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EMERGING ADULTS' TREATMENT OUTCOMES IN RELATION TO 12-STEP MUTUAL-HELP ATTENDANCE AND ACTIVE INVOLVEMENT

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Abstract

Background—Participation in Alcoholics Anonymous (AA) and Narcotics Anonymous (NA) during and following treatment has been found to confer recovery-related benefit among adults and adolescents, but little is known about emerging adults (18–24yrs). This transitional life-stage is distinctive for greater distress, higher density of psychopathology, and poorer treatment and continuing care compliance. Greater knowledge would inform the utility of treatment referrals to 12-step organizations for this age-group.

Methods—Emerging adults (N=303; 18–24yrs; 26% female; 95% White; 51% comorbid [SCID-derived] axis I disorders) enrolled in a naturalistic study of residential treatment effectiveness assessed at intake, 3, 6, and 12 months on 12-step attendance and involvement and treatment outcomes (Percent Days Abstinent [PDA]; Percent Days Heavy Drinking [PDHD]). Lagged hierarchical linear models (HLMs) tested whether attendance and involvement conferred recovery benefits, controlling for a variety of confounds.

Results—The percentage attending 12-step meetings prior to treatment (36%) rose sharply at 3months (89%), was maintained at 6 months (82%), but declined at 12 months (76%). Average attendance peaked at about 3 times per week at 3 months dropping to just over once per week at 12 months. Initially high, but similarly diminishing, levels of active 12-step involvement were also observed. Lagged HLMs found beneficial effects for attendance, but stronger effects, which increased over time, for active involvement. Several active 12-step involvement indices were associated individually with outcome benefits.

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Conclusions—Ubiquitous 12-step organizations may provide a supportive recovery context for this high-risk population at a developmental stage where non-using/sober peers are at a premium.

Keywords

Alcoholics Anonymous; Narcotics Anonymous; 12-step; young adults; emerging adults; addiction treatment

1. INTRODUCTION

Compared to other life-stages, the developmental phase of emerging adulthood (18–24 years; Arnett, 2000) confers the highest risk for the onset of harmful alcohol and other drug use, as well as substance use disorder (SUD; Substance Abuse and Mental Health Services Administration, 2011). In the United States, for example, the rate of SUD among emerging adults is 20.0%, compared to 7.0% among adolescents and 7.3% among adults aged 26 and older (Substance Abuse and Mental Health Services Administration, 2011). Many emerging adults who meet criteria for SUD remit without formal treatment; however, others experience problems chronically over years and decades (Brown and Ramo, 2006; Dennis et al., 2005).

Social context factors, particularly situations in which individuals are exposed to drug/alcohol cues and abstinence-specific support is absent, have been shown to exert negative influence that lengthens the time to remission (Kelly et al., 2010; Moos, 2007; Moos and Moos, 2004; Stout et al., 2012). Because regular and intensive use of alcohol and illicit drugs is more common during emerging adulthood than at any other stage of human development (Substance Abuse and Mental Health Services Administration, 2011), locating and accessing sobriety-supportive social contexts during this life stage is more challenging for emerging adults seeking recovery.

1.1. Role of mutual-help organizations as recovery-supportive social contexts

It has long been recognized that among treatment-seeking individual some form of ongoing monitoring and management aids recovery efforts (Dennis and Scott, 2012; McLellan et al., 2000; Moos and Moos, 2006; White, 2008). Mutual-help groups, such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA), are ubiquitous community recovery resources in the U.S. and in many other countries (Mäkela, 1996) and potentially could provide emerging adults with a locatable, accessible, higher density source of ongoing recovery management and support (Humphreys et al., 2004; Kelly and Yeterian, 2008, 2012). Importantly, a major mechanism through which 12-step organizations has been shown to aid SUD recovery is by facilitating adaptive changes in individuals' social networks (Humphreys and Noke, 1997; Kaskutas et al., 2002; Kelly et al., 2012, 2010). These network changes may reduce exposure to alcohol/drug cues and increase pleasant sober activities (Kelly and Yeterian, 2012). Perhaps in recognition of this, the majority of treatment programs in the U.S. attempts to link patients with community 12-step organizations (Kelly and Yeterian, 2008; Knudsen et al., 2008). However, whereas studies in this area reveal beneficial effects from post treatment community 12-step participation for adults (Emrick et al., 1993; Kaskutas, 2009; Moos and Moos, 2006; Timko et al., 2000; Tonigan et al., 1996), comparatively little is known about their effects among adolescents (Kelly and Myers, 2007; Mundt et al., 2012; Sussman et al., 2008) or emerging adults.

Available research suggests emerging adults attend less often and discontinue sooner than older adults, but similar to older adults, attendance is associated with better outcomes. One 12-month study compared emerging adults (18–25 yrs; n=98) to older adults (26yrs+; n=922) and found emerging adults were less likely to attend AA, and those who did,

attended about half as many meetings and had lower affiliation and declined more quickly in the frequency and intensity of attendance over time (Mason and Luckey, 2003). A seven-year follow-up of a community/treatment sample of emerging adults with problem drinking/dependence ($n=265$) who were part of a larger cohort, found AA attendance was one of the few positive predictors of salutary alcohol changes (Delucchi et al., 2008) and an eight-year follow-up of adolescents across the transition to emerging adulthood found significant AA/NA-related recovery benefits (Kelly et al., 2008). Given the high prevalence of substance use during emerging adulthood and the lack of available evidence, more research is needed to inform 12-step continuing care recommendations.

The current study assesses the degree to which emerging adults attend 12-step meetings and whether attendance is related to better outcomes over one-year following residential treatment. It also investigates the extent to which emerging adults become *actively* involved in 12-step organizations (e.g., meet with a sponsor; verbally participate during meetings). Such indices of involvement are important to 12-step theory, as they are deemed vital in expediting social engagement (e.g., Alcoholics Anonymous, 1953, p. 61). They represent key 12-step activities that are featured prominently within the AA and NA literatures (e.g., Alcoholics Anonymous, 1984, 2001; Narcotics Anonymous, 1996) and that are prescribed by therapists in treatment (Humphreys and Noke, 1997; Kaskutas et al., 2009; Kelly and Urbanoski, 2012). Extrapolating from prior research, it was hypothesized that more frequent 12-step attendance would lead to better outcomes, and derived benefits would be enhanced by active 12-step involvement.

2. METHOD

2.1 Participants

Participants were emerging adults ($N=303$; 18–24 years) entering a private residential SUD treatment program in the U.S. Midwest. A total of 607 emerging adults were admitted during the recruitment period (October 2006 to March 2008). To ensure sufficient representation of all ages within the target range (18–24 years), a stratified sampling procedure was used to select potential participants. All patients aged 21–24 years and every second patient aged 18–20 were approached for the study. Of those approached ($n=384$), 64 declined. Reasons for non-participation included not wanting to participate in the follow-ups (44%), not interested (31%), wanting to focus on treatment (14%), and legal issues (2%). Following enrollment, an additional 17 participants withdrew prior to baseline assessment. The final sample of 303 represents 78.9% of those approached.

Average age was 20.4 years old ($SD = 1.6$). Participants were predominantly male (73.9%) and all were single. Most were Caucasian (94.7%); 1.7% identified as American Indian, 1.3% identified as African American, and 1.0% as Asian (1.4% reported “other” or missing). At admission, 24.1% were employed full- or part-time, and 31.7% were students. Most had completed high school: 43.6% had a high school diploma and 39.6% had attended college. All youth met for DSM-IV substance use disorder with the most common primary substance used being alcohol (28.1%) or marijuana (28.1%), followed by heroin or other opiates (22.4%), cocaine or crack (12.2%), and amphetamines (5.9%). In terms of severity of dependence, the average Leeds Dependence Questionnaire (LDQ) score (see measures section) at baseline was 18.7 ($SD=8.7$) in this sample, similar to the mean of 19.7 in a larger clinical sample of older adults with alcohol/opiate dependence (Heather et al., 2001). The prevalence of concurrent (past year) co-occurring Axis I disorders (other than SUD) was 51.2%, similar to other prevalence estimates of youth in SUD treatment (Kelly et al., 2010; Langenbach et al., 2010; Schroder et al., 2008).

In terms of representativeness among U.S. treatment programs, participants were more likely to be Caucasian than other 18–24 yr olds treated in public sector residential treatment (76%; SAMHSA, 2009) or adults (18+) in private sector treatment (71%; Roman and Johnson, 2004). They were comparable in terms of gender, marital status, and employment (Roman and Johnson, 2004). Regarding treatment payment source, 61% was from insurance and 35% from family. Also, 34% of the sample came from areas with households below the U.S. median household income (\$50, 221); 50% of the sample came from households in areas where the median household income was below \$56,000.

2.2 Treatment

Treatment was based on an eclectic and multidisciplinary residential approach for SUD, based on the abstinence-based, 12-step, framework of AA (McElrath, 1997). Services were comprehensive and multi-faceted, employing evidence-based interventions based in Twelve Step facilitation, motivational, cognitive-behavioral, and family therapy approaches. Programming included clinical assessment, individual and group therapy, and specialty groups, such as relapse prevention, anger management, eating issues, dual disorders, gender issues, and trauma. Integrated mental health care was available on-site, including assessment, therapy, and medication management. Average length of stay was 25.6 days (SD = 5.7, ranging from 4–35 days). The majority (83.8%) was discharged with staff approval.

2.3 Procedure

Research staff conducted assessments at intake, discharge, and at 3, 6, and 12 months post-discharge. Interviews were completed in person or by telephone, and self-administered surveys completed online or returned by mail. Participants were reimbursed \$30 for the baseline, discharge, and 3-month follow-ups, and \$40 for the 6- and 12-month assessments. Follow-up rates were 87.1% (n=264) at discharge, 81.8% (n=248) at 3 months, 72.28% (n=219) at 6 months, and 70.63% (n=214) at 12 months. The study was conducted in accordance with an independent Institutional Review Board at Schulmann Associates.

2.4 Measures

Demographics—Demographic characteristics, including age, gender, ethnicity, education, and marital status, and drug of choice were abstracted for the study from patients' records.

Twelve-Step Participation was measured at each assessment timepoint using the Multidimensional Mutual-help Meeting Activity Scale (Kelly et al., 2011). This provided in-depth information on mutual-help group participation across three dimensions of involvement: (i) meeting participation (e.g., active engagement in meetings, such as verbal participation or helping set up/run meetings); (ii) fellowship involvement (i.e., considering self a fellowship member, active engagement in fellowship and activities, such as obtaining a sponsor, sponsor contact outside of meetings, contact with other members outside of meetings); and (iii) step work (i.e., progress working through the 12-step program). These data were used to derive a summary index of active involvement based on the sum of 8 dichotomous indicators: consider yourself a member, have a sponsor, contacted your sponsor outside of meetings, contacted other members outside of meetings, read 12-step literature outside of meetings, talked or shared during meetings, helped to set up or run meetings, and completed any steps. Internal consistency of the composite measure was high (Kuder-Richardson Formula 20: 0 months = 0.87, 3 months = 0.88, 6 months = 0.88, 12 months = 0.95).

Psychological distress was measured at admission, mid-treatment, and discharge with the Global Severity Index (GSI) of the 18-item Brief Symptom Inventory (BSI-18; Derogatis,

2001). Items were rated on a 5-point scale measuring past-week distress. Raw scores were converted to standardized T scores ($M=50$, $SD=10$) using published gender-specific community norms (Derogatis, 2001). The measure has shown good internal and test-retest reliability (coefficients =.74–.89), and construct validity in similar populations (Derogatis, 2001) including among substance users (Wang et al., 2010).

Motivation for abstinence was assessed at intake using the Stages of Change and Readiness and Treatment Eagerness Scale (SOCRATES; Miller and Tonigan, 1996) which contains three subscales: Recognition; Ambivalence; Taking Steps. Of these, only Ambivalence and Taking Steps were significantly related and retained as control variables.

Substance use Consequences was assessed using the Inventory of Drug Use Consequences – Recent (InDUC-2R; Tonigan and Miller, 2002) a 50-item self-report assessing consequences of alcohol/drug use across 5 domains: physical (8 items), interpersonal (10 items), intrapersonal (8 items), impulse control (12 items), and social responsibility (7 items), rated in terms of past 90-day consequences from never (0) to daily/almost daily (3). Scores are summed to provide a total score (range = 0–135), as well as each subscale. The InDUC-2R is sensitive to changes and has good-excellent test-retest reliability (Tonigan and Miller, 2002).

Abstinence Self-Efficacy was assessed using the Alcohol/Drug Self-Efficacy Scale (A-DSES; DiClemente et al., 1994) a self-report measure assessing patients' degree of Temptation (1 = not at all to 5 = extremely) to use alcohol/drugs in 20 common situations, as well as their level of Confidence (i.e. self-efficacy) that they would abstain in those situations. It consists of four internally consistent subscales related to types of relapse triggers: negative affect, social/positive, physical and other concerns, and withdrawal and urges.

Commitment to Sobriety—A newly constructed Commitment to Sobriety scale (CSS) was administered at treatment intake consisting of 5-items measured on a 6-point Likert scale from 1 “strongly disagree” to 6 “strongly agree” and summed (range 0–30): “Staying sober is the most important thing in my life;” “I am totally committed to staying off of alcohol/drugs;” “I will do whatever it takes to recover from my addiction;” “I never want to return to alcohol/drug use again;” “I have had enough alcohol and drugs” (Cronbach's $\alpha=.89$).

Prior Substance Use Disorder Treatment—This construct was assessed using the FORM 90 (Miller and Del Boca, 1994), which asked at treatment intake the number of days in the past 90 participants had received inpatient/residential treatment for SUD.

Severity of Substance Dependence—This construct was assessed with the Leeds Dependence Questionnaire (LDQ; Raistrick et al., 1994) a brief measure of dependence severity not specific to particular substances. The 10 items address frequency of symptom experience, rated from never (0) to nearly always (3) (range 0–30). The measure has high internal consistency ($\alpha = .93$) and good construct validity in the present sample (Kelly et al., 2010) and others (Lennings, 1999; Raistrick et al., 1994).

Substance Use Outcomes consisted of percentage of days abstinent (PDA) from all substances and the percentage of days heavy drinking (PDHD; 6 or more drinks for a man; 5 or more for a woman). For baseline and follow-up interviews, PDA was assessed using the Form-90 (Miller and Del Boca, 1994). It has good test-retest reliability and construct validity among adults and adolescents (Slesnick and Tonigan, 2004; Tonigan et al., 1997). To verify self-reported abstinence, a 7 panel saliva test (Cone et al., 2002) was administered

at each follow-up on a sub-sample of subjects that lived within 50 miles of the facility and could attend follow-up interviews in-person (15%). Abstinence was confirmed in 97% of subjects self-reporting abstinence.

2.5 Analysis Plan

We first computed the proportion of the sample that attended any 12-step meetings at intake and over follow-up. We also computed the mean percentage of days attending meetings (Table 1; Figure 1) and the proportion that engaged in any of the eight 12-step involvement indices. We did the same for the combined 8-item composite 12-step involvement measure (Table 1).

To examine independent outcome effects of 12-step attendance and involvement, we screened first for large set of variables that predicted study attrition (i.e., gender, race, ethnicity, education, prior SUD treatment, baseline PDA, BSI score, InDUC-2R score, LDQ, CSS, ADSES temptation + confidence, and the 6 SOCRATES subscales). Because of the large number of variables, a stepwise procedure was used (entry criterion $p < .05$) and a binary outcome of missing vs. non-missing (Judd et al., 2001; Singer and Willett, 2003); only education (less) was associated with attrition and was retained as a control variable.

To determine which variables predicted outcome we screened three sets of predictors: demographics (age, gender, ethnicity, education), psychological variables (motivation, commitment to sobriety, dependence severity, psychiatric symptoms, alcohol/drug use consequences), and prior SUD treatment. Of the variables screened, six were related to one or both outcomes: gender, prior inpatient SUD treatment, commitment to sobriety, engagement with other 12-step members outside meetings in at intake, and two motivational subscales from the SOCRATES: “Ambivalence” and “Taking steps”. These six variables were included in the final models along with intake level of the outcome variable. We then computed hierarchical linear models (HLMs) to test for relationships among 12-step attendance and involvement and substance use outcomes (Singer and Willett, 2003). To ensure temporal precedence of 12-step predictor variables and enhance causal inference (Hill, 1965; Kazdin and Nock, 2003), analyses were lagged such that attendance and involvement at 1–3 months and 4–6 months predicted outcomes at 4–6 months and 6–12 months. Finally, in order to test which aspects of involvement were most strongly associated with outcomes, the eight 12-step involvement items were investigated for their comparative influence on outcomes. PDA and PDHD were considerably skewed (PDA = -2.26; PDHD = 4.89) and needed to be transformed. For PDA, a negative log ($-\log x [101 - \text{PDA}]$) transformation reduced skewness to -1.0; for PDHD, a reciprocal transformation ($-1 / (1 + \text{PDHD})$) successfully reduced skewness (1.37).

3. RESULTS

3.1 Attendance and Involvement Over time

Relative to attendance rates prior to treatment entry, there was a marked increase in the proportion of the sample attending any 12-step meetings (table 1). This peaked at 3 month follow-up and declined steadily thereafter. The curve for average attendance was similar with a sharp increase in percent days attending meetings during the first 3 months after discharge followed by declining average attendance rates (figure 1).

Table 1 also contains details of the degree of active involvement in commonly prescribed 12-step activities. Relative to where patients were when they came in to treatment, 12-step involvement increased substantially following treatment.

3.2 Lagged effects of 12-step attendance and active 12-step involvement over time

To examine the lagged effects of 12-step attendance and active 12-step involvement over time, a series of hierarchical linear models (HLMs) was computed controlling for the six significant predictors of outcome across the follow-up period, as well as the intake measure of the outcome variable (Table 2).

3.3 Effects of 12-step Attendance and Active 12-step Involvement on PDA

In terms of the effects of 12-step attendance alone, greater attendance was associated independently with significantly greater PDA over time (Table 2, model a). The effect of active 12-step involvement on PDA was significant and notably stronger than attendance alone (Table 2, model b). The non-significant interactions of attendance x time and involvement x time indicate these relationships were consistent across the follow-up period. When entered together in a single model to examine the independent effects of attendance and involvement on PDA, there were significant interactions for both attendance and involvement over time (Table 2, model c). The direction of these interaction effects indicated that there was an *initially stronger* independent relationship between attendance and PDA that *diminished* in magnitude over time, and an *initially weaker* independent relationship between involvement and PDA that *strengthened* in magnitude over time. Other variables adding independently to the models and relating to a higher PDA were more years of education, more commitment to sobriety, less prior SUD treatment, and more involvement with 12-step members at intake.

3.4 Effects of 12-step Attendance and active 12-step Involvement on PDHD

A similar pattern of results emerged for PDHD, with a marginally independent effect of 12-step attendance on outcome over time ($p=.06$; model a) which was substantially stronger for active involvement (model b) and with no significant interactions. When entered in the model together, there was an interaction effect for 12-step attendance over time at the level of a trend ($p=.09$), and a main effect, but no significant interaction for 12-step involvement on PDHD (model c). The positive sign on the interaction term for attendance indicates there was an initially stronger relationship between more attendance and lower PDHD that diminished in magnitude over time. Other variables adding independently to lower PDHD were more education, greater commitment to sobriety, and less prior treatment (Table 2).

3.5 Which particular aspects of 12-step involvement most strongly predict better outcomes?

To explore which aspects of active 12-step involvement were associated with greater PDA and lower PDHD, further analyses were conducted. Initially, 12-step attendance, the covariates, and all eight individual indices were entered simultaneously into the model; however, high inter-correlations among involvement indices obfuscated relationships to outcomes. Consequently, a backwards stepwise selection process was computed with the least statistically significant of the eight involvement predictors removed at each step. Using this procedure for PDA, two involvement variables contributed significantly over and above attendance and the other involvement indices to the models: considering oneself a member ($F=9.17$, $p=.002$) and verbal participation during meetings ($F=7.85$, $p=.005$). For PDHD, two different aspects of involvement predicted better subsequent outcome: meeting with others outside of meetings ($F=6.58$, $p=.01$) and working the twelve steps ($F=5.40$, $p=.02$).

4. DISCUSSION

This is the first detailed prospective investigation of the effects of 12-step attendance and active 12-step involvement on substance use outcomes following residential treatment among emerging adults. Findings indicate emerging adults treated for SUD can substantially

increase their levels of 12-step attendance and active involvement in the year following treatment, and that such participation is independently associated with better substance outcomes. Certain aspects of involvement, in particular, may help explain the beneficial effects of attending 12-step organizations.

In the 90 days prior to treatment, about one third of the sample had attended *at least one* 12-step meeting. This percentage rose substantially following treatment to about 90%, and tapered off to 76% by 12 months. In terms of the average frequency of attendance, the sample was attending at a rate of about two to three times per month prior to treatment. Following treatment this rose substantially, peaking at the 3-month follow-up at about three to four times *per week*, on average, subsequently tapering off to one to two times per week, on average, by the 12-month follow-up. Although there is no comparison condition to more definitely attribute a causal connection between this specific treatment and 12-step attendance, the relatively poor unaided uptake of 12-step participation among youth in general suggests that this 12-step-oriented residential facility is particularly adept at engaging emerging adults with these community resources. There were also high rates of active involvement in purportedly key aspects of 12-step activity, including obtaining a sponsor, meeting with a sponsor and other 12-step members outside of meetings, and engaging in a variety of other active program activities. These observed attendance and active involvement rates are substantially higher than in a recent adolescent outpatient study sample (Kelly and Urbanoski, 2012) and attendance is higher than in the Mason and Luckey (2003) study.

Most importantly, from a treatment and recovery perspective, is that both attending and becoming actively involved in these free recovery community resources were associated independently with better outcomes over the year-long follow-up. As shown in other studies (Montgomery et al., 1995; Weiss et al., 2005), and in keeping with 12-step organization emphases on active involvement (Alcoholics Anonymous, 2001; Narcotics Anonymous, 1996), there were stronger effects for involvement than attendance. Noteworthy were the interaction effects where there appeared to be diminishing effects of *attending* 12-step meetings in relation to outcomes over time, but strengthening effects of *active involvement* on outcomes over time. Thus, while meeting attendance when examined by itself is associated with better outcomes over the year follow-up period, once active involvement is taken into account, the pattern of findings suggests that attendance will only take one so far: a failure to move beyond just attending 12-step meetings will lead to diminishing returns, whereas active involvement is likely to maintain or increase recovery benefits over time.

Individual aspects of affiliation and involvement may serve as salient markers of recovery engagement, but these differed somewhat according to the particular outcome examined. With respect to PDA, considering oneself to be a “12-step member” and verbally participating during meetings were both independently related to increased abstinence after accounting for 12-step attendance and a variety of other confounders. Although 12-step organizations do not keep formal membership rosters, this self-reported “member” status may reflect a strong sense of commitment to the organization and engagement that has benefits. This psychological sense of connection with these recovery-focused organizations implies adoption of their values, including strict abstinence, and thus may give rise to a non-contingent, “rule-governed” abstinence goal (i.e., not using no matter what happens). Similarly, as in professional “talk therapies,” the more verbally active an individual is in 12-step meetings, the more likely they are to benefit. This finding also replicates a recent result in an adolescent outpatient sample (14–19 years) that showed an independent incremental effect of verbal participation during meetings (Kelly and Urbanoski, 2012).

With respect to aspects of active 12-step involvement related to reductions in PDHD, more contact with other 12-step members outside of meetings and working the 12-steps both made additive, independent contributions to reducing heavy drinking. It is unclear exactly why different aspects of involvement relate to different outcomes, but at this stage, it may be clinically prudent to recommend attending and verbally participating during meetings, working the 12 steps, and engaging with other 12-step members outside of meetings.

4.1 Limitations

The non-experimental manipulation of the independent variable may mean that factors other than 12-step participation may be responsible for outcome variability. Attrition at 12-month follow-up was high and although we attempted to control for this statistically, generalizations should be made cautiously. The setting was a private SUD residential facility and although participants were largely similar to same-aged publicly treated patients, results may not generalize to all public programs. Also, the extent to which these results may generalize to outpatient settings is unknown. Although biological assays were collected on a sub-sample, assessment of 12-step and other variables relied mostly on self-report. Finally, the high rates of 12-step participation and observed related benefits may not generalize to programs that do not emphasize the 12-step philosophy as strongly.

4.2 Conclusion

As noted by Hser and colleagues (2011), recognition of individuals' life-stage is key, as it highlights important contextual risk and protective factors that may influence the clinical course of SUD and subvert or bolster recovery efforts. Clinical and epidemiological data from the U.S. suggest that emerging adulthood is the life-stage that poses the highest risk for licit and illicit drug use and the onset of SUD. Consequently, when viewed from a life-course perspective, it represents a phase of development wherein low-risk, substance-free, environments and recovery supports may be sparser than at any other point across the lifespan. Findings here indicate that more severely substance-involved emerging adults participate in and benefit from 12-step organizations following treatment and that active involvement may be particularly valuable in helping sustain recovery over time. As such, these continuing care resources may provide an easily locatable and freely accessible recovery-supportive social context for emerging adults during a developmental phase in which such support is comparatively scarce.

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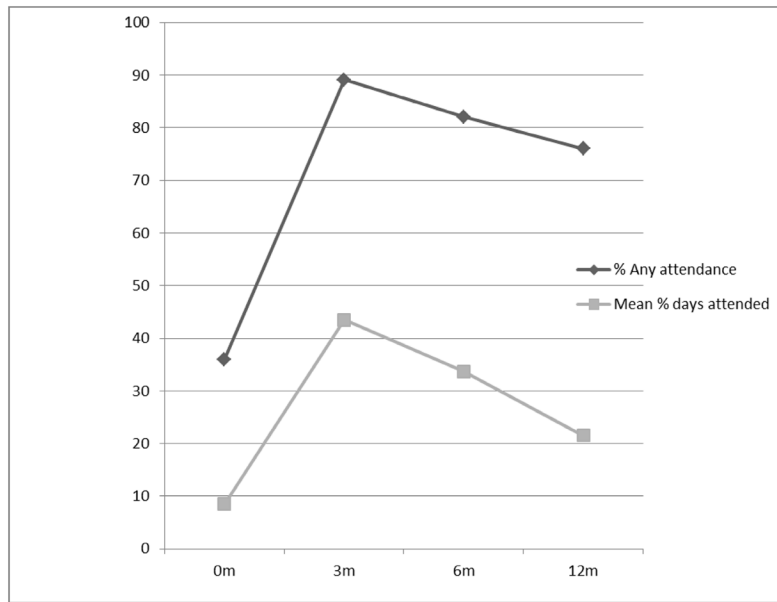


Figure 1. Proportion of Sample attending any 12-step meetings and mean % days attended across time.

Table 1
Levels of 12-step Attendance and indices of 12-step involvement over the follow-up period

	0m	3m	6m	12m
Attended <i>any</i> 12-step meetings (%)	36.0	89.12	82.11	76.06
Mean% (SD) 12-step attendance	8.5 (20.28)	43.49 (32.01)	33.73 (27.21)	21.53 (20.91)
Mean% (SD) 12-step Involvement	1.47 (2.35)	5.69 (2.53)	5.26 (2.97)	5.04 (3.16)
Had Sponsor (%)	13.58	63.52	59.36	53.74
Met with sponsor outside meetings (%)	12.58	62.70	57.53	53.74
Met with other 12-step members (%)	20.07	78.93	74.77	72.17
Consider self a 12-step member (%)	25.50	83.20	74.89	72.43
Verbally participated in meetings (%)	27.15	83.20	76.71	74.77
Read 12-step literature (%)	21.40	75.93	67.89	63.21
Helped setup meetings (%)	10.26	42.21	47.03	50.00
Worked 12-steps (%)	17.00	81.22	68.95	66.04

Table 2

HLM Models of the lagged effects of a) 12-step attendance, b) 12-step involvement, and c) both, at 3m and 6m follow-ups on subsequent PDA and PDHDat 6m and 12m outcomes.

	PDA					PDHD				
	b	B	SE	F	p	b	B	SE	F	p
PDA/HDD 0m	-0.026	-0.012	0.131	0.040	0.841	0.163	0.168	0.053	9.29	0.003
Commitment to sobriety 0m	0.489	0.309	0.102	23.05	0.000	-0.066	-0.188	0.021	9.67	0.002
Gender	-0.260	-0.070	0.218	1.43	0.234	0.037	0.044	0.045	0.66	0.419
Education	0.060	0.113	0.031	3.68	0.057	-0.011	-0.098	0.006	3.18	0.076
Prior SUD treatment 0m	-0.568	-0.152	0.230	6.12	0.014	0.173	0.209	0.048	12.85	0.000
12-step social 0m	-0.023	-0.125	0.012	3.70	0.056	0.003	0.072	0.003	1.41	0.236
SOCRATES Ambivalence	-0.012	-0.034	0.024	0.26	0.613	0.005	0.068	0.005	1.15	0.284
SOCRATES taking steps	0.010	0.046	0.015	0.44	0.510	0.001	0.012	0.003	0.03	0.862
Time	0.460	0.139	0.203	5.14	0.025	-0.095	-0.130	0.050	3.66	0.057
12-step attendance	0.008	0.146	0.004	5.64	0.019	-0.002	-0.132	0.001	3.49	0.063
12-step attendance*time	-0.003	-0.055	0.004	0.45	0.505	0.001	0.073	0.001	0.66	0.418

	PDA					PDHD				
	b	B	SE	F	p	b	B	SE	F	p
PDA/HDD 0m	0.063	0.028	0.119	0.28	0.595	0.177	0.183	0.051	12.25	0.001
Commitment to sobriety 0m	0.348	0.220	0.093	13.95	0.000	-0.038	-0.108	0.020	3.41	0.066
Gender	-0.288	-0.077	0.196	2.14	0.145	0.049	0.059	0.043	1.27	0.261
Education	0.069	0.130	0.028	5.97	0.015	-0.014	-0.119	0.006	5.26	0.023
Prior SUD treatment 0m	-0.558	-0.150	0.204	7.45	0.007	0.180	0.218	0.045	15.91	0.000
12-step social 0m	-0.023	-0.125	0.011	4.82	0.029	0.002	0.050	0.002	0.80	0.371
SOCRATES Ambivalence	-0.011	-0.031	0.021	0.26	0.612	0.004	0.057	0.005	0.91	0.343
SOCRATES taking steps	0.007	0.031	0.014	0.24	0.625	0.002	0.035	0.003	0.30	0.586
Time	0.065	0.020	0.243	0.07	0.790	-0.066	-0.090	0.061	1.18	0.278

b)

	PDA					PDHD				
	b	B	SE	F	p	b	B	SE	F	p
12-step involvement	0.151	0.219	0.042	31.27	0.000	-0.034	-0.219	0.010	18.81	0.000
12-step involvement*time	0.076	0.128	0.049	2.46	0.118	-0.001	-0.008	0.012	0.01	0.931

c)

	PDA					PDHD				
	b	B	SE	F	p	b	B	SE	F	p
PDA/HDD 0m	0.008	0.004	0.122	0.00	0.945	0.171	0.177	0.052	10.94	0.001
Commitment to sobriety 0m	0.384	0.242	0.098	15.30	0.000	-0.046	-0.130	0.021	4.61	0.033
Gender	-0.205	-0.055	0.204	1.01	0.315	0.031	0.037	0.044	0.49	0.483
Education	0.064	0.120	0.029	4.77	0.030	-0.013	-0.107	0.006	4.09	0.045
Prior SUD treatment 0m	-0.367	-0.099	0.218	2.83	0.094	0.137	0.166	0.047	8.40	0.004
12-step social 0m	-0.030	-0.159	0.011	6.74	0.010	0.004	0.092	0.002	2.42	0.121
SOCRATES Ambivalence	0.001	0.003	0.022	0.00	0.964	0.003	0.042	0.005	0.47	0.496
SOCRATES taking steps	0.001	0.004	0.014	0.00	0.954	0.002	0.046	0.003	0.48	0.488
Time	0.117	0.035	0.258	0.20	0.651	-0.075	-0.102	0.064	1.38	0.242
12-step attendance	0.009	0.171	0.004	0.91	0.342	-0.001	-0.105	0.001	0.17	0.681
12-step attendance*time	-0.014	-0.258	0.005	7.23	0.008	0.002	0.175	0.001	2.83	0.094
12-step involvement	0.101	0.146	0.046	24.56	0.000	-0.026	-0.171	0.011	15.19	0.000
12-step involvement*time	0.176	0.293	0.060	8.65	0.004	-0.016	-0.122	0.015	1.22	0.270