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Rudolf H. Moos and Bernice S. Moos

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Treated and Untreated Alcohol-Use Disorders

Course and Predictors of Remission and Relapse

Rudolf H. Moos

Bernice S. Moos

Department of Veterans Affairs and Stanford University

The research described here focused on personal, life context, and help-related factors to trace the long-term course of treated and untreated alcohol-use disorders. A group of 461 individuals who sought help for alcohol problems was surveyed at baseline and 1, 3, 8, and 16 years later. Compared with individuals who remained untreated, individuals who entered treatment and/or Alcoholics Anonymous (AA), and participated in these modalities for a longer interval, were more likely to attain remission. Personal resources associated with social learning, stress and coping, behavior economic, and social control theories predicted the maintenance of remission.

Keywords: *alcohol; remission; relapse, treatment; Alcoholics Anonymous*

Although there is an extensive literature on the predictors and outcome of treatment for alcohol-use disorders (Finney, Wilbourne, and Moos 2007), at least three salient issues remain unresolved. One issue is that many of the patients involved in outcome evaluations have had one or more prior episodes of treatment. Therefore, estimates of treatment effects are based largely on studies of individuals who have not responded to prior episodes of care or have relapsed. When individuals first initiate help-seeking for an alcohol disorder, what proportion actually obtain treatment or join a self-help group and how long do these initial episodes of help last? Does more extended participation in treatment or a self-help group lead to a higher likelihood of short-term and/or long-term remission?

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A second issue involves “spontaneous” remission, a phenomenon Lemere (1953) recognized more than 50 years ago. It is widely recognized that natural recovery (i.e., the resolution of alcohol problems without professional treatment or participation in organized self-help groups) is a frequent path to remission (Tucker 2002; Watson and Sher 1998). The prevalence of natural recovery has raised two compelling questions: Do individuals who obtain alcoholism treatment or participate in self-help groups experience better outcomes than comparable individuals who do not? Is remission more stable among individuals who have participated in treatment or self-help groups than among individuals who have remitted without these sources of help?

A third issue reflects the fact that much of the prior work on predictors of remission and relapse has been bereft of theory. This has led to many predictors of the likelihood and course of remission, but few consistent findings integrated within a theoretical perspective. Can theories about protective factors that reduce the likelihood of developing an alcohol or drug use disorder help understand the process of remission? Do personal and social resources that reflect four prevalent theories about the initiation and growth of alcohol use (social learning, stress and coping, behavior economic, and social control theory) predict remission and relapse?

Each of these points needs to be examined within a life-course perspective. One key transition in the course of an alcohol use disorder is marked by recognition that alcohol use is a problem and by initiation of a search for help. A related transition involves obtaining help by entering treatment or participating in a 12-step self-help group such as Alcoholics Anonymous (AA). The ebb and flow of risk and protective factors then affects transitions into and out of problematic alcohol use. To focus on these issues, we conducted a 16-year prospective study of individuals with alcohol use disorders who, at baseline, had never been in treatment before. At five assessment occasions over a 16-year interval, we obtained information about these individuals’ personal and social resources, participation in treatment and AA, and remission and relapse.

Participation in Treatment and AA and Remission

Patients with substance use disorders who receive extended episodes of outpatient care tend to experience better outcomes and are more likely to achieve remission than do patients who have outpatient care for a shorter interval (Moos et al. 2000; Ritsher, Moos, and Finney 2002). However, these findings apply primarily to short-term outcomes and to individuals

with severe and chronic substance use disorders, many of whom likely need longer episodes of care. Individuals who have less chronic disorders may respond more quickly and experience good outcomes with brief treatment (Moyer et al. 2002).

Turning to 12-step self-help groups, patients who attend more group meetings in the first year after treatment tend to have better subsequent outcomes than do patients who are less involved in such groups (Kissin, McLeod, and McKay 2003; Gossop et al. 2003; Witbrodt and Kaskutas 2005). In Project MATCH, more frequent participation in AA in the first 3 months after treatment was associated with a higher likelihood of subsequent abstinence (Tonigan, Connors, and Miller 2003). These findings are important; however, prior studies have not focused on individuals early in their help-seeking careers and have not separated the influence of self-help from that of treatment. To consider these issues, we examined the relationship between the duration of participation in treatment and AA and short- and long-term remission.

Natural and Treated Remission and Relapse

Short-term remission rates vary between 20 and 50% among treated individuals, depending on the severity of their disorder and the criteria for remission (Miller, Walters, and Bennett 2001). Initial studies in this area suggested that between 5 and 45% of untreated individuals with alcohol-use disorders may achieve some improvement or remission (Roizen, Cahalan, and Shank 1978). In a subsequent review, Cunningham (1999) estimated that untreated remission rates ranged from 50 to 80% or more, depending on the severity of alcohol problems. However, these studies focused primarily on individuals who had less severe and as yet unrecognized alcohol problems and had not yet initiated help seeking.

Much less is known about the likelihood of relapse among individuals who achieve short-term remission. Estimated long-term relapse rates in treated samples have varied between 20 and 80% (Finney, Moos, and Timko 1999; Jin et al. 1998). However, there is relatively little prospective information about relapse rates for individuals who achieve short-term remission without participation in treatment or AA. To address these issues, we compared 3-year remission rates and subsequent 16-year relapse rates for individuals who did versus those who did not enter treatment or AA in the first year after seeking help.

Theory-Based Protective Resources and Long-Term Remission

Four related theories have been applied to identify personal and social resources that protect individuals against the initiation and development of substance use problems and may facilitate their resolution. These four theories are social learning theory, stress and coping theory, behavioral economics, and social control theory. They highlight social processes that appear to lessen the likelihood that individuals will develop substance use disorders and that may underlie effective psychosocial treatments for these disorders (Moos 2006, 2007).

According to social learning theory, substance use originates in the substance-specific attitudes and behaviors of the adults and peers who serve as an individual's role models. Modeling effects begin with observation and imitation of substance-specific behaviors, continue with social reinforcement for and expectations of positive consequences from substance use, and culminate in substance use and misuse. In contrast, anti-use attitudes and behaviors of adults and peers who serve as role models appear to protect individuals from substance use (Bandura 1997; Maisto, Carey, and Braddizza 1999).

Stress and coping theory posits that life stressors stemming from family members and friends, work, and financial and other problems, lead to distress, alienation, reliance on avoidance coping, and eventually to substance misuse (Kaplan 1996). The theory assumes that stressors are most likely to impel substance use among impulsive individuals who lack self-confidence and coping skills and who tend to use substances as a form of avoidance coping and self-medication for alienation and depression. However, when stressors occur, strong self-efficacy and the ability to confront rather than avoid problematic situations are thought to protect individuals from alcohol misuse.

For behavioral economics, the most important factors are rewards that can substitute for those that may be obtained from substance use (Bickel and Vuchinich 2000). These rewards can protect individuals from exposure to substances and opportunities to use them, as well as from escalating and maintaining substance use. The theory posits that effective access to rewards through involvement in educational, work, religious, and social/recreational pursuits will reduce the likelihood of engaging in behavior that eventuates in more problematic rewards, such as substance misuse.

According to social control theory, strong bonds with family members, friends, and coworkers motivate individuals to engage in responsible behavior and refrain from problematic behavior such as alcohol misuse (Hirschi 1969). These bonds encompass monitoring or supervision and directing behavior toward acceptable goals and pursuits. When such bonds are weak or

absent, individuals are less likely to adhere to conventional standards and tend to engage in undesirable behavior, such as the misuse of alcohol and drugs. To examine the potential influence of these personal and social resources, we focused on the extent to which they predicted remission and relapse after remission.

Method

Participants

We initially recruited and conducted a baseline assessment of 628 individuals with alcohol-use disorders who contacted alcoholism information and referral (I&R) centers or detoxification (detox) programs. The 628 baseline participants were almost evenly divided between women (47%) and men (53%). Most were Caucasian (80%), unmarried (39%) or separated/divorced (39%), and unemployed (60%). On average, these individuals were in their mid-30s, had 13 years of education, and an annual income of about \$12,000 at baseline. Only 14% had any prior participation in AA.

Individuals who entered the study were identified as having an alcohol use disorder, as determined by one or more substance use problems, dependence symptoms, drinking to intoxication in the past month and/or perception of alcohol abuse as a significant problem. Participants had relatively severe alcohol-related problems at baseline: On average, they were intoxicated on more than 10 days in the last month and reported more than five alcohol-dependence symptoms and more than four alcohol-related problems in the last 6 months.

These individuals were followed 1 year, 3 years, 8 years, and 16 years after the baseline assessment. A total of 121 (19.3%) of the 628 baseline participants had died by the 16-year follow-up (for a description of the causes and predictors of mortality, see Timko et al. 2006). A total of 461 (91%) of the remaining 507 individuals were followed on two or more occasions or at the 16-year follow-up. Compared with the other 46 individuals, these 461 participants were more likely to be women and to be employed at baseline, but otherwise the two groups were closely comparable.

Measures

Personal factors: drinking patterns and problems. At baseline and each follow-up, participants were asked about three aspects of their drinking patterns and problems:

- (a) *Alcohol Consumption* (quantity) was assessed by three items that asked about the usual amount of wine (glasses), beer (glasses, cans), and hard liquor (shots) consumed on the days in which the individual drank that beverage in the last month. We converted the responses to reflect the ethanol content of these beverages and then summed them.
- (b) *Drinking Problems* were assessed by items drawn from the Health and Daily Living form (HDL; Moos, Cronkite, and Finney 1992). Respondents rated how often (on a 5-point scale varying from 0 = *never* to 4 = *often*) they had experienced each of nine problems (e.g., with health, job, money, family arguments) as a result of drinking (alpha at baseline = .80) in the last six months. Collaterals and participants showed significant agreement at baseline on this index (Finney and Moos 1995).
- (c) *Drinking Patterns* were assessed on a 6-point scale ranging from abstinence to occasional drinking binges for each month in the past 6 months.

To be considered *remitted*, individuals had to meet several criteria at the relevant follow-up: Abstinence from alcohol or light to moderate drinking in each of the past 6 months, no drinking problems in the past 6 months, and no intoxication or consumption of more than 2 ounces of ethanol on drinking days in the past month. This criterion for remission is somewhat more stringent than the criterion used in prior analyses of this sample (Moos and Moos 2006b). Initially remitted individuals who did not meet these criteria at a subsequent follow-up were classified as *relapsed*.

Personal factors: self-efficacy and coping skills. Three indices were included to tap key aspects of social learning and stress and coping theories. Self-efficacy to resist alcohol consumption was assessed with 10 items (alpha = .93) adapted from the Situational Confidence Questionnaire (Annis and Graham 1988). The items covered situations involving negative and positive emotions, interpersonal conflict, and testing one's self-control. Each item was rated on a 6-point scale varying from *not at all* to *very confident*; individuals received a score of 1 for each item they rated as confident or very confident.

Respondents were asked to describe the most important stressful life event that had occurred in the past year and how they coped with it:

- (a) *Approach coping* (alpha = .65) was assessed by six items that reflected seeking information (e.g., "I tried to find out more about the situation") and six items (reversed scored) that reflected emotional discharge coping (e.g., "took it out on other people when I felt angry or sad"). These were 4-point items ranging from *no* to *fairly often* drawn largely from the Coping Responses Inventory (Moos 1993).

- (b) *Avoidance coping* was assessed with a 4-point item that reflected individuals' tendency to drink to reduce tension as a coping strategy. This item has been shown to be a strong risk factor for increased alcohol consumption and drinking problems (Holahan et al. 2003). Each of these indices was assessed at baseline and each follow-up.

Life stressors and social resources. An adapted version of the Life Stressors and Social Resources Inventory (Moos and Moos 1994) was used to measure indices in this domain at baseline and each follow-up. Health and financial resources assessed variables related to behavioral economics; family, friend, and work resources tapped indices associated with social control theory.

Health (alpha = .78) was indexed by the sum of 13 items that assessed medical conditions (e.g., cancer, diabetes, high blood pressure) and 13 items that assessed physical ailments (e.g., frequent headaches, pains in the back or spine, stiffness or aching in joints or muscles). The resulting index was reversed so that a higher score reflected better health. *Financial resources* (alpha = .87) was composed of the sum of four items (e.g., do you have enough money to afford needed furniture and household appliances, or needed quality of medical/dental care). These items were rated on four-point scales varying from *definitely no* (1) to *definitely yes* (4).

The quality of *family* relationships (alpha = .75) was the sum of six items (e.g., count on family members to help you when you need it; family members respect your opinion). The quality of relationships with *friends* (alpha = .83) was the sum of ten items (e.g., count on friends to help you when you need it, friends respect your opinion). The quality of relationships at *work* (alpha = .68) was the sum of 13 items (e.g. coworkers friendly toward you, get recognition for contributions at work). These items were rated on 5-point scales varying from *never* (0) to *often* (5).

Participation in treatment and self-help groups. At each follow-up, participants were asked whether or not they had obtained professional treatment for their alcohol problems and/or participated in AA since the prior assessment. If participants answered "yes," they were asked to record the dates involved and the number of weeks and sessions or meetings attended. We focused on the number of weeks or duration of participation because prior findings indicated that duration of participation was more closely associated with alcohol-related outcomes than was frequency of participation (Moos and Moos 2003, 2004).

Analytic Plan

Analyses of the effects of treatment and AA on remission involved logistic regressions that controlled for gender, marital status, and the baseline value of alcohol consumption. These three variables were controlled because prior analyses on this sample showed that they were associated with alcohol-related outcomes (Moos and Moos 2006a). Follow-up analyses of variance compared groups of individuals who varied in the duration of participation in treatment and AA. We used chi-squares to compare remission and relapse rates between individuals who obtained help and those who did not.

To examine the role of protective resources in remission, we used logistic regression analyses in which the predictors were the protective resources and the criteria were 3-year, 8-year, and 16-year remission; gender, marital status, and 1-year remission were controlled. We expected that the protective resources would predict a higher likelihood of remission and a lower likelihood of relapse. We used a regression-based maximum likelihood model (Hill 1997) and information from baseline and completed follow-ups to impute missing values for surviving individuals; 91% of these individuals had completed at least two of the four follow-ups.

Results

Participation in Treatment and AA

We focused first on the effect of the duration of participation in treatment and AA in the first year on remission at each follow-up. To consider relatively broad and distinct groups, we compared participants who did not obtain help in the first year with groups of individuals who were in treatment (or AA) between 1 and 8 weeks, 9 and 26 weeks, or 27 weeks or more. These categories reflect designations of brief, moderate, and long-term treatment and the distribution of the duration of treatment (Bien, Miller, and Tonigan 1993; Moos et al. 2000; Moyer et al. 2002). We used these categories to provide meaningful and easily interpretable information about distinctive durations of episodes of treatment and AA.

Duration of treatment in the first year and remission. A total of 273 (59%) of the 461 individuals entered professional treatment in the first year; they obtained an average of 20 weeks of treatment ($SD = 17.6$). Compared with individuals who remained untreated, individuals who

Table 1
Remission at One Year, Three Years, Eight Years, and
Sixteen Years by the Duration of Participation in Treatment
and Alcoholics Anonymous in the First Year

Outcome (% of patients)	Duration of Help in Year 1				Chi-Square
	None	1-8 weeks	9-26 weeks	27+ weeks	
Duration of Treatment	(N = 188)	(N = 110)	(N = 68)	(N = 95)	
Remission					
1 year	30.3 ^b	34.6	39.7	61.1 ^b	24.46**
3 years	35.6 ^b	44.6	48.5	54.7 ^b	9.84*
8 years	39.4 ^{ab}	50.0	57.4 ^a	57.4 ^a	14.10**
16 years	46.3 ^b	52.7	60.3	61.1 ^b	6.71*
Duration of Alcoholics					
Anonymous	(N = 192)	(N = 66)	(N = 88)	(N = 115)	
Remission					
1 year	28.1 ^{ab}	18.2	51.1 ^a	60.0 ^b	46.98**
3 years	31.8 ^b	37.9	44.3	66.1 ^b	35.64**
8 years	38.5 ^{ab}	43.9	53.4 ^a	66.1 ^b	22.79**
16 years	43.2 ^b	45.5	56.8	70.4 ^b	23.54**

Note: For each chi-square, degrees of freedom = 3; N = 461. Means that share the same superscript differ significantly ($p < .05$).

Superscripts a and b denote differences between the no help (treatment or Alcoholics Anonymous) group and the 9-26 week and 27+ week duration of help groups, respectively.

[†] $p < .10$; * $p < .05$; ** $p < .01$

obtained a longer duration of treatment were more likely to be remitted at all four follow-ups (Table 1). For example, only 30% and 46% of individuals who did not obtain treatment in the first year were remitted at 1 year and 16 years, respectively, compared with 61% and 61%, respectively, of individuals who obtained 27 weeks or more of treatment in the first year.

A total of 71 individuals who did not enter treatment in the first year obtained delayed treatment between years 2 and 8. In general, individuals who delayed entering treatment were less likely to be remitted at the 8-year (35% vs. 56%; $F = 8.65$; dfs 1,339; $p < .01$) and 16-year follow-ups (45% vs. 58%; $F = 3.31$; dfs 1, 339; $p = .07$) than were individuals who obtained timely treatment. Moreover, the duration of treatment in years 2 through 8 was not significantly associated with 8-year or 16-year remission (both $F_s < 1$, ns).

Duration of AA in the first year and remission. In all, 269 (58%) of the 461 individuals entered AA in the first year; they participated for an average of 26.3 weeks ($SD = 18.0$) in that year. Compared to individuals who did not enter AA in the first year, individuals who participated in AA for 9 weeks or more in the first year were more likely to attain 1-year and 8-year remission (Table 1). For example, only 28% of individuals who did not participate in AA in the first year were abstinent at 1 year, compared to 51% of individuals who participated for 9 to 26 weeks and 60% of those who participated for 27 weeks or more. At 16 years, 43% of the individuals who did not attend AA in the first year were remitted compared to 57% and 70%, respectively of individuals who participated in AA for 9 to 26 weeks or 27 weeks or more.

Overall, 176 (38%) of individuals participated in AA in years 2 to 3 of the follow-up. Participation in AA in these years was independently related to a higher likelihood of 8-year and 16-year remission, even after controlling for participation in AA in year 1 (betas = .29 and .32, respectively; both $ps < .01$). However, the benefit of a longer duration of participation in AA was limited to individuals who attended meetings for 27 weeks or more. For example, 45% of individuals who did not participate in AA in years 2 to 3 were remitted at 16 years, compared to an average of 46% of individuals who participated for 1 to 26 weeks and 78% of those who participated for 27 weeks or more ($F = 6.54$; $df = 3$; $p < .01$). The associations between participation in AA and remission held after controlling for the effects of participation in treatment.

Natural and Treated Remission and Relapse

Natural and treated remission. Only 36% of individuals in the no help group were remitted by the 3-year follow-up, compared with 61% of individuals in the helped group (chi-square = 18.76; $df = 1$; $p < .01$). In the no help group, there was no significant difference in the proportion of remitted (25%) and non-remitted (33%) individuals who delayed entry but then participated in treatment and/or AA in years 2 and 3 (chi-square < 1 ; $df = 1$; ns). Similarly, in the helped group, there was no significant difference in the proportion of remitted (64%) and non-remitted (61%) individuals who were involved in treatment and/or AA in years 2 and 3 (chi-square < 1 ; $df = 1$; ns). Thus, participation in treatment or AA in years 2 and 3 was not associated with a higher likelihood of remission for individuals in either the no help or helped group.

Relapse after natural and treated remission. A total of 43% of 3-year remitted individuals in the helped group had relapsed by the 16-year follow-up, compared to 61% of the 3-year remitted individuals in the no help group (chi-square = 4.22; $df = 1$; $p < .05$). Only 14% of relapsed and 13% of continuously remitted individuals in the helped group participated in treatment and/or AA in years 4 to 8 (chi-square < 1 ; $df = 1$; *ns*). Only 5% of relapsed and 0% of continuously remitted individuals in the no help group participated in treatment and/or AA in years 4 to 8 (chi-square < 1 ; $df = 1$; *ns*). Thus, there was no association between participation in treatment or AA in years 4 to 8 and 16-year remission for individuals in either group.

Theory-Based Protective Resources

To measure protective resources associated with social learning and stress and coping theories we used indices of self-efficacy, approach and avoidance coping, and involvement in AA, which encompasses interaction with abstinence-oriented role models and reinforcement for abstinence. For behavioral economics theory, we focused on indices of health and financial resources. We used indices of social resources associated with family members, friends, and the workplace to assess protective bonds associated with social control theory.

Protective resources as predictors of remission. More 1-year self-efficacy, approach coping, and participation in AA, predicted a higher likelihood of 3-year remission (Table 2). Several of the 3-year resources predicted 8-year remission. More 3-year self-efficacy, approach coping, and participation in AA predicted a higher likelihood of 8-year remission; more reliance on avoidance coping predicted a lower likelihood of 8-year remission (Table 2). More 3-year resources from finances and friends also predicted a higher likelihood of 8-year remission. Similarly, several of the 8-year protective resources, including more self-efficacy, approach coping, participation in AA, and friend- and work-related resources, and less reliance on avoidance coping, predicted a higher likelihood of 16-year remission.

Lack of protective resources as predictors of relapse. We also examined the extent to which a lack of protective resources predicted relapse after remission. Specifically, we selected individuals who had attained remission by the 1-year and/or 3-year follow-up and used the 8-year values of the

Table 2
Protective Resources as Predictors of Three-Year, Eight-Year, and Sixteen-Year Remission and Sixteen-Year Relapse after Remission

Index	3-Year Remission (<i>N</i> = 461)	8-Year Remission (<i>N</i> = 461)	16-Year Remission (<i>N</i> = 461)	16-Year Relapse (<i>N</i> = 256)
Social learning and stress and coping indices				
Self-efficacy	.26*	.53**	.59**	-.82**
Approach coping	.26*	.26**	.39**	-.57*
Avoidance coping	-.07	.57**	-.68**	.75**
Abstinence models (Alcoholics Anonymous)	.31	.36**	.19**	-.15
Behavior economic indices				
Health	-.01	.16	.03	-.25*
Financial	.15	.27**	.18	-.27*
Social control indices				
Family	-.09	-.04	.14	-.07
Friends	.14	.34**	.26**	-.39**
Work	.16	.10	.22*	-.33**
Constant	-1.94	-1.25	-0.83	1.89
Nagelkerke <i>R</i>²	.27	.29	.21	.20

Note: Entries are beta coefficients from individual logistic regressions; entries in bold identify independent predictors when all significant predictors are entered.

p* < .05. *p* < .01

resources to predict 16-year relapse. A total of 256 individuals had attained remission, and of these, 89 or 34.8% had relapsed by the 16-year follow-up. As shown in Table 2, less 8-year self-efficacy and reliance on approach coping, fewer health and financial resources, less support from friends and at work, and more reliance on avoidance coping predicted 16-year relapse.

Discussion

Participation in Treatment and AA

The findings extend earlier results from this project and prior studies showing that a longer duration of participation in treatment is associated with a higher likelihood of abstinence and freedom from drinking problems

(Moos and Moos 2006a; Moos et al. 2000). They support the conclusion that more extended treatment is associated with better long-term alcohol-related outcomes and imply that treatment programs should be structured to emphasize the continuity of care. In this respect, patients who have fewer substance use and psychiatric symptoms, lack resources for recovery, and perceive providers as less supportive are less likely to engage in continuing care (Harris et al. 2006). Clinicians can use information about the predictors of lack of involvement in treatment to identify patients who may benefit from interventions to increase retention in continuing care, such as by providing social rewards for attendance (Lash et al. 2004).

Consistent with prior studies (Kissin, McLeod, and McKay 2003; Kelly et al. 2006; Moos and Moos 2006a; Tonigan, Collins, and Miller 2003), the findings also show that more extended participation in 12-step self-help groups such as AA is associated with a higher likelihood of sustained remission. Participation in AA for 8 weeks or less in the year after help-seeking was initiated was not associated with either short- or long-term remission. In contrast, participation in AA for 9 weeks or more in the first year and 27 weeks or more in years 2 and 3 was independently associated with 16-year remission, indicating that there is added value in extended engagement in AA.

Participation in AA made a positive contribution to remission, over and above the contribution of treatment. This finding is consistent with prior findings on this sample, which showed that individuals who participated in both treatment and AA in the first year after seeking help experienced higher rates of remission than did those who participated only in treatment (Moos and Moos 2005). Similarly, Fiorentine and Hillhouse (2000) found that patients who participated in both treatment and self-help groups tended to experience better outcomes than did patients who were involved only in treatment. In other studies, patients who participated in 12-step self-help groups experienced better substance use outcomes after considering their participation in outpatient mental health care (Ritsher, Moos, and Finney 2002). Overall, participation in AA and treatment appears to reflect a set of integrated recovery activities that can strengthen each other.

Natural and Treated Remission and Relapse

The finding of a higher remission rate for individuals who received help than for those who did not extends prior results from this project using somewhat more liberal criteria for remission and relapse; it is consistent with growing evidence that participation in treatment and/or AA contributes to better short-term alcohol-related outcomes (Moos and Moos, 2006b).

In this regard, Weisner, Matzger, and Kaskutas (2003) found that treated alcohol-dependent individuals had higher 1-year non-problem use outcomes (40% vs. 23%) than untreated individuals did. Moreover, according to Moyer and Finney's (2002) meta-analysis of alcoholism treatment outcome studies, average short-term abstinence rates were 21% for untreated individuals in wait list, no-treatment, or placebo conditions, compared to 43% for treated individuals.

The 61% 3-year remission rate in the helped sample is somewhat higher than the 20 to 50% rate typically shown in treated samples, probably because the current sample was composed of individuals who were at a relatively early stage in their alcoholism careers. The 36% 3-year remission rate among individuals who did not obtain help quickly is comparable to the rates obtained in prior studies of individuals who were aware of their alcohol problem and sought but did not obtain treatment (Armor and Meshkoff 1983; Roizen, Cahalan, and Shanks 1978).

The 61% 16-year relapse rate among individuals who remitted without help is comparable to the 50% rate identified in 7- and 14-year follow-ups of untreated remitted individuals with alcohol use disorders (Klingemann and Aeberhard 2004). These findings show that natural remission may be followed by a high likelihood of relapse. The 16-year relapse rate of just over 40% for individuals who obtained help and initially remitted is consistent with prior estimates of relapse rates in treated samples (Finney, Moos, and Timko 1999; Jin et al. 1998). Individuals who recognize their alcohol-use problem and initiate help-seeking but do not obtain help quickly appear to be less likely to achieve remission and, once having achieved remission, may be more likely to relapse.

Protective Resources

Protective resources at each follow-up predicted a higher likelihood of subsequent remission, whereas a lack of resources predicted relapse after remission. The findings provide a framework to help integrate the predictors of remission and relapse with theories about protective factors that prevent the development of alcohol misuse (Moos and Moos 2007). Three of the social learning and stress and coping indices (self-efficacy, eschewing avoidance coping when under stress, and involvement in AA) were the strongest independent predictors of remission.

More specifically, the findings are consistent with studies showing that individuals' resistance self-efficacy or confidence to avoid substance use in high-risk situations is a key factor that sustains remission and reduces the

risk of relapse (Haaga, Hall, and Haas 2006). High resistance self-efficacy at intake to treatment (Walton et al. 2002), during treatment (Greenfield et al. 2000), and at or after discharge from treatment (Allsop, Saunders, and Phillips 2000; Ilgen, McKellar, and Tiet 2005) is a stable predictor of better alcohol- and drug-use outcomes. Moreover, the development of a positive therapeutic alliance and participation in skills training activities during treatment appear to increase self-efficacy (Ilgen, McKellar, and Moos 2007; Ilgen et al. 2006); accordingly, self-efficacy may mediate the effect of specific components of treatment on alcohol-related outcomes.

With respect to coping, more reliance on general approach coping (such as positive reappraisal and problem solving) and less on general avoidance coping (such as cognitive avoidance and emotional discharge) helps to manage a broad range of stressors and tends to foreshadow stable remission and abstinence (Annis, Sklar, and Moser 1998; Carpenter and Hasin 1999; Chung et al. 2001). Involvement with abstinence-oriented role models, such as in AA, contributes to better alcohol-related outcomes (Humphreys 2004), as predicted by social learning theory.

As behavior economics predicts, individuals who obtain rewards that do not involve substance use are more likely to achieve remission and tend to have a better long-term prognosis (Tucker, Vuchinich, and Rippens 2002; Tucker et al. 2006). In this regard, consistent with prior studies showing that employment and more income reduce the likelihood of excessive alcohol use (Dooley and Prause 1997; Peirce et al. 1994), financial resources tended to predict remission. In addition, consistent with social control theory, support from friends and in the workplace was a modest but relatively consistent predictor of remission and relapse (Beattie and Longabaugh 1999; Bond, Kaskutas, and Weisner 2003; McCrady 2004).

More broadly, once we know more about how personal and social resources interact with treatment, a summary index of protective resources may help to allocate care. There may be a compensatory relationship between protective resources and treatment such that brief treatment may be sufficient for individuals with more personal and social resources, whereas individuals who have fewer resources may benefit more from extended treatment. Alternatively, protective resources may bolster the beneficial influence of treatment on long-term outcome; in this vein, individuals with more resources may do better with longer or more intensive treatment because they live in a social context that strengthens treatment-induced change (Moos and Moos 2007). Treatment may be less beneficial for individuals who have fewer resources because the broader social context does little to help maintain short-term change.

Limitations and Future Directions

To review, we obtained three important findings:

- (a) Individuals who elected to enter treatment and/or AA relatively soon after acknowledging their alcohol problems and who obtained treatment and/or participated in AA for 27 weeks or more were more likely to attain remission than were those who received no help or who delayed receiving help. These findings highlight the benefits of obtaining timely help and of continuity of care and ongoing participation in 12-step self-help groups.
- (b) Compared to individuals who received help, those who did not were less likely to achieve remission and, when they did achieve remission, were more likely to relapse later. Natural remission may be followed by a high likelihood of relapse; preventive interventions may be indicated to forestall future alcohol problems among individuals who temporarily cut down on drinking on their own.
- (c) Protective resources associated with social learning, stress and coping, behavioral economics, and social control theories predicted a higher likelihood of remission. Protective resources may be especially strongly related to remission among individuals who obtain more extensive help and thus may amplify the influence of participation in treatment and/or self-help groups.

Limitations

These findings are of potential interest, but some important limitations should be noted. We conducted a naturalistic study in which individuals self-selected into treatment and AA and, on the basis of their experience, decided on the duration of participation. Thus, in part, the benefits we identified are result from the influence of self-selection and motivation to obtain help as well as that of longer participation per se. Our findings probably reflect the real-world effectiveness of participation in treatment and AA for alcohol-use disorders; however, the naturalistic design precludes firm inferences about the causal role of treatment or AA.

We also focused on individuals who had already recognized their alcohol-related problems and initiated a search for help. Accordingly, our findings on lower remission and higher relapse rates among individuals who do not obtain help quickly may not generalize to individuals who have alcohol-related problems but have not sought help. These individuals may have less severe problems and/or more personal and social resources that can help them initiate and sustain natural recovery.

Another limitation is that we obtained information only on 6-month windows of alcohol-related outcomes at each follow-up and thus cannot trace

the complete drinking status of respondents over the 16-year interval. In addition, our data were based on self-report. We obtained some evidence for the validity of respondents' self-reports at baseline, but did not gather subsequent information from collaterals. However, self-reported alcohol-related outcomes appear to be reasonably valid, especially when they are obtained independently of treatment providers and with assurance of confidentiality, as was the case here (Babor et al. 2000). There also is some support for the reliability and validity of self-reports of episodes of treatment (Adair et al. 1996; Keller et al. 1983) and of AA (Tonigan, Connors, and Miller 2003).

Future Directions

Our findings on the benefits of treatment and AA support the value of strengthening agency referral processes to try to ensure that individuals with substance use disorders who initiate a search for help enter formal treatment and/or AA relatively quickly. Some useful procedures are to make personal introductions to treatment staff, arrange initial intake assessments and ongoing clinic visits, and implement telephone reminders to sustain motivation. With respect to AA, providers can introduce patients to an AA sponsor or recovery guide, follow-up with patients on agreements made to attend AA, and encourage further involvement, such as reading 12-step literature, doing service, and becoming a sponsor (Timko, DeBenedetti, and Billow 2006).

Because individuals who delay obtaining help after recognizing an alcohol-related problem tend to experience poorer long-term outcomes, it is important to clarify the reasons for such delays and identify barriers to receiving help. Individuals in the current sample who perceived their drinking problem as less severe and had fewer alcohol-related problems, were less depressed and experienced fewer recent stressful life events, were less likely to obtain timely help (Finney and Moos 1995). More information about the personal and social factors that deter help-seeking, and the reasons why individuals who do not obtain help relatively quickly have worse outcomes, could lead to effective targeted interventions for high-risk individuals.

Another high priority for future research is to focus more on "turning points" involved in the development and cessation of substance-use disorders. One important issue is to examine the predictive associations between trajectories of protective resources and substance use and to apply the findings to improve treatment and recovery-oriented care. It would also be useful to develop linkages with conceptually comparable research in related areas, which has shown, for example, that women with both personal and social risk factors and few protective factors are likely to experience major depression and poor work outcomes (Danziger, Kalil, and Anderson 2000; Siefert et al.

2000). Other issues to address include examination of the processes by which specific resources enhance remission, exploration of how treatment and protective resources amplify each other to increase the likelihood of long-term recovery, and development of integrated theories about the apparent comparability of the resources that protect adolescents from developing substance use disorders and those that foster recovery among adults (Moos 2006).

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Rudolf Moos is a senior research career scientist at the VA Palo Alto Health Care System and a professor in the Department of Psychiatry and Behavioral Sciences at the Stanford University School of Medicine.

Bernice Moos is a program analyst and software programmer at the VA Palo Alto Health Care System and the Department of Psychiatry and Behavioral Sciences at the Stanford University School of Medicine.