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Socioeconomic Differences in Adolescent Substance Abuse Treatment Participation and Long-term Outcomes

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Abstract

Socioeconomic status (SES) has been consistently linked to poorer access, utilization and outcomes of health care services, but this relationship has been understudied in adolescent substance abuse treatment research. This study examined SES differences in adolescent's treatment participation and long-term outcomes of abstinence and 12-step attendance over five years after treatment. Data are from 358 adolescents (ages 13–18) who were recruited at intake to substance abuse treatment between 2000 and 2002 at four Kaiser Permanente Northern California outpatient treatment programs. Follow-up interviews of adolescents and their parents were conducted at 1, 3, and 5 years, with over 80% response rates across time points. Using parent SES as a proxy for adolescent SES, no socioeconomic differences were found in treatment initiation, treatment retention, or long-term abstinence from alcohol or drugs. Parent education, but not parent income, was significantly associated with 12-step attendance post-treatment such that adolescents with higher parent education were more likely to attend than those with lower parent education. Findings suggest a lack of socioeconomic disparities in substance abuse treatment participation in adolescence, but potential disparities in post-treatment 12-step attendance during the transition from adolescence to young adulthood.

Keywords

Adolescent; Socioeconomic Status; Substance Use Disorder; Treatment Participation; Treatment outcome

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Contributors

Dr. Lui designed the study, led analysis of data, and interpretation of findings. Drs. Sterling, Campbell, and Ms. Chi contributed to interpretation of findings. Ms. Chi and Ms. Lu assisted with variable operationalization and data management. Dr. Lui wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

1. INTRODUCTION

Disparities in substance abuse treatment has received new attention with the implementation of the Affordable Care Act (ACA) and the creation of the federal Office of Behavioral Health Equity to reduce disparities in substance use and improve access to quality care (Mechanic, 2012; Substance Abuse and Mental Health Services Administration [SAMHSA], 2014a). Race/ethnicity has been much of the focus of treatment-related disparities research (Alegria, Carson, Goncalves, & Keefe, 2011; Campbell, Weisner, & Sterling, 2006; Sahker, Toussaint, Ramirez, Ali, & Arndt, 2015; Saloner, Carson, & Lê Cook, 2014) with fewer studies focused on disparities related to socioeconomic status (SES).

SES often serves as a key outcome variable in treatment studies with employment or school enrollment as measures of successful treatment outcomes (Arria, 2003; Balsa, Homer, French, & Weisner, 2009; Hubbard, Craddock, & Anderson, 2003). Yet how SES predicts treatment participation and outcomes is relatively understudied. With increasing social inequalities in the U.S. (U.S. Department of Health and Human Services, 2014), we need to determine the extent of socioeconomic disparities in substance abuse treatment and to identify ways to enhance treatment strategies for SES groups at-risk for poorer treatment participation and outcomes. In this study, we investigate how SES, measured via parent education and income, can help explain who is more likely to participate in adolescent treatment and who has better long-term treatment outcomes.

We focus on socioeconomic disparities in adolescent substance abuse treatment for three reasons. First, an estimated 1.3 million U.S. adolescents aged 12 to 17 (5.4%) had a substance use disorder (SUD) in the past year (SAMHSA, 2014b), and only 9.1% of them received treatment at a specialty facility in the past year (SAMHSA, 2014b). SUD can have a major impact on adolescents' physical and mental development, and lead to long-term effects including unintentional injuries, lower socioeconomic status, and early morbidity/mortality (Fothergill & Ensminger, 2006; Palmer et al., 2009). Therefore, early and effective adolescent substance abuse treatment can help to reduce long-term SUD consequences.

SUD and SES can have a reciprocal relationship in which SUD can influence later SES or lower SES can heighten the risk for later SUD (Schulenberg, Maggs, & O'Malley, 2003). To disentangle the relationship, this study examines SES early in the life course by studying the relationship of parent SES on adolescent SUD and treatment. Given that adolescents are still in school, parent SES is often used as a proxy for adolescents' SES and serves as a foundation from which advantages or disadvantages are passed on to adolescents as they build their own SES trajectory during the transition into adulthood (Furstenberg, 2008; Hanson & Chen, 2007).

Second, an extensive literature has demonstrated a strong and positive association between SES and healthcare utilization and outcomes (Adler & Newman, 2002; Isaacs & Schroeder, 2004). In general, higher SES leads to better access to health care and health outcomes. However, the relationship between SES and substance abuse treatment is not clear. For example, in population-based studies, lower SES was associated with receipt of substance abuse treatment for adults in the National Survey on Drug Use and Health (NSDUH) and

National Epidemiologic Survey on Alcohol and Related Conditions data (Cook & Alegría, 2011; Ilgen et al., 2011). Studies examining adolescents in NSDUH and Monitoring the Future data showed positive relationships between family income and parent education on adolescents' receiving treatment in bivariate analyses, but the relationships did not remain significant in multivariate analyses (Cummings, Wen, & Druss, 2011; Ilgen et al., 2011). In treatment samples, lower education and family income were associated with lower treatment utilization, completion and outcomes among adolescents and adults (Dobkin, Chabot, Maliantovitch, & Craig, 1998; Saloner et al., 2014; Saloner & Lê Cook, 2013). In contrast, two treatment studies showed no significant relationship between parent SES and adolescent treatment outcomes (Anderson, Ramo, Cummins, & Brown, 2010; Chung, Martin, & Clark, 2008). These mixed findings demonstrate the need to better understand socioeconomic differences in treatment participation and outcomes.

Third, as a multidimensional construct, the processes by which SES affects substance abuse treatment may vary by SES dimension (Krieger, Williams, & Moss, 1997; Oakes & Rossi, 2003), and could explain the mixed findings in the SES-treatment research. For example, educational attainment, one dimension of SES, could be indicative of knowledge of the treatment system and comprehension of different treatment options; health-relevant habits and abilities including navigating the treatment system; and social networks or lifestyles that promote or discourage substance use or maintaining treatment regimens or recovery (Crosnoe & Riegle-Crumb, 2007; Ross & Mirowsky, 2011). Income, another SES dimension, could capture purchasing power or the financial resources to obtain substance abuse treatment and opportunities for more specialized treatment. Given the availability of publically-funded treatment programs that minimizes the economic treatment costs, income may not be as salient a measure to capture disparities in treatment participation. Therefore, the strategies used to reduce SES disparities in substance abuse treatment may differ depending on the SES measure.

1.2 Research Questions and Hypotheses

Our primary research questions were: (1) are there socioeconomic differences in adolescent treatment participation and long-term outcomes? and (2) does the relationship between SES and treatment vary by the SES construct of education versus income? Drawing on data from a longitudinal adolescent treatment study, this current study uses a unique sample of socioeconomically-diverse youth who entered substance abuse treatment in Kaiser Permanente Northern California's (KPNC) integrated managed health care plan between 2000 and 2002. Although KPNC serves families with Medicare and Medicaid, a large number of primary KPNC members were employed with a broad range of education and income levels and were racially-ethnically diverse (Gordon, 2000).

Given the socioeconomic diversity of its members, KPNC adolescent treatment data offer a valuable opportunity to study the SES-treatment relationship for several reasons. First, this dataset includes SES measures from parent and adolescent participants, which are not typically collected in treatment studies or administrative data. Second, youth treatment samples are often of high-risk offending youth or youth receiving publicly-funded or community-based treatment services (Adams, Grella, & Hser, 2001; Brown, D'Amico,

McCarthy, & Tapert, 2001; Griffin, Ramchand, Edelen, McCaffrey, & Morral, 2011). Youth in both settings tend to be from lower SES backgrounds, and thus SES-treatment findings from these samples could be biased. Finally, participants were surveyed at intake, and followed for over five years. This longitudinal design provides additional information about treatment outcomes beyond the typical 6- to 12-month follow-up assessments typical in treatment evaluation studies.

In addition to abstinence as an outcome, we examine participation in after-care support through 12-step attendance. SUD recovery extends beyond time in treatment, continues across the life-course for adolescents, and is not merely the absence of symptoms (Joe, Knight, Becan, & Flynn, 2014). Twelve-step participation can be a positive outcome of treatment and encourages abstinence post-treatment (Chi, Campbell, Sterling, & Weisner, 2012; Chi, Kaskutas, Sterling, Campbell, & Weisner, 2009; Kelly, Brown, Abrantes, Kahler, & Myers, 2008; Kelly & Urbanoski, 2012). In this current study, we expect that higher SES will be associated with greater adolescent substance abuse treatment participation, and long-term outcomes of abstinence and 12-step attendance. Given that treatment services are available to all KPNC members regardless of SES and that 12-step support is free, we hypothesize that education, representing parent's knowledge and skills to maximize adolescent treatment benefits, will serve as a stronger SES indicator than income, representing parent's financial resources to access adolescent treatment services.

2. METHODS

2.1. Participants

Adolescents (ages 13–18) were recruited from four KPNC Chemical Dependence Recovery programs, a not-for-profit, integrated health care delivery system between 2000 and 2002. The treatment sites were located in four different Northern California cities that represent geographic and racial/ethnic diversity. Adolescents were eligible for KPNC services through their parents' or guardians' membership. Of the approximately 3 million KPNC members in 2000, 88% were commercially insured, 10% had Medicare, and 2% had Medicaid (or Medi-Cal) (Gordon, 2000). More than three-quarters of KPNC members have at least some college education and two-thirds of families reported household incomes between \$30,000 and \$75,000. Adolescent treatment was provided on an outpatient basis for up to one year and includes supportive group therapy, education, relapse prevention, family therapy, individual counseling, and pharmacotherapy. Programs were abstinence-based with random drug testing. Aftercare support via 12-step programs was highly recommended.

After intake with a clinician, adolescents and their parents were invited to participate in the study by a research assistant. A total of 419 adolescents and their parents (or guardians) agreed to participate (64% recruitment rate). Study participation was independent of receiving treatment and thus, study participants may have completed intake, but did not start treatment. Among all adolescents who started treatment during the recruitment period, the recruitment rate was 83% (Sterling, Kohn, Lu, & Weisner, 2004). At baseline, adolescents completed a computerized self-report and paper-pencil questionnaire, and parents completed a paper-pencil questionnaire. Telephone follow-up interviews with participants and their parents occurred at 6 months (92% response rate [RR]), 1- (92% RR), 3- (85% RR), and 5-

(84% RR) years after intake. Using data from adolescent and parent baseline and follow-up surveys at 1-, 3-, and 5-years, the final analytic sample included 358 adolescents who were not missing on treatment measures and covariates. There were significant differences in gender distribution and treatment length of stay between those in the analytic sample and those not in the sample. The samples were similar on age, race/ethnicity, parent education, and treatment initiation. Thus findings from the analytic sample may be biased towards females and those who remained in treatment longer. Study approval was received from the KPNC's and Public Health Institute's Institutional Review Boards.

2.2. Measures

2.2.1. Key Outcomes

Treatment Participation: Following prior studies using these data (Balsa et al., 2009; Campbell et al., 2006), treatment participation was captured through initiation and retention. Initiation was defined as 2 visits within the first 60 days since intake (1=yes; 0=no). Retention was the total number of weeks within 12 months of intake. Any visits that occurred after a gap of 6 weeks or more were not counted (Campbell et al., 2006).

Treatment Outcomes: Alcohol and drug abstinence and 12-step participation were examined from the 1-, 3-, and 5-year follow-up surveys. Abstinence from alcohol and drugs were captured from the last 30-days. Twelve-step involvement was defined as having attended 10 or more meetings of Alcoholics Anonymous (AA), Narcotics Anonymous or other 12-step group in the past 6 months (Chi et al., 2012; Chi et al., 2009).

2.2.2. Primary Independent Variable

Parent Socioeconomic Status (SES): Parent SES was operationalized as education and income at baseline. Education was coded into high school (HS) grad or less, some college or technical school, and college graduate or more. Annual household income was grouped into less than \$50,000, \$50,000-\$74,999, and \$75,000 and over. We conducted analyses separating the lowest income group into less than \$30,000 and \$30,000-\$49,999, but the groups were similar by demographics and outcomes. A small percentage of parent surveys were completed by a guardian or relative (7%) other than a mother or father figure. Sensitivity analyses excluding participants with non-parent figures showed no significant differences in the final models. Thus we include non-parental figures as parents.

2.2.3. Other Explanatory Factors

Demographics and Intake Characteristics: include self-reported race/ethnicity (Black, Hispanic, White, and other), gender, and age. From the adolescent-reported baseline survey, we included parent history of alcohol or drug problems, participants' criminal justice involvement in last 6 months, and parent as a referral source (Achenbach, 1991; Sterling & Weisner, 2005). The Adolescent Circumstances, Motivation, Readiness, and Suitability Scales for Substance Abuse Treatment (A-CMR) instrument was used to capture external (circumstances), internal (motivation) pressures, and readiness for treatment (Campbell et al., 2006; De Leon, Melnick, Kressel, & Jainchill, 1994). Higher scores indicated more motivation and readiness for treatment.

The Comprehensive Adolescent Severity Inventory (CASI), a semi-structured self-report questionnaire based on the Addiction Severity Index, was used to assess baseline alcohol and drug problem severity (e.g., loss of control, withdrawal, social consequences, and physical dependence) with a higher number indicating greater severity (score 0–14) (Campbell et al., 2006; Meyers, McLellan, Jaeger, & Pettinati, 1995). Other baseline treatment factors included self-perceived need for treatment, perception that treatment was expensive, and parental treatment involvement. Prior studies using these data have found significant differences by Kaiser facility so an indicator to distinguish the four treatment sites was included (Balsa et al., 2009; Campbell et al., 2006).

2.3. Data Analyses

Bivariate analyses were conducted to examine the relationship of each parent SES measure (education and income), covariates and outcomes (treatment initiation and retention, and abstinence and 12-step attendance at 1-, 3-, and 5-year follow-ups). Covariates that did not meet a significance level of $p < 0.20$ with the outcomes were not included in the multivariate models (Hosmer & Lemeshow, 2000). For multivariate models, logistic regression was applied for treatment initiation (binary outcome) and negative binomial regression model for treatment retention (count outcome) given the over-dispersed data on treatment retention (Rosner, 2006). To examine long-term outcomes, separate generalized estimation equation (GEE) models were conducted on repeated measures of alcohol abstinence, drug abstinence and 12-step participation from each follow-up survey. For each outcome, parent SES measures were examined separately in regression models, and then combined together in the final models, accounting for demographics, intake characteristics, treatment factors, and time to capture lagged effects of the outcome.

3. RESULTS

3.1. Treatment Characteristics and Outcomes by Parent SES

Participants included 358 adolescents (M age = 16.2 years (13–18 years); 64.2% male) and their parents who completed baseline and follow-up surveys. Almost one-third of participants had parents with a HS degree or less, 45.5% with some college, and 22.6% with a college degree or higher. Forty percent have parents who reported a household income of \$50,000 or less compared to 30.5% with incomes between \$50,000 and \$74,999, and 29.6% with incomes of \$75,000 or greater.

Table 1 presents sample characteristics and outcomes by parent education and parent income. We found no significant age and gender differences by parent SES, but there were significant racial/ethnic differences. Parents of Hispanic participants were less likely to have college or higher degrees. Parents of White participants were significantly more likely to have higher incomes. Few differences were found by parent SES and intake characteristics (i.e., criminal justice involvement, facility site, treatment as expensive). For outcomes, alcohol or drug abstinence did not significantly differ by parent education or income. While no difference was found for parent income, participants with higher educated parents were significantly more likely to participate in 12-step groups at 3- and 5-year follow-ups.

3.2. Treatment Participation and Outcomes

Neither parent education nor parent income significantly predicted treatment initiation (Table 2). Among those who initiated treatment, a similar pattern of no significant association between parent SES and treatment retention was found.

On average, parent SES did not have a significant effect on alcohol or drug abstinence up to 5 years after treatment (Table 3). For post-treatment care, parent education was a significant predictor of 12 step involvement, but not parent income. Parent education was marginally significant with 12-step involvement from 1- to 5-year follow-up (overall F-test p-value=0.077). There was a significant difference such that participants with a HS educated parent or less were 50% less likely to report 12-step involvement than participants with a college-educated parent ($p=0.029$).

4. DISCUSSION

With such strong evidence of socioeconomic disparities in the general health literature, one would expect SES to predict substance abuse treatment initiation and retention. Theoretically, higher SES affords better resources to participate and adhere to SUD treatment regimens, and the means to provide support for recovery. However, in our sample of socioeconomically-diverse families in a managed care setting, we found no SES differences in adolescent treatment or outcomes of alcohol or drug abstinence up to 5 years after treatment. We did find a significant difference between parent education and 12-step attendance in the years after treatment.

4.1 Treatment Participation

These findings suggest that in an insured, largely employed patient population, SES may not influence adolescent treatment participation. The structure of KPNC's managed care system provides its members the opportunity for equal access to SUD treatment services, regardless of SES. There could be potentially unmeasured factors, (e.g., structure of the treatment system, provider-specific characteristics) that ensure more equity for adolescents seeking treatment. Future studies are needed to investigate whether this lack of disparity remains in other treatment systems and over time. With ACA and Mental Health Parity and Addition Equity Act, use of high deductible benefit plans have increased over the last several years, and patients are expected to contribute greater cost-sharing for services, which may negatively impact access and participation (Claxton, Cox, & Rae, 2015; Claxton et al., 2014). Thus, we should pay close attention as to whether changes in payment plans for treatment services and increased costs for services lead to greater treatment barriers among adolescents.

4.2 Treatment Outcomes

Long-term alcohol or drug abstinence was not related to parent SES which is consistent with two other adolescent treatment studies that accounted for parent SES (Anderson et al., 2010; Chung et al., 2008). Both studies reported non-significant effects of parent SES (via Hollingshead index, a composite measure of parent's occupation and education) on adolescent treatment outcomes of alcohol and drug use.

Beyond adolescence, the average age at the 5-year follow-up was 21 (range of 18–23), a peak age for alcohol and drug use in the general population. Perhaps, other factors, such as peer or social influences, could trump parent SES in maintaining alcohol/drug abstinence entering the young adult period, and thus explain the null findings for parent SES. However, because these adolescents are entering a sensitive period of heightened risks for alcohol and drug use in young adulthood, further studies are necessary to investigate how maintaining abstinence is affected by the transition into adulthood. Parent SES, and the advantages or disadvantages transmitted from parents during the transition to adulthood, can potentially elevate the protective or risk factors associated with maintaining abstinence as these young adults navigate their new roles and environments.

Significant findings of parent education and 12-step involvement post-treatment point to potential disparities in seeking aftercare support and the ability to maintain a positive recovery in young adulthood. On the one hand, this finding suggests socioeconomic disparities in continuing care after adolescents received substance abuse treatment. Participants with college-educated parents were more likely to attend 12-step groups than participants with HS (or less)-educated parents. Parent education could be indicative of adolescents' higher knowledge and ability to navigate options for continuing care. It may also represent parent's understanding of the benefits of post-treatment 12-step involvement that can support abstinence. Parent income was not related to 12-step attendance which demonstrates how cost is not an important factor for 12-step, especially since it is free and available at flexible times and various locations. Twelve-step involvement has demonstrated positive results in maintaining abstinence among treated adolescents (Chi et al., 2012; Chi et al., 2013), in particular post-treatment, by encouraging a positive recovery lifestyle for young adults through supportive social networks to maintain abstinence (Kelly, Dow, Yeterian, & Kahler, 2010; Kelly, Stout, & Slaymaker, 2013). If future studies show a positive relationship between SES and 12-step participation, then treatment programs can encourage adolescents and their parents, in particular those from lower SES backgrounds, to utilize 12-step groups post-treatment.

On the other hand, this significant finding could reflect that socioeconomic disparities in maintaining recovery may emerge after adolescence. Disparities could be a result of substantial life changes of leaving high school, moving out of parent/family home, or entering post-secondary education or full-time work. Lower SES individuals may have greater hurdles to accessing and participating in 12-step groups given work schedules, transportation, and limited motivation for attending these groups. Additional research is needed to investigate the role of SES on continuing care options and maintaining a positive recovery lifestyle in young adulthood.

4.3 Limitations

This study is not without its limitations. First, generalization of findings is limited to adolescents who received treatment in a managed care health plan, and not to other adolescent treatment populations. Second, while treatment initiation and retention measures were based on administrative data, all other measures are self-reported. Third, our measures of parent SES are limited to the parent participant who completed the baseline survey.

4.4 Conclusion

This study contributes to the literature on SES and adolescent substance use treatment. While no socioeconomic disparities were found in adolescent treatment and long-term outcomes, more research is necessary to provide support for this finding using adolescent treatment samples in both public and private treatment settings. Disparities in 12-step attendance emphasize the need to ensure adolescents leaving treatment, as well as their parents, have the knowledge and ability to seek out continuing care services to maintain recovery in young adulthood. Given that 12-step participation leads to better long-term treatment outcomes, our finding that parent education is significantly associated with 12-step warrants further research to explore disparities in continuing care. As a chronic health problem, effects of adolescent SUDs may continue across the life course, and it is necessary to identify strategies to maximize the benefits of SUD treatment services received in adolescence and create an equitable system for continuing care during the transition to adulthood.

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Abbreviations

KPNC	Kaiser Permanente Northern California
SES	Socioeconomic Status
SUD	Substance Use Disorders

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Highlights

- Socioeconomic status (SES) is understudied in adolescent substance abuse treatment.
- We examined parent SES on adolescent treatment and long-term outcomes.
- No difference in parent SES on treatment participation and abstinence over 5 years.
- Parent education, but not income, associated with 12-step involvement over 5 years.

Table 1

Sample Characteristics by Parent Socioeconomic Status (SES) (n=358)

	Parent Education			Parent Income		
	HS grad or less	Some College	College grad or higher	Less than \$50K	\$50K-\$74,999	\$75K or higher
Demographics						
Gender (%)						
Male	66.4	64.0	61.7	64.3	68.8	59.4
Female	33.6	36.0	38.3	35.7	31.2	40.6
Race/Ethnicity (%)						
Whites	50.4	52.4	46.9	41.3	49.5	64.2 **
Blacks	8.0	15.2	22.2	18.2	17.4	6.6
Hispanic	25.7	20.1	9.9	25.2	14.7	17.0
Other	15.9	12.2	21.0	15.4	18.4	12.3
Age (Mean)	16.09	16.16	16.22	16.13	16.12	16.23
Intake Characteristics						
TX referral via parent/guardian (%)	77.0	82.9	90.1	81.1	81.7	85.9
Alcohol and other drug (AOD) severity (mean)	4.43	4.48	4.57	4.69	4.14	4.55
Criminal justice involvement (%)	29.2	33.5	17.3	28.7	33.9	22.6
Perceived need for TX (%)	38.9	43.3	33.3	41.3	36.7	40.6
Total CMR Score (mean)	47.00	48.01	45.53	47.41	46.44	47.45
Treatment Characteristics						
Facility ID (%)						
Site 1	3.5	9.8	21.0	10.5	10.1	10.4
Site 2	24.8	39.6	38.3	32.2	35.8	36.8
Site 3	33.6	25.0	16.1	21.7	29.4	28.6
Site 4	38.1	25.6	24.7	35.7	24.8	25.5
Parental support for TX (%)	92.0	91.5	87.7	91.6	87.2	93.4
TX barrier-expensive (%)	15.9	12.8	2.5	14.7	9.2	9.4

	Parent Education			Parent Income		
	HS grad or less	Some College	College grad or higher	Less than \$50K	\$50K-\$74,999	\$75K or higher
Treatment Participation						
TX Initiation (%)	71.5	74.4	67.1	69.7	74.8	71.8
TX Retention (Mean days among those who initiated)	12.61	15.56	14.82	15.00	12.37	16.02
Treatment Outcomes						
Alcohol Abstinence (%)						
1-Year FU	62.4	59.0	64.2	62.6	56.1	64.8
3-Year FU	43.8	37.3	28.8	40.0	34.0	37.9
5-Year FU	31.0	30.3	23.9	29.4	30.4	27.3
Drug Abstinence (%)						
1-Year FU	55.1	57.1	59.3	55.4	52.3	63.8
3-Year FU	51.4	52.7	57.5	46.9	57.3	57.9
5-Year FU	52.0	51.7	46.5	47.6	55.9	48.9
Twelve-Step involvement (%)						
1-Year FU	22.0	29.8	28.4	25.2	23.4	33.3
3-Year FU	19.1	32.9	26.0	28.7	25.2	26.3
5-Year FU	12.0	24.1	25.4	19.1	20.6	22.7

Notes: TX=treatment; CMR=circumstance, motivation, and readiness for treatment scale; FU=follow-up survey

* p<.05,

** p<.01,

*** p<.001

Table 2

Treatment Participation (Initiation and Retention) by Parent SES, logistic and negative binomial regression models

	TX Initiation (n=358)			TX Retention (n=258)		
	OR	p	95% CI	IRR	p	95% CI
Parent Education						
HS grad or less	1.14		[0.55, 2.35]	0.96		[0.73, 1.26]
Some College	1.38		[0.71, 2.67]	1.04		[0.81, 1.32]
College grad or higher	Ref			Ref		
Parent Income						
<\$50,000	0.79		[0.43, 1.47]	1.00		[0.79, 1.26]
\$50-\$74,999	1.15		[0.59, 2.22]	0.80		[0.63, 1.03]
\$75,000	Ref			Ref		
Demographics						
Age	0.94		[0.76, 1.15]	0.97		[0.90, 1.04]
Gender						
Male	Ref			Ref		
Female	0.78		[0.46, 1.32]	0.92		[0.76, 1.12]
Race/Ethnicity						
Whites	Ref			Ref		
Blacks	2.38		[0.96, 5.89]	0.55	***	[0.40, 0.75]
Hispanic	0.77		[0.40, 1.48]	0.88		[0.69, 1.14]
Other	0.51		[0.25, 1.02]	1.02		[0.77, 1.36]
Parent History of AOD Problems	0.81		[0.47, 1.39]	0.84		[0.68, 1.03]
Intake Characteristics						
Parent referral	1.34		[0.69, 2.58]	1.00		[0.77, 1.29]
AOD Severity	1.04		[0.96, 1.14]	1.03		[1.00, 1.07]
Criminal Justice Involvement	1.49		[0.80, 2.78]	1.22		[0.99, 1.49]
Perceived need for TX	2.59	**	[1.34, 5.00]	0.76	*	[0.61, 0.95]
Total CMR Score	0.98		[0.95, 1.02]	1.01		[1.00, 1.02]
TX Characteristics						
Facility ID						

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	TX Initiation (n=358)			TX Retention (n=258)		
	OR	p	95% CI	IRR	p	95% CI
Site 1	0.96		[0.39, 2.34]	1.05		[0.73, 1.51]
Site 2	Ref			Ref		
Site 3	2.02	*	[1.05, 3.88]	0.67	**	[0.53, 0.85]
Site 4	2.49	**	[1.30, 4.77]	0.64	***	[0.50, 0.82]
Parental Support for TX	1.46		[0.65, 3.25]	1.06		[0.74, 1.51]
TX barrier-expensive	1.11		[0.48, 2.54]	0.74	*	[0.55, 0.99]

Notes: TX=treatment, OR=odds ratios, IRR=incidence rate ratios; HS=high school; AOD=alcohol and other drugs; CMR=circumstance, motivation, and readiness for treatment scale;

* p<.05,

** p<.01,

*** p<.001

Table 3

Parent SES and Treatment Outcomes at 1-, 3-, and 5-year follow-ups, generalized estimation equation (GEE) logistic regression models (n=325)

	Alcohol Abstinence			Drug Abstinence			12-Step Involvement		
	OR	p	95% CI	OR	p	95% CI	OR	p	95% CI
Parent Education									
HS grad or less	1.43		[0.87, 2.34]	0.84		[0.52, 1.37]	0.50	*	[0.27, 0.93]
Some College	1.07		[0.68, .67]	0.85		[0.55, 1.32]	0.77		[0.45, 1.32]
College grad or higher	Ref			Ref			Ref		
Parent Income									
<\$50,000	0.99		[0.65, 1.50]	0.83		[0.55, 1.26]	0.97		[0.58, 1.62]
\$50-\$74,999	0.91		[0.59, 1.42]	0.97		[0.63, 1.50]	1.06		[0.61, 1.81]
\$75,000	Ref			Ref			Ref		
Time (Ref: 1-Year)									
3-Year Follow-up	0.34	***	[0.25, 0.46]	0.88		[0.67, 1.15]	0.94		[0.70, 1.27]
5-Year Follow-up	0.23	***	[0.16, 0.33]	0.80		[0.58, 1.09]	0.59	**	[0.40, 0.86]
Demographics									
Age	0.79	***	[0.69, 0.90]	0.89		[0.78, 1.01]	0.85		[0.72, 1.01]
Gender (Ref: Male)									
Female	2.02	***	[1.40, 2.91]	1.70	**	[1.18, 2.44]	0.68		[0.42, 1.07]
Race/Ethnicity (Ref: Whites)									
Blacks	1.18		[0.67, 2.06]	1.20		[0.68, 2.10]	0.40	*	[0.18, 0.89]
Hispanic	0.89		[0.55, 1.35]	1.00		[0.64, 1.54]	0.98		[0.57, 1.67]
Other	1.09		[0.66, 1.79]	0.88		[0.54, 1.44]	0.56		[0.29, 1.05]
Parent History of AOD Problems	0.81		[0.56, 1.18]	0.84		[0.58, 1.21]	1.14		[0.72, 1.81]
Intake Characteristics									
Parent Referral	0.87		[0.55, 1.38]	1.29		[0.83, 2.02]	1.18		[0.66, 2.10]
AOD Severity	0.92	**	[0.87, 0.97]	0.98		[0.92, 1.04]	1.01		[0.94, 1.08]
Criminal justice involvement	0.95		[0.64, 1.41]	0.78		[0.53, 1.16]	1.75	*	[1.10, 2.80]
Perceived need for TX	1.40		[0.91, 2.12]	1.45		[0.96, 2.20]	1.73	*	[1.03, 2.91]
Total CMR Score	1.02		[1.00, 1.05]	1.02		[1.00, 1.04]	1.00		[0.97, 1.03]

Treatment (TX) Characteristics											
Alcohol Abstinence						Drug Abstinence			12-Step Involvement		
OR	p	95% CI	OR	p	95% CI	OR	p	95% CI	OR	p	95% CI
Facility ID (Ref: Site 2)											
Site 1	0.76	[0.41, 1.42]	0.58		[0.31, 1.06]	0.85		[0.39, 1.86]			
Site 3	0.80	[0.51, 1.26]	1.29		[0.83, 2.00]	0.69		[0.40, 1.18]			
Site 4	1.08	[0.69, 1.68]	1.38		[0.89, 2.14]	0.82		[0.47, 1.40]			
Treatment Initiation											
Treatment Retention	1.04	[0.65, 1.67]	1.12		[0.70, 1.78]	0.65		[0.36, 1.20]			
Parental Support for TX	1.00	[0.99, 1.02]	1.00		[0.99, 1.02]	1.04	***	[1.02, 1.06]			
TX Barrier-Expensive	1.69	[0.91, 3.16]	1.06		[0.60, 1.88]	3.44	*	[1.27, 9.33]			
12-step Involvement (Years 1–5)	1.12	[0.65, 1.91]	1.24		[0.72, 2.11]	2.04	*	[1.10, 3.78]			
	1.92	*** [1.34, 2.76]	1.34		[0.95, 1.88]						

Notes: OR=odds ratios,

* p<.05,
** p<.01,
*** p<.001