.7)	6.8 (10.8)	NS
Number of recovery helpers	8.2 (11.0)	8.6 (12.7)	5.4 (7.5)	NS
Anyone encourage you to drink/use (%)	17	12	8	7.2*
Married or living as married (%)	39	54	59 ^a	24.5***
AA Affiliation Scale	2.9 (2.7)	3.1 (2.7)	2.3 (2.5)	NS
Ever been a 12-Step member (%)	58	66	50	7.8*
Ever called 12-Step for help (%)	47	42	19 ^{ab}	19.1***
Number of 12-Step meetings attended in past year	88.8 (96.0)	93.2 (99.1)	60.6 (77.4)	NS
Current Kaiser insurance (%)	59	80	91 ^a	55.6***

Analysis of 'number of 12-Step meetings' includes only participants who reported attending one or more meetings in the previous year (*n* = 319). Results of post-hoc age group comparisons: ^asignificantly different from younger group, ^bsignificantly different from middle-aged group (*P* < 0.01). **P* < 0.05, ****P* < 0.001.

Table 3 Five-year outcomes by age group (*n* = 925).

	Age group at baseline (years)			χ^2 or F
	18–39 (<i>n</i> = 564)	40–54 (<i>n</i> = 296)	55 + (<i>n</i> = 65)	
Longest period of total abstinence, in days	486 (476)	562 (502)	699 (647)	5.0**
Total abstinence in previous year (%)	29	42	42	16.8***
Total abstinence in previous 30 days (%)	40	49	52	8.8*
Men (%)	37	45	43	NS
Women (%)	44	57	81 ^a	10.7**
Addiction Severity Index				
Alcohol	0.087 (0.14)	0.086 (0.16)	0.084 (0.14)	NS
Drug	0.018 (0.04)	0.008 (0.02)	0.008 (0.02)	NS
Medical	0.177 (0.31)	0.222 (0.34)	0.222 (0.34)	NS
Legal	0.016 (0.08)	0.001 (0.01)	0.000 (0.00) ^a	6.4**
Family/social	0.118 (0.19)	0.064 (0.14)	0.046 (0.11) ^a	12.7***
Psychiatric	0.173 (0.21)	0.162 (0.02)	0.145 (0.18)	NS
Self-reported health	2.52 (0.96)	2.78 (1.04)	2.97 (1.03) ^a	10.6***
Smoked cigarettes in past 30 days (%)	56	44	37 ^a	16.7***
Serious anxiety in past 30 days (%)	38	31	28	NS
Serious depression in past 30 days (%)	25	25	23	NS

n = 913–925. Self-reported health was measured on a scale from 1 (excellent) to 5 (poor). ASI age group differences were tested using ANOVA. Results of post-hoc age group comparisons: ^asignificantly different from younger group, ^bsignificantly different from middle-aged group (*P* < 0.01). **P* < 0.05, ***P* < 0.01, ****P* < 0.001.

line diagnosis of alcohol dependence only (*N* = 382), 52% of older and middle-aged adults and 47% of younger adults were abstinent (not significant). Among patients who did not meet dependence criteria (*N* = 107), 60% of older adults, 49% of middle-aged adults and 30% of younger adults were abstinent (not significant).

Table 3 shows age comparisons for ASI composite scores at 5 years. Significant age effects were found for legal and family/social scales. Older adults reported worse health and were less likely to report smoking cigarettes in the previous 30 days than younger adults

(*P* < 0.01). Because our sample included both randomized and non-randomized participants, we examined differences between these two groups at 5 years. Forty-four per cent of randomized and 43% of non-randomized patients were abstinent (not significant).

Variables associated independently with abstinence

To test our model, we examined effects of individual, treatment and extra-treatment characteristics on 30-day abstinence at 5 years, using logistic regression analysis

(Table 4). Variables selected were components of our model that had significant age bivariate differences and were associated with abstinence at 5 years. These variables were significantly associated with abstinence at 5 years, using χ^2 or one-way ANOVA analyses (not shown): female gender ($P = 0.003$), baseline dependence diagnosis ($P = 0.011$), longer treatment retention ($P < 0.001$); and being married ($P = 0.010$), health plan membership ($P = 0.01$) and not having any friends or family who encouraged alcohol or drug use at 5 years ($P < 0.001$). These variables, age group and gender were entered into a single model. Age group was not significant. Significant variables were female gender, greater treatment retention and having no close family or friends who encouraged alcohol or drug use at 5 years. For the overall model, $\chi^2 (11, N = 914) = 88.14, P < 0.001$, Cox & Snell pseudo- $R^2 = 0.09, P < 0.001$.

Analysis of gender differences

Older women were more likely to be abstinent than older men, $\chi^2 (1, N = 65) = 7.2, P = 0.007$. Within gender, there were differences in effect of age group on 30-day abstinence. Older women were also more likely to be abstinent than younger women, $\chi^2 (1, N = 233) = 8.2, P = 0.004$; but when only men were analyzed, there was no age effect (Table 3). Because of this striking gender difference, we conducted *post-hoc* analyses of older adults by gender to test potential explanations using χ^2 and *t*-tests. We caution that the small number of older women ($n = 17$) resulted in limited power. Older women stayed in treatment for 20.7 weeks ($SD = 22.8$) versus 9.5 weeks ($SD = 15.8$) for older men, $t = 2.2 (65)$,

$P = 0.03$. Mortality rates were 5% for older women and 13% for older men (not significant). Among older adults there were no gender differences in baseline substance diagnosis, AA Affiliation scale score, marital status, number of close friends, self-reported health, Kaiser membership at 5 years, or in whether or not they had a close friend or family member that encouraged drug use at 5 years.

DISCUSSION

This study examined 5-year outcomes of older, middle-aged and younger adults in a private, non-profit managed care program that has integrated medical and behavioral health treatment. Abstinence rates of older adults were higher than those of younger adults, although age differences were not found among participants dependent only on alcohol. These results are generally consistent with previous studies that have found that older adults in mixed-aged treatment settings have short-term outcomes as good or better than those of younger adults (Oslin *et al.* 2002; Satre *et al.* 2003). Mortality findings, which showed increased mortality with age, have also been found in public samples (Moos, Brennan & Mertens 1994; Lemke & Moos 2003). Mortality rates in our sample were lower than those found in these studies, across all three age groups, possibly because health plan records used to determine mortality in our study excluded those patients who had left the health plan and could not be located at the 5-year follow-up and because this is an insured population which perhaps has had more access to health care.

Table 4 Summary of logistic regression analysis for variables associated with 30-day abstinence from alcohol and drugs, 5 years following treatment ($n = 914$).

Variable	OR	95% CI
Individual characteristics		
Age group (older versus younger)	1.18	(0.65, 2.14)
Age group (middle versus younger)	1.11	(0.80, 1.50)
Gender (female versus male)**	1.51	(1.13, 2.02)
Alcohol dependence (versus alcohol and drug dependence)	1.43	(0.95, 2.17)
Drug dependence (versus alcohol and drug dependence)	1.13	(0.74, 1.73)
Dependence criteria not met (versus alcohol and drug dependence)	0.87	(0.51, 1.49)
Treatment		
Length of stay (weeks)***	1.03	(1.02, 1.04)
Greater treatment intensity	1.15	(0.87, 1.52)
Extra-treatment factors		
Health plan membership	1.16	(0.85, 1.57)
Married	1.17	(0.88, 1.55)
No friends or family that encourage drinking or drug use***	3.01	(1.97, 4.67)

All extra-treatment factors were measured at 5-year follow-up. 'Health plan membership' indicates Kaiser membership. The logistic regression analysis eliminates cases with missing data on any predictor. For the overall model, $\chi^2 (11, N = 914) = 88.14, P < 0.001$, Cox & Snell pseudo- $R^2 = 0.09, P < 0.001$. ** $P < 0.01$, *** $P < 0.001$.

We tested a model that included individual, treatment and extra-treatment characteristics of older adults to examine how age affects abstinence, and to inform strategies to support long-term recovery among older adults. Age was not a significant predictor of abstinence once substance diagnosis, gender, treatment retention and social networks were considered. Staying longer in treatment and not having friends who encourage alcohol or drug use were the most important of these factors.

Previous studies have found that longer treatment duration leads to better outcome (Gottheil, McLellan & Druley 1992) and that older adults often remain longer in treatment (Schuckit 1977; Wiens *et al.* 1982). We also found that older adults had longer treatment retention than younger adults (Satre *et al.* 2003). Although the odds ratio is very small, the finding that length of stay is associated independently with abstinence at 5 years suggests that persistence in treatment has long-lasting benefits.

It is important that older adults have adequate support following treatment. Particularly in older subgroups, social networks may be reduced as a result of physical limitations and loss of family members and friends. However, in our relatively young sample of older adults, patients reported fewer family problems and were more likely to be married than the younger adult group. Higher rates of continued health plan coverage and lower scores on the family/social ASI scale may be indicative of better social stability. Most significantly, less likelihood of having any family members or friends who encourage alcohol or drug use is an advantage of older adults in the sample.

Age findings on 12-Step affiliation measures were mixed. On items that appear to signify greater depth of involvement, older adults scored lower. In contrast, a study of male veterans found that older adults were equally involved as younger and middle-aged adults in 12-Step groups 2 years following in-patient treatment (Lemke & Moos 2003). Less reliance on 12-Step groups among older adults, if replicated, is associated potentially with practical barriers to meeting attendance, developmental changes in social interaction with age or greater reliance on a marital partner. The oldest of the older adult group may lack transportation, have physical disabilities or feel uncomfortable attending meetings in the evening. This group also tends to have smaller social networks than younger adults, yet report comparable satisfaction from network size and quality (Lansford, Sherman & Antonucci 1998). They may be less interested than younger adults in expanding networks (Carstensen, Gross & Fung 1998). However, 12-Step groups are potentially less useful for individuals uncomfortable sharing personal information in large or anonymous groups

(Galaif & Sussman 1995). It is possible that older adults may benefit from smaller groups, or groups that focus on older adult issues. Alternatively, older adults may benefit from mobilizing existing social networks to support recovery.

We identified variables likely to contribute to the effect of gender on outcome, such as greater treatment retention among older women than older men. Previous analysis of the entire sample found that women attended more 12-Step meetings prior to 5-year follow-up, and were more likely to have family or friends supporting their efforts to reduce substance use (Weisner *et al.* 2003). Therefore, the older women in this sample may have several characteristics contributing to abstinence, associated with being both older and female.

Limitations of the study

On some measures, differences between older and middle-aged adults were not significant, despite apparent linear trends in the data (e.g. marital status, current Kaiser Permanente insurance, 12-Step affiliation, self-reported health). Significance testing may have been limited by the small sample size of the older group relative to the other age groups. Therefore, our results may underestimate some differences between older and middle-aged adults. While we did not adjust significance level for multiple comparisons in the study (Rothman 1990), we note that use of multiple comparisons increases the odds of Type I error (false positive results) in the analyses.

Mortality in the sample was associated with greater baseline alcohol problem scores, suggesting that alcohol problems may have contributed to cause of death. As a result, it is possible that age group differences in mortality may have influenced the higher abstinence outcome rate observed among older adults compared with younger adults.

An additional issue is inclusion of both randomized and non-randomized patients in our study. Because our intent was to be representative of the population entering treatment, we also recruited those unable or unwilling to be randomized for all study procedures. Those not randomized were assigned to treatment condition by usual practice. In the original 6-month outcome study, we found that among non-randomized patients, better outcomes resulted in the day hospital versus out-patient treatment condition (Weisner *et al.* 2000b), although these differences were no longer found at the 5-year follow-up. Importantly, randomization status did not differ by age group. However, inclusion of both randomized and non-randomized patients in each treatment condition may result in variability in patient motivation, employer pressure and other factors within treatment conditions (Weisner *et al.* 2000b). Therefore, we examined the

relationship of randomization status to outcome at 5 years, and found no relationship.

Long-term drug and alcohol treatment outcome of older adults has been under-investigated, in spite of prominent arguments for its importance (Institute of Medicine 1990; Blow *et al.* 2000). The under-representation of older adults in typical treatment programs has contributed to the difficulty of developing a body of research to address this gap in the literature (Booth *et al.* 1992). Therefore, the current study makes an important addition to understanding treatment in this population.

While the focus of this study is on older adults, it should be noted that the percentage of older adults in the sample is small (7%) and that the older sample includes those as young as age 55. Therefore, results may not generalize to older subgroups within the elderly population (such as adults in their 70s and older) who may differ in areas such as health status and the proportion retired. In future studies, it will be important to utilize larger samples in which the differences between older and younger subgroups could be examined.

The study examined understudied populations, including privately insured individuals, older adults and women in a large treatment sample with a high long-term follow-up rate. Although individuals in privately insured samples, such as this one, may have lower levels of problem severity than those in public samples, it is important to examine this population since private programs represent the predominant mode of US chemical dependency treatment.

The gender composition of the sample represents an improvement over previous treatment studies of older adults, which with few exceptions have been based on all-male samples (Rice *et al.* 1993; Blow *et al.* 2000). The small number of older women in our sample made extensive gender comparisons unfeasible; differences that were found should be generalized with caution, yet the large gender difference in abstinence within the older adult group is intriguing. Length of stay appears to play a role in better outcomes among older women. Further study is clearly needed to examine treatment of older women in order to understand factors contributing to recovery. Analysis of larger samples would also be useful to investigate whether better outcome with age occurs only in women, or if this finding applies to men as well.

CONCLUSIONS

This study examined long-term treatment outcome of older adults compared with middle-aged and younger adults in a managed care chemical dependency program. Good outcome of older adults 5 years after treatment, especially among older women, is a welcome finding.

These results should provide strong impetus to health and social service providers to encourage older adults to seek chemical dependency treatment. Results also support development of more effective ways to engage older patients who may be reluctant to seek treatment. Our results identify factors contributing to abstinence 5 years after receiving treatment, including domains in which older adults may require assistance. In particular, future studies should investigate potential sources of extra-treatment support such as social networks and 12-Step groups, to maximize treatment success in this growing population.

Acknowledgements

This study was funded by the National Institute on Alcohol Abuse and Alcoholism (R37 AA10359) and the National Institute on Drug Abuse (R01 DA10572). The first author was supported by a National Institute on Drug Abuse training grant (T32 DA07250) and center grant (P50 DA09253). The authors wish to thank G. Thomas Ray MBA and Andy Avins MD for comments on the manuscript, and Agatha Hinman BA for editorial assistance.

References

- American Psychiatric Association (2000) *Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR (Text Revision)*. Washington, DC: American Psychiatric Association.
- Beresford, T. P. (1995) Alcoholic elderly: prevalence, screening, diagnosis, and prognosis. In: Beresford, T.P. & Gomberg, E.S., eds. *Alcohol and Aging*, pp. 3–18. New York: Oxford University Press.
- Bierman, A. S., Bubolz, T. A., Fisher, E. S. & Wasson, J. H. (1999) How well does a single question about health predict the financial health of Medicare managed care plans? *Effective Clinical Practice*, 2, 56–62.
- Blow, F. C., Cook, C. A., Booth, B. M., Falcon, S. P. & Friedman, M. J. (1992) Age-related psychiatric comorbidities and level of functioning in alcoholic veterans seeking out-patient treatment. *Hospital and Community Psychiatry*, 43, 990–995.
- Blow, F. C., Walton, M. A., Chermack, S. T., Mudd, S. A. & Brower, K. J. (2000) Older adult treatment outcome following elder-specific inpatient alcoholism treatment. *Journal of Substance Abuse Treatment*, 19, 67–75.
- Booth, B. M., Blow, F. C., Cook, C. A., Bunn, J. Y. & Fortney, J. C. (1992) Age and ethnicity among hospitalized alcoholics: a nationwide study. *Alcoholism: Clinical and Experimental Research*, 16, 1029–1034.
- Burstrom, B. & Fredlund, P. (2001) Self rated health: is it as good a predictor of subsequent mortality among adults in lower as well as in higher social classes? *Journal of Epidemiology and Community Health*, 55, 836–840.
- Carstensen, L. L., Gross, J. J. & Fung, H. H. (1998) The social context of emotional experience. In: Schaie, K.W. & Lawton, M.P., eds. *Annual Review of Gerontology and Geriatrics*, vol. 17, pp. 325–352. New York: Springer.

- Chermack, S. T., Singer, K. & Beresford, T. P. (1998) Screening for alcoholism among medical inpatients: how important is corroboration of patient self-report? *Alcoholism: Clinical and Experimental Research*, **22**, 1393–1398.
- Doll, R., Peto, R., Hall, E., Wheatley, K. & Gray, R. (1994) Mortality in relation to consumption of alcohol: 13 years' observations on male British doctors. *BMJ*, **309**, 911–918.
- Edmunds, M., Frank, R., Hogan, M., McCarty, D., Robinson-Beale, R. & Weisner, C. (1997) *Managing Managed Care: Quality Improvement in Behavioral Health*. Washington, DC: National Academy Press.
- Galaif, E. R. & Sussman, S. (1995) For whom does Alcoholics Anonymous work? *International Journal of the Addictions*, **30**, 161–184.
- Gfroerer, J., Penne, M., Pemberton, M. & Folsom, R. (2003) Substance abuse treatment need among older adults in 2020: the impact of the aging baby-boom cohort. *Drug and Alcohol Dependence*, **69**, 127–135.
- Gottheil, E., McLellan, A. T. & Druley, K. A. (1992) Length of stay, patient severity and treatment outcome: sample data from the field of alcoholism. *Journal of Studies on Alcohol*, **53**, 69–75.
- Hser, Y.-I., Anglin, M. D., Grella, C., Longshore, D. & Prendergast, M. L. (1997) Drug treatment careers: a conceptual framework and existing research findings. *Journal of Substance Abuse Treatment*, **14**, 543–558.
- Humphreys, K., Kaskutas, L. A. & Weisner, C. (1998) The Alcoholics Anonymous Affiliation Scale: development, reliability, and norms for diverse treated and untreated populations. *Alcoholism: Clinical and Experimental Research*, **22**, 974–978.
- Idler, E. L. & Benyamini, Y. (1997) Self-rated health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior*, **38**, 21–37.
- Institute of Medicine (1990) *Broadening the Base of Treatment for Alcohol Problems*. Washington, DC: National Academy Press.
- Kaskutas, L. A. (1995) *Social Network Assessment in Alcohol Treatment*. Berkeley, CA: Alcohol Research Group.
- Kerr, W. C., Fillmore, K. M. & Bostrom, A. (2002) Stability of alcohol consumption over time: evidence from three longitudinal surveys from the United States. *Journal of Studies on Alcohol*, **63**, 325–333.
- Lansford, J. E., Sherman, A. M. & Antonucci, T. C. (1998) Satisfaction with social networks: an examination of socioemotional selectivity theory across cohorts. *Psychology and Aging*, **13**, 544–552.
- Lemke, S. & Moos, R. H. (2003) Outcomes at 1 and 5 years for older patients with alcohol use disorders. *Journal of Substance Abuse Treatment*, **24**, 43–50.
- McLellan, A. T., Kushner, H., Metzger, D., Peters, R., Smith, I., Grissom, G., Pettinati, H. & Argeriou, M. (1992) The 5th edition of the Addiction Severity Index. *Journal of Substance Abuse Treatment*, **9**, 199–213.
- McLellan, A. T., Luborsky, L., Cacciola, J., Griffith, J., Evans, F., Barr, H. L. & O'Brien, C. P. (1985) New data from the Addiction Severity Index: reliability and validity in three centers. *Journal of Nervous and Mental Disease*, **173**, 412–423.
- Mertens, J. R. & Weisner, C. M. (2000) Predictors of substance abuse treatment retention among women and men in an HMO. *Alcoholism: Clinical and Experimental Research*, **24**, 1525–1533.
- Midanik, L. T. (1988) Validity of self-reported alcohol use: a literature review and assessment. *British Journal of Addiction*, **83**, 1019–1029.
- Moos, R. H., Brennan, P. L. & Mertens, J. R. (1994) Mortality rates and predictors of mortality among late-middle-aged and older substance abuse patients. *Alcoholism: Clinical and Experimental Research*, **18**, 187–195.
- Moos, R. H., Mertens, J. R. & Brennan, P. L. (1993) Patterns of diagnosis and treatment among late-middle-aged and older substance abuse patients. *Journal of Studies on Alcohol*, **54**, 479–487.
- National Institute on Alcohol Abuse and Alcoholism (2000) 10th Special Report to the U.S. Congress on Alcohol and Health, Highlights From Current Research, June 2000. Washington: Government Printing Office.
- Oslin, D. W., Pettinati, H. & Volpicelli, J. R. (2002) Alcoholism treatment adherence: older age predicts better adherence and drinking outcomes. *American Journal of Geriatric Psychiatry*, **10**, 740–747.
- Osterling, A. & Berglund, M. (1994) Elderly first time admitted alcoholics: a descriptive study on gender differences in a clinical population. *Alcoholism: Clinical and Experimental Research*, **18**, 1317–1321.
- Rice, C., Longabaugh, R., Beattie, M. & Noel, N. (1993) Age group differences in response to treatment for problematic alcohol use. *Addiction*, **88**, 1369–1375.
- Rothman, K. J. (1990) No adjustments are needed for multiple comparisons. *Epidemiology*, **1**, 43–46.
- Satre, D. D., Mertens, J., Areán, P. A. & Weisner, C. (2003) Contrasting outcomes of older versus middle-aged and younger adult chemical dependency patients in a managed care program. *Journal of Studies on Alcohol*, **64**, 520–530.
- Satre, D. D., Mertens, J. R. & Weisner, C. (2004) Gender differences in older adult treatment outcomes for alcohol dependence. *Journal of Studies on Alcohol*, in press.
- Schmidt, L. & Weisner, C. (1993) Developments in alcoholism treatment. In: Galanter, M., ed. *Recent Developments in Alcoholism*, vol. 11, pp. 369–396. New York: Plenum Press.
- Schuckit, M. A. (1977) Geriatric alcoholism and drug abuse. *Gerontologist*, **17**, 168–174.
- Selby, J. V. (1997) Linking automated databases for research in managed care settings. *Annals of Internal Medicine*, **127**, 719–724.
- Tucker, J. A., Vuchinich, R. E., Harris, C. V., Gavornik, M. G. & Rudd, E. J. (1991) Agreement between subject and collateral verbal reports of alcohol consumption in older adults. *Journal of Studies on Alcohol*, **52**, 148–155.
- Vaillant, G. E. (1996) A long-term follow-up of male alcohol abuse. *Archives of General Psychiatry*, **53**, 243–249.
- Wannamethee, G. & Shaper, A. G. (1988) Changes in drinking habits in middle-aged British men. *Journal of the Royal College of General Practitioners*, **38**, 440–442.
- Weisen, S. F., Frishman, W. H., Aronson, M. K. & Wassertheil-Smoller, S. (1999) Self-rated health assessment and development of both cardiovascular and dementing illnesses in an ambulatory elderly population: a report from the Bronx Longitudinal Aging Study. *Heart Disease*, **1**, 201–205.
- Weisner, C., McLellan, A. T. & Hunkeler, E. M. (2000a) Addiction Severity Index data from general membership and treatment samples of HMO members: one case of norming the ASI. *Journal of Substance Abuse Treatment*, **19**, 103–109.
- Weisner, C., Mertens, J., Parthasarathy, S., Moore, C., Hunkeler, E. M., Hu, T.-W. & Selby, J. V. (2000b) The outcome and cost of alcohol and drug treatment in an HMO: day hospital versus traditional out-patient regimens. *Health Services Research*, **35**, 791–812.

- Weisner, C., Mertens, J., Parthasarathy, S., Moore, C. & Lu, Y. (2001a) Integrating primary medical care with addiction treatment: a randomized controlled trial. *Journal of the American Medical Association*, **286**, 1715–1723.
- Weisner, C., Mertens, J., Tam, T. & Moore, C. (2001b) Factors affecting the initiation of substance abuse treatment in managed care. *Addiction*, **96**, 705–716.
- Weisner, C., Ray, G. T., Mertens, J. R., Satre, D. D. & Moore, C. (2003) Short-term alcohol and drug treatment outcomes predict long-term outcome. *Drug and Alcohol Dependence*, **71**, 281–294.
- Wiens, A. N., Menustik, C. E., Miller, S. I. & Schmitz, R. E. (1982) Medical-behavioral treatment of the older alcoholic patient. *American Journal of Drug and Alcohol Abuse*, **9**, 461–475.