

Substance Use and Mental Health Treatment Retention among Young Adults



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Abstract

In Western and European cultures where marriage and parenthood are increasingly delayed to the late twenties and early thirties, a distinct developmental stage between adolescence and adulthood has been described as “emerging” or “young” adults. Development theory suggests that these “younger” adults have less social control and exercise higher levels of impulsivity and risky behavior than their older counterparts. This study examined the effect of age on treatment retention among adults with co-occurring substance use and mental health disorders enrolled in private, residential treatment. Study participants included 929 adults (198 young adults, 18-25 years, and 761 older adults, ≥ 26 years) receiving private residential treatment in the U.S. Bivariate analyses, life tables, and Cox regression (survival analyses) were used to examine the effects of age on treatment retention.

Introduction

In Western and European cultures where marriage and parenthood are increasingly delayed to the late twenties and early thirties, a distinct developmental stage between adolescence and adulthood has been described as “emerging” or “young” adults [1]. As these individuals make the transition from adolescence to adulthood, when parental or authoritative and protective influences weaken, they begin to explore possible life directions in love, work, and worldviews and a new level of social freedom and responsibility is experienced. The period of emerging adulthood is filled with both opportunities and challenges. Explorations of love, work, and worldviews are fraught with the possibility of romantic rejection, failure to find work that is satisfying and meaningful, and disillusionment with the world’s inequities and realities [1]. Developmental theory suggests that these “younger adults” have less social control and exercise higher levels of impulsivity than their older counterparts.

Thus, the years of young adulthood are defined not only by age and increased social responsibilities and pressures, but also by increased risky behavior. Young adulthood is a period that is developmentally associated with biological, psychological,

social, and cognitive changes, along with increases in risk-taking, such as substance use [2]. According to White House estimates, three million young adults gained health insurance coverage as a result of the Affordable Care Act [3]. The increase of young adults’ coverage, representing a return to pre-recession rates, is primarily a result of expanded dependent coverage [4]. In addition, approximately 60 million Americans have gained expanded mental health and substance use disorder benefits and/or federal parity protections [3].

These changes are particularly important because young adults between the ages of 18 and 25 have higher rates of substance use than any other age group [4]. The median age of onset for substance related disorders in the United States is 20 years of age [5]. The rate of substance use disorder among adults aged 18 to 25 (22.0%) is 2.3 times higher than that among youths aged 12 to 17 (9.4%) and 2.6 times higher than among adults aged 26 or older (8.3%) SAMHSA (50). In a recent national sample of young adults aged 18-25 years of age, 59.6% reported current alcohol use, 10.8% reported heavy alcohol use, and 37.7% reported binge drinking (50). Of particular note, college age adults (18-22 years old) enrolled as full-time college

students have higher binge drinking rates (39.0%) than those enrolled part-time in college or not enrolled in college (33.4%) [49]. Among adults 26 years and older the rates of heavy alcohol use and binge drinking steadily decline with increasing age [49].

Since 1980, college students have consistently displayed the highest rates of heavy drinking as compared to high school seniors and non-college students of the same age [6]. The developmental transition during the college years is often associated with the initiation and escalation of heavy drinking, which in turn can be associated with later life challenges that involve alcohol and other drugs [7]. Heavy drinking and the associated risks remain a high priority for universities since many of the consequences hamper student learning [8]. The impact of heavy drinking in this population also includes disturbances in physical and mental health, social and peer functioning, academic performance, and legal issues [8].

Current research indicates that students who drink heavily do not learn from past consequences and often overestimate the quantity of a period after [9] alcohol they can consume without experiencing adverse effects [9]. High school seniors transitioning to college exhibit similar alcohol and substance use trends. The 2013 Monitoring the Future study found that 68.2% of high school seniors in a nationwide sample had consumed alcohol and 50.4% had used illicit drugs within their lifetime [10]. Results also revealed attitudinal shifts in students' perceptions of regular marijuana use, with 60% of 12th grade students viewing regular use as not harmful. Over the last decade, the number of young adults who view marijuana as harmful has diminished greatly, while rates of marijuana use have increased. The increased use of marijuana combined with the perception of less harm among young adults preparing to leave for college could be indicative of future increases in use among this population [11].

Among young adults living outside their parent's home over the past 20 years there is a higher likelihood of marijuana and alcohol use [12] and college students living on campus are five times more likely to initiate marijuana use than students who live off campus [13]. The number of college students using any illicit drug has risen incrementally since 2006, with the increase being largely attributed to higher instances of marijuana use [14]. The annual prevalence of marijuana use among college students in 2013 was 36 percent [10]. Initiation of cannabis use in college freshman is associated with several other factors, including disposable income, other illicit substance use, and tobacco and alcohol use [13]. Cannabis is used primarily to support social functioning and interactions among college [15].

Young adults have the highest rates of use of prescription opioid pain relievers, stimulants for the treatment of ADHD, and anti-anxiety drugs [48]. While heroin use among Americans aged 18-25 years increased 109% from 2002-2004 and 2011-2013 and increased 58% among Americans 26 years and older, the greater epidemic is dependence on prescription painkillers

in the U.S [49]. People are 40 times more likely to be addicted to heroin if they are addicted to prescription (opioid) painkillers [49]. Nine in 10 people who use heroin use it with at least one other drug, and most use at least three other drugs SAMHSA [49]. Opiate abuse is associated with a greater risk of HIV, hepatitis, and premature death. Hepatitis C incidence rates remain high, especially for young adults who are injection drug users [16]. Although declines were evident among reported cases overall during 2002-2009, an increase was observed among cases in the 15-24 year age group, representing an epidemic related to intravenous drug use among young adults [17].

In addition to substance use, co-occurring mental health disorders are an added challenge for young adults. Individuals with SUDs experience mental health disorders at higher rates than those without SUDs [18]. Young adulthood is a period of particular risk for mental health disorders. Of individuals who will experience a mental health disorder during their lifetime, 75% will be diagnosed by age 24 [19]. Nearly half of emerging adults are estimated to have had a mental health disorder in the prior year [20] and they have triple the suicide rate of their adolescent (12-17 year old) counterparts [19].

Young adults are more likely to stop substance abuse behaviors or to enter treatment as a result of negative consequences [21,22]. They are also less likely to be self-motivated to enter treatment for substance abuse problems [23]. Smith & colleagues [22] found that young adults are more likely to stop substance abuse behaviors as a result of external factors rather than as a result of damaged or diminished interpersonal relationships [22]. College students, in particular, are less likely to recognize the need for treatment or to seek help [24].

Young adult peer groups and social networks can have a strong impact on behavior. However, it is more common for young adults to be influenced to drink more than to be influenced to drink less [25]. In contrast, studies suggest that positive peer support is a key factor in maintaining sobriety [24]. Recent evidence suggests that the link between peer group and individual substance use patterns extends to online relationships [26].

Characteristically different from older adults at treatment intake. [27], young adults may require different programming components and interventions than their older counterparts [1,28]. For example, as age increases, higher levels of internal motivation, greater lengths of stay and higher rates of post-treatment abstinence are reported [29]. Younger adults and college students also respond differently to substance use treatment programming when compared to older adults [29]. As increasing numbers of young adults are able to access behavioral health services through expanded healthcare coverage, understanding the ways this subgroup differs from other segments of the general population will become increasingly important. One measure of treatment success is treatment retention. Treatment retention is a widely used proxy for

treatment outcomes such as substance use relapse, recidivism to crime, and sustained recovery. Factors related to both treatment program characteristics and individual patient characteristics have been investigated for their impact on retention in treatment [30].

Longer periods of treatment engagement are also associated with lower readmission rates, [31] and longer length of stay in treatment is associated with better treatment outcomes including lower post-treatment substance use rates [30,32]. Although the significance of remaining in treatment is well established, leaving treatment prior to completion or against clinical advice remains a treatment concern [33] and is associated with less desirable treatment outcomes [34].

Most personal and substance use characteristics have been found to be inconsistent predictors of treatment retention and outcomes [35-38]. Age is the only socio-demographic characteristic that consistently predicts retention in substance abuse treatment regardless of gender, with older age associated with longer lengths of stay [39-41].

In summary, although the literature commonly describes risky behaviors during adolescence, several of the risk behaviors peak in the ages 18-25. The developmental dynamics of emerging adulthood are also associated with risk behaviors [6] that appear to rapidly decline following marriage and again after the birth of children typically in late twenties or early thirties [6]. Little research has investigated the characteristics and treatment behaviors, such as treatment retention, in young adults who attend private, residential substance abuse and mental health treatment. To address this research gap, the purpose of this study was to explore treatment retention in a sample of adults who enrolled in residential treatment for co-occurring substance use and mental health disorders. The study was designed to examine the effect of age on treatment retention in private residential dual diagnosis treatment. To that end, we were guided by two research questions:

- a. Is there a difference in treatment retention between young adults and older adults? And
- b. What factors influence treatment retention in each age group?

Methods

All participants received evidence-based individual and group interventions at one of three residential facilities operated by Foundations Recovery Network, a private for-profit provider of integrated treatment for mental health and substance use disorders. Though the treatment centers are located in Tennessee and California, participants were drawn from across the United States and Canada. Participants received an intake assessment by a multidisciplinary team, which provided the basis for an individual treatment plan to address substance use, psychiatric disorder, and medical and social service needs. Co-occurring disorders were assessed and monitored over the

course of treatment starting with initial screening, assessment, and psychiatric evaluation. Each participant was assigned to one of the program's clinicians who utilize the information gathered through initial screening and assessment to develop an initial treatment plan with the patient during an initial individual session during the first week of treatment.

Ongoing psychiatric and individual therapy sessions were provided in conjunction with weekly treatment team meetings to update each patient's treatment plan. This process provided input from a multidisciplinary team in order to thoroughly assess co-occurring disorders throughout treatment as symptoms may change or become clearer during the course of treatment. The typically expected length of stay was between 28 and 40 days, however, recommended treatment duration was individualized based on clinical assessment and medical necessity. A total of 959 patients who entered treatment between February 1, 2008 and July 31, 2010 agreed to participate in the study. A trained intake staff member described the evaluation design, obtained informed consent, and collected baseline data. Follow-up data was collected at one-, six-, and twelve-months post discharge. A community-based Institutional Review Board reviewed and approved the study protocol to assure the protection of human subjects.

Measurement

Addiction Severity

The scalable questions that make up the composite indices of the Addiction Severity Index (ASI) [42] were utilized to measure addiction severity. The ASI was developed to measure problem severity in each of seven potential problem areas that include: medical, employment, alcohol, drug, legal, family/social and psychiatric problems. In order to ensure that each question within a given problem area is given the same weight in calculation of the composite score each item in a subscale is divided by its maximum value and by the total number of questions in a composite. This scoring yields a score from 0-1 for each composite index.

Readiness for Change

The University of Rhode Island Change Assessment (URICA) [43] is a measure of readiness to change that has been studied with a range of different populations. The instrument consists of 32 statements that subjects endorse on a 5-point scale from strongly agree to strongly disagree. The URICA yields scores on each of four scales corresponding to the stages of change described by DiClemente & Norcross [44] period-contemplation, Contemplation, Action, and Maintenance. The scores from these sub-scales are used to create a Readiness to Change composite score by adding the Contemplation, Action, and Maintenance scores and subtracting the Pre-Contemplation score. The Readiness to Change score was derived for this study in the same manner used in Project MATCH [45]. The average Contemplation, Action, and Maintenance scores were added

and the Pre-contemplation score was subtracted from the sum. Treatment Retention. Treatment retention was operationalized as length of stay, calculated as the total number of days between program start date and discharge date.

Data Analysis

Initial analyses consisted of basic descriptive statistics and bivariate analyses to identify and examine group differences on pre-treatment demographic and use-related variables as well as components of treatment retention. A life table was then developed to investigate the trajectory of treatment retention by age group and finally, Cox regression was employed to investigate the impact of various predictors of treatment retention by age group. The Cox regression allowed for the unbiased analysis of time to event data controlling for covariates. The event of interest in the current study is a discharge from treatment. Like logistic regression, the exponential of the coefficients from 97% of the young adults and 87.4% of the older adults.

the Cox model provides the relative risk of the odds for the covariate but Cox regression also proves superior to ordinary least squares regression (OLS) by allowing for censoring of persons who discontinued or did not experience the event (treatment retention in the current study) during the study period.

Results

Descriptive Analysis

The results of descriptive analyses are presented in Table 1. The mean age of the total sample (n=959) was slightly older than 37 years, with patients ranging from 18 to 74 years of age. Approximately 20% of the sample (n=198) was between the ages of 18 and 25. Overall, 41.5% of the participants were female with 37.4% of the young adults and 42.6% of older adults being female. The sample was primarily Caucasian: 89.4% overall and

Table 1: Sample Description.

	Young Adults (18-25) N=198 (59.1%)	Older Adults (26 & older) N=761 (40.9%)	P Value	Total Sample N=959
	Mean (SD)	Mean (SD)	p value	Mean (SD)
Age	20.79 (1.93)	41.24 (9.78)	<.001	37.02 (12.05)
ASI: Medical	.20 (.31)	.29 (.38)	<.01	.27 (.36)
ASI: Employment/Support	.47 (.26)	.39 (.27)	<.001	.41 (.27)
ASI: Alcohol	.22 (.27)	.42 (.34)	<.001	.38 (.34)
ASI: Drug	.24 (.15)	.15 (.15)	<.001	.17 (.16)
ASI: Legal	.21 (.26)	.09 (.19)	<.001	.12 (.21)
ASI: Family/Social Relationships	.32 (.25)	.30 (.27)	n.s.	.30 (.26)
ASI: Psychiatric	.51 (.19)	.49 (.21)	n.s.	.49 (.21)
Readiness for Change	10.62 (1.46)	10.82 (1.59)	n.s.	10.77 (1.56)
Precontemplation	1.70 (.54)	1.66 (.51)	n.s.	1.67 (.52)
Contemplation	4.39 (.43)	4.42 (.44)	n.s.	4.41 (.44)
Action	4.23 (.49)	4.29 (.47)	n.s.	4.28 (.47)
Maintenance	3.70 (.57)	3.77 (.65)	n.s.	3.76 (.63)
Days in Treatment*	35.33 (23.37)	31.60 (20.14)	<.05	32.38 (20.89)
	N (%)	N (%)		N (%)
Treatment Retention at 30 days-Yes	98 (49.5)	301 (39.6)	<.05	399 (41.6)
Gender Female	74 (37.4)	324 (42.6)	n.s.	398 (41.5)
Race/Ethnicity				
African American	4 (2.0)	82 (10.8)	<.001	86 (9.0)
Caucasian	192 (97.0)	665 (87.4)	<.001	857 (89.4)
Latino	2 (1.0)	14 (1.8)	n.s.	16 (1.7)
Employment in last 30 days-Yes	82 (41.4)	451 (59.3)	<.001	533 (55.6)
Type of Substance Use Disorders				

Alcohol	131 (66.2)	567 (74.5)	<.05	698 (72.8)
Cocaine	56 (28.3)	186 (24.4)	n.s.	242 (25.2)
Cannabis	123 (62.1)	177 (23.0)	<.001	300 (31.3)
Opioid	113 (57.1)	240 (31.5)	<.001	353 (36.8)
Multiple Drug	138 (69.7)	367 (48.2)	<.001	505 (52.7)
Others	2 (1.0)	14 (1.8)	n.s.	16 (1.7)
Type of Mental Health Disorders				
Major Depression	147 (74.2)	589 (77.4)	n.s.	736 (76.7)
Anxiety Disorder	175 (87.9)	634 (83.3)	n.s.	808 (84.3)
Mood Disorder	58 (29.3)	279 (36.7)	n.s.	337 (35.1)
Bi-Polar Disorder	3 (1.5)	8 (1.1)	n.s.	11 (1.1)
Eating Disorder	2 (1.0)	6 (0.8)	n.s.	8 (0.8)
ADHD	3 (1.5)	7 (5.9)	n.s.	10 (1.0)
Dementia	5 (2.5)	12 (1.6)	n.s.	17 (1.8)
Missing	8 (4.0)	37 (4.9)	n.s.	45 (4.7)

Statistically significant differences were found between young and older adults on five of the seven ASI composite indices. Younger adults entered treatment with greater severity on the drug, legal, and employment subscales and lesser severity on the medical and alcohol subscales. Younger adults were less likely to be employed in the 30 days prior to intake and were also less likely to have used alcohol within the 30 days prior to treatment. Younger adults were more likely to report using cannabis, opioids, or multiple drugs in the 30 days prior to admission. There were no significant differences in readiness to change scores, ASI composite indices for relationships and psychological issues or gender between the two groups at intake. There were also no statistically significant differences in days of use prior to treatment between younger and older adults for cocaine, sedatives or hallucinogens. Additionally, there were no statistically significant differences on mental health diagnoses between younger and older adults at admission (Table 1).

Results of the young adults Cox regression model indicate that three variables were associated with the likelihood of remaining in treatment. The probability of remaining in treatment was reduced by 32.4% for young adult females when compared to their male counterparts (p=.03). The probability of young adults remaining in treatment was also significantly associated with their ASI employment subscale score. Higher severity of substance use-related employment problems resulted

in a lower likelihood of remaining in treatment (p=.018). A one-unit increase in employment severity reduced the likelihood of remaining in treatment by 59.8%. In addition, young adults who scored higher on the contemplation subscale of the URICA at treatment entry were less likely to remain in treatment (p=.021). In this case, being a young adult and entering treatment in the contemplative stage of change reduced the probability of remaining in treatment by 50.5%.

Older adult retention was predicted by four factors. Similar to younger adults, female adults over the age of 25 were less likely to remain in treatment than their male counterparts (p=.007). The probability of remaining in treatment for female patients over 25 years of age was reduced by 23.2% as compared to males in the same age group. When compared to a mood disorder, patients over the age of 25 who had a diagnosis of dementia were two times more likely to remain in treatment (p=.033). Also similar to younger adults, greater severity on the ASI subscale score for employment reduced the probability of remaining in treatment for adults over 25 years of age by 37% for every one-unit increase in severity. Finally, adults over the age of 25 were less likely to remain in treatment as their ASI psychiatric composite scores increased (p=.004). The likelihood of remaining in treatment was reduced by 61.6% for each unit increase in severity of the psychiatric subscale score (Table 2).

Table 2: Cox Regression Models for Treatment Retention.

Variables	Model for Young Adults					Model for Adults				
	B	SE	Exp (B)	P-Value	95% CI	B	SE	Exp (B)	P-Value	95% CI
Female	-.392	.181	.676	.030	(.474-.963)	-.264	.098	.768	.007	(.634-.929)
Caucasian ¹	-.089	.450	.915	.843	(.379-2.209)	-.224	.136	.799	.099	(.613-1.043)
Employed in last 30days--yes	-.334	.208	.716	.108	(.476-1.076)	-.095	.118	.909	.419	(.722-1.145)
Opiate Abuse/Dependence	.361	.249	1.435	.147	(.881-2.339)	.237	.146	1.268	.103	(.953-1.687)

Cocaine Abuse/ Dependence ²	-.129	.303	.879	.670	(.486- 1.591)	-.261	.143	.770	.067	(.582- 1.019)
Cannabis Abuse/ Dependence ²	.223	.273	1.249	.415	(.732- 2.133)	-.203	.229	.816	.375	(.521- 1.278)
Poly Substance Abuse/ Dependence ²	.006	.253	1.006	.982	(.613- 1.651)	.082	.168	1.086	.623	(.782- 1.508)
Depression	.128	.244	1.136	.601	(.704- 1.834)	.267	.146	1.307	.066	(.982- 1.738)
Anxiety Disorder ³	-.071	.308	.931	.816	(.510- 1.701)	-.029	.158	.972	.855	(.713- 1.324)
Bipolar ³	.306	.791	1.358	.698	(.288- 6.396)	-.752	.831	.472	.366	(.092- 2.406)
Eating Disorder ³	-.245	.806	.783	.761	(.161- 3.801)	-.607	.521	.545	.243	(.196- 1.512)
ADHD ³	1.085	.642	2.958	.091	(.840- 10.420)	-.218	.523	.804	.676	(.289- 2.239)
Dementia ³	.053	.505	1.054	.917	(.392- 2.835)	.743	.349	2.103	.033	(1.061- 4.169)
Missing Mental Disorders--Yes	-.031	.468	.969	.947	(.388- 2.423)	.410	.265	1.506	.122	(.896- 2.532)
ASI: Medical	-.102	.267	.903	.703	(.535- 1.525)	-.131	.126	.877	.298	(.685- 1.123)
ASI: Employment	-.911	.385	.402	.018	(.189- .855)	-.461	.210	.630	.028	(.418- .951)
ASI: Alcohol	.564	.343	1.758	.100	(.897- 3.445)	.034	.155	1.034	.829	(.762- 1.403)
ASI: Drug	.638	.652	1.894	.327	(.528- 6.792)	.133	.376	1.142	.724	(.547- 2.386)
ASI: Legal	.273	.317	1.314	.389	(.706- 2.448)	-.481	.260	.618	.065	(.371- 1.030)
ASI: Family/Support	-.008	.348	.992	.982	(.502- 1.962)	-.229	.181	.795	.207	(.557- 1.135)
ASI: Psychiatric	-.915	.618	.401	.139	(.119- 1.347)	-.957	.330	.384	.004	(.201- .733)
Readiness to Change										
Precontemplation	-.124	.211	.883	.557	(.584- 1.336)	-.069	.118	.933	.557	(.740- 1.176)
Contemplation	-.704	.306	.495	.021	(.272- .901)	-.075	.169	.928	.658	(.666- 1.293)
Action	-.035	.229	.965	.878	(.617- 1.512)	.120	.132	1.128	.360	(.872- 1.460)
Maintenance	-.134	.164	.874	.413	(.634- 1.206)	-.054	.077	.948	.486	(.815- 1.102)
-2 Log Likelihood	1547.639					5780.432				
χ^2 , df, p-value	40.405, 25, .026*					84.999, 25, .000***				

¹African American and Latino were the reference group.

²Alcohol abuse/dependences and others were the reference group

³Mood disorders was the reference group

The survival lines, indicating time to discharge for both young and older adults, are illustrated in Figure 1. Survival lines remain similar for the first 20 days of treatment. However, after 25 days the lines split into different trajectories that continue to broaden as time progresses. At 30 days, approximately 50% of young adults remained in treatment compared to less than 40% of older adults. Comparison of the survival lines was performed using the Wilcoxon (Gehan) statistic (5.196, $df=1$, $p < .05$). This result further highlights the statistical significance of the differences in the trajectories of these lines (Figure 1).

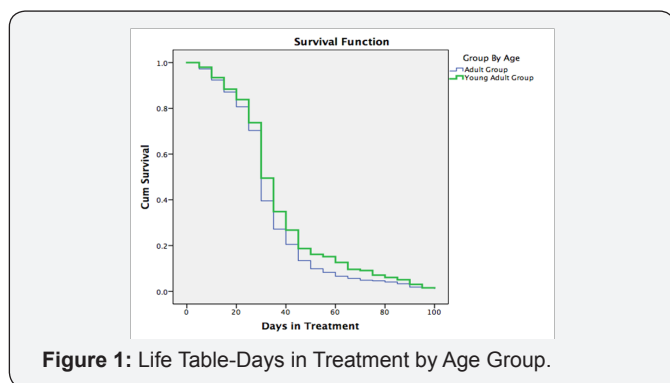


Figure 1: Life Table-Days in Treatment by Age Group.

Discussion

Historically, age has been a consistent predictor of treatment retention. Unlike many prior studies that found older age predicted longer length of stay in treatment, this study found that the young adult age group (18-25) remained in treatment longer than the group of adults age 26 and older. During the first 25 days there was little difference in retention between the two groups, but at 30 days only 40% of adults over age 26 remained in treatment while 50% of the younger adults remained in treatment. This separation in retention between the two age groups was sustained over the next 60 through 90 days when the retention within both groups became essentially the same. A higher rate of employment in older adults at treatment admission is one possible explanation for the disparity in retention observed between the two groups. Older adulthood is more likely to include greater social and familial responsibilities, which might require these patients to return home earlier than their younger counterparts.

Young adults presented to treatment with greater severity of legal issues, which may motivate them to remain in treatment longer. This finding would be consistent with findings that young adults are more likely to be externally motivated to address substance use problems [22,23,46]. Although there were not significant differences in the severity of the family and social relationships, it is possible that external support or pressure could also influence young adults' decisions to remain in treatment longer. Similarly, young adults may be more influenced by peer groups [24] such as those found in therapeutic communities, which could also have contributed to the differences seen in retention. In a Canadian study examining

motivation to treatment among young adults ages 16-24 entering outpatient substance use treatment, [23] found that peer pressure to reduce alcohol or substance use was positively correlated with supportive treatment motivation and was not perceived as coercion.

This was in contrast to parental pressure to reduce alcohol or substance use which was perceived as external coercion [23]. Similar perceptions of peer pressure to enter treatment as supportive and parental pressure to enter treatment as coercive hold opportunities for engaging peer support and peer messaging to motivate retention in treatment Goodman et al. [23]. Peer support promotes self-efficacy and also provides an opportunity for individuals to actively engage in treatment through leadership and modeling within the group treatment setting [50]. Finally, it is possible that programming was a determining factor in the decision to remain in treatment. Relevant and timely treatment programming that sufficiently engaged the younger adult group to remain in treatment may have tipped the balance in young adults, especially in combination with other factors listed above.

The older age group had greater severity of alcohol and medical problems and nearly 60% had been employed in the 30 days prior to admission. This is not surprising given the emergence of physical health problems associated with aging such as hypertension, cardiovascular disease, stroke, cancer, diabetes, obesity, arthritis, excess alcohol use, tobacco use, depression and dementia which are exacerbated by heavy alcohol use [47]. This finding is congruent with national findings that current, binge, and heavy alcohol use are highest among the age group 21-25 year olds, current, binge, and heavy alcohol use remains high with only a gradual decrease over time across the remaining adult age groups. While the short-term risks of excess alcohol use and binge drinking include injuries such as motor vehicle crashes, violence such as sexual assault, intimate partner violence or suicide, alcohol poisoning, risky sexual behaviors and adverse birth outcomes, the cumulative health effects of over time are associated with chronic diseases identified above [47].

The young adult group had greater severity of drug, legal, and employment/support problems and a pattern of cannabis, opioid, and multiple drug use compared to the older adults. This is also not a surprising finding given national survey findings that young adults age 18 to 25 have the highest use of all categories of illicit drugs (21.5%) and marijuana (19.1%) compared to adults 26 and older use of illicit drugs (7.3%) and marijuana (5.6%). While the number of new nonmedical users of pain relievers in 2013 (1.5 million) was lower than the numbers in 2002 through 2012 (ranging from 1.9 million to 2.5 million), it is important to note that the average ages at first nonmedical use was 21.7 years for pain relievers. Other first nonmedical uses of psychotherapeutics in 2013 were 21.6 years for stimulants, 25.0 years for sedatives, and 25.4 years for tranquilizers [48-50].

With the legalization of medical marijuana and recreational marijuana in a small but increasing number of state laws, over 53% of Americans favored legalization of marijuana Pew Report [51], and adolescents aged 12 to 17 have a decreasing perceived risk of marijuana use indicating smoking marijuana once or twice a week from 54.6% in 2007 to 39.5% in 2013. Decrease in perceived risk is commonly associated with increased use of substances, further contributing to the mix of polysubstance use. The two age groups differed in the predictors of treatment retention. Young adults were more likely to leave treatment prematurely if they were female, had greater employment severity, and scored highest on the Contemplative Stage in the Readiness to Change Assessment.

The older adults were more likely to leave if they were female, had a mental health diagnosis of dementia, and had greater severity on employment composite subscale and the psychiatric composite subscale of the ASI. Women in both the young adult and older adult groups were more likely to leave treatment prematurely than men in both age groups. Gender as a predictor of treatment retention has mixed findings with studies reporting shorter treatment retention for women primarily reported in programs specifically designed for women-only within the context of trauma-informed care [52]. A gender-specific group treatment focused on women's substance abuse treatment needs may enhance longer-term clinical outcomes for women with substance use disorders [8].

Collectively, these findings suggest that young adults age 18-25 with risky alcohol and substance use pose both challenges and opportunities to engage and retain in effective treatment programs. While legal problems coupled with parental or employer pressure may provide extrinsic motivation causing a young adult to enter substance use treatment, they are more likely to actively engage in treatment if peer support and relevant and timely programming foster intrinsic self-motivation. Recent systematic reviews of psychosocial interventions for substance use disorders for young adults indicate that brief interventions resulted in decreased alcohol intake and alcohol related problems with greater effect size reflected in interventions that included motivational interviewing, decisional balance, and goal-setting exercises [53,54].

Similarly, a systematic review of computer-based interventions identified less substance use, greater motivation to change, improved treatment retention, and increased knowledge about substance use information when compared to treatment as usual [55]. Programs serving younger adults should focus on behaviors associated with multiple substances of abuse as well as illicit drug use [56]. These programs should also consider providing services to address pending legal issues and perhaps extending the length of engagement in therapeutic services to support the timely and successful closure of legal issues. Central to the transition from illicit drug culture for many young adults will be services that support both life skill development and emotional resilience [57,58].

The findings of this study must be considered in light of its limitations. The study was based on data from private sector substance abuse treatment programs with nearly 90% of sample being Caucasian. Although this limits generalizability to other ethnic and minority groups, it is one of the few studies of private sector patients with a large sample size. The study population used here is both a limitation and strength. While it may be limited in generalizability across a broad spectrum of programs, it is one of few studies examining treatment retention in private residential treatment. In conclusion, data collected in this study suggest that there are some important differences in presentation at treatment between adults aged 18-25 and older adults and that these differences may predict length of stay in treatment. By exploring these differences, program administrators can better tailor services to support retention in treatment and improve treatment outcomes.

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