

# The Impact of Publicly Funded Managed Care on Adolescent Substance Abuse Treatment Outcomes

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**Abstract:** This study compares the 12-month changes in substance use following admission to substance abuse treatment in Massachusetts between adolescents enrolled in Medicaid managed care and other publicly funded adolescents. Two hundred and fifty-five adolescents were interviewed as they entered substance abuse treatment and at 6 and 12 month follow-ups. Medicaid enrollment data were used to determine the managed care enrollment status. One hundred forty two (56%) adolescents were in the managed care group and 113 (44%) comprise the comparison group. Substance use outcomes include a count of negative consequences of substance use, days of alcohol use, days of cannabis use, and days of any substance use in the previous 30 days. Repeated measures analysis of covariance (ANCOVA) was used to assess change with time of measurement and managed care status as main effects and the interaction of time and managed care included to measure differences between the groups over time. Although several changes across time were detected for all four outcomes, we found no evidence of an impact of managed care for any of the outcomes. The results of our study do not support the fears that behavioral

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managed care, by imposing limits on services provided, would substantially reduce the effectiveness of substance abuse treatment for adolescents. At the same time, the results do not support those who believe that the continuity of care and improved resource utilization claimed for managed care would improve outcomes.

**Keywords:** Adolescents, alcohol, consequences, managed care, substance abuse

## INTRODUCTION

### Managed Care and Behavioral Health Services

Managed care has become a common approach for delivering behavioral health services. As of 1999, 41 states operated some form of managed behavioral health care involving Medicaid populations (1). About half of the states have adopted a carve-out to a managed care organization (MCO), which administers only the mental health and/or substance abuse treatment benefits. These managed behavioral health organizations (MBHO) usually are at financial risk, and are responsible to organize service delivery, prescreen utilization of intensive services, and conduct concurrent reviews. These types of managed care arrangements could lead to positive or negative impacts on substance abuse treatment outcomes. This article will examine these potential impacts in Massachusetts using data from a larger multi-site Substance Abuse and Mental Health Administration (SAMHSA) study on the impact of managed care on vulnerable populations. Particular outcomes to be examined are substance use and negative consequences of substance use for adolescents during the one-year period after admission to substance abuse treatment.

A recent review of the literature finds costs savings coming from the substitution of outpatient care for expensive inpatient services as a positive outcome of public managed behavioral health care, and delays in treatment or exclusions of vital services as negative effects (2). Substance abuse clients may be particularly vulnerable to the effects of managed care, because there is little consensus on the appropriate treatment standards, and therefore more opportunity for reductions in service provision (3). Literature reviews have found evidence of reductions in access to inpatient care without clear evidence of offsetting increases in the use of outpatient services, as found with managed mental health care (4-6). McCarty et al. (5) argued that patient and provider characteristics, as well as the financing mechanisms in publicly funded substance abuse treatment systems, may increase the possibility of undesirable effects. For example, clients in public systems typically have greater levels of impairment and a greater range of clinical and social needs than those

privately insured. Further, specialized substance abuse treatment providers used by the public system are relatively inexperienced with managed care's control over utilization of services, and this might affect the quality and quantity of care delivered (5).

### **Adolescents and Substance Use**

Adolescent substance abuse clients are of particular concern because of their growing number and different treatment needs. The consequences of adolescent substance use include the potential to negatively affect mental and emotional development (7). Other potential significant consequences include traffic accidents, school-related problems, risky sexual practices, delinquent behavior, juvenile crime, and future substance use disorders (8). Due to the prevalence and potential long-term consequences of adolescent substance use, it is important to investigate how different factors influence the effectiveness of substance treatment.

Studies of adolescent treatment, for the most part, have included primarily middle-class adolescents (9–11) rather than low-income adolescents, and/or adolescents who receive publicly funded treatment services. A lower income population may have different treatment experiences and outcomes, particularly if they are more vulnerable to co-morbidities and unstable living situations and have fewer social resources to draw upon. A recent and notable large-scale study of adolescent substance abuse treatment was Drug Abuse Treatment Outcome Studies for Adolescents (DATOS-A), which studied outcomes for over 1,500 adolescents treated in community-based programs. About 30% of the DATOS-A sample had public insurance and another 30% reported no insurance (12, 13). The researchers found evidence to suggest that differences in insurance status and referral patterns across the modality of treatment might result in differential access to treatment and levels of care, for reasons other than needs-based patient matching to appropriate setting (12). However, like other prior studies, the source of payment or insurance was not a focus of their analysis. In contrast, the adolescents in the present study were in publicly funded treatment, providing an opportunity to look specifically at the differences in outcomes between those adolescents under Medicaid Managed Care with those adolescents in a similar low income group with no insurance for their treatment.

### **Managed Care and Adolescent Substance Abuse Clients**

Adolescent managed care literature has focused on the impact managed care has had on access to services and the type of services adolescents

receive. One study examined the effect of incentives associated with a Medicaid capitated mental health carve-out contract in Colorado and found that children and adolescents treated by a managed care provider were less likely to receive inpatient care and more likely to receive residential treatment center care than a comparison group reimbursed under Medicaid fee for service (14). Client outcomes were not compared between the two groups. The Health Care Reform Tracking Project (HCRTP), a nationwide study designed to track and analyze public sector managed behavioral health care initiatives as they affect children and adolescents, completed a special analysis of managed care's impact on adolescent substance abuse treatment (15). Using data collected from site visits and key informant interviews, the HCRTP researchers found that in many states managed care has made it more difficult for adolescents to access extended care, inpatient, or residential services, and that alternative treatment services for adolescents were poorly developed. This study also did not address client outcomes (15).

Reviews of the adolescent treatment literature more generally find that a variety of treatments for substance abuse can be effective (16–18). While empirical studies have found positive outcomes for youths (i.e., some treatments are better than no treatment) there has been no conclusive evidence that any one approach is more effective than another (18, 19). Moreover, little is known of the factors contributing to treatment effectiveness. Again, this uncertainty contributes to the potential for reductions in service provision under alternative payment systems that can potentially lead to poorer outcomes (3). Little has been done that directly examined the impact of managed care or other alternative payment systems on substance use outcomes.

Earlier evaluations of the introduction of managed care behavioral health care system in Massachusetts found increased inpatient admission rates among children and adolescents, as well as a reduction in per-child expenditures and a possible decline in continuity of care for disabled children (20, 21). The managed behavioral health system is now a mature system (having begun in July 1992) and the MBHO contract includes performance standards directed towards the continuation of care for children and adolescents, suggesting the potential for positive outcomes. The purpose of this article is to examine aggregate differences in outcomes between adolescents enrolled in the Massachusetts Medicaid managed care behavioral health carve-out with adolescents receiving standard care funded by the Massachusetts Bureau of Substance Abuse Services (BSAS). We focus on the outcomes of substance use and the negative consequences of substance use for adolescents ranging in ages from 12 to 19 during the one-year period after admission for specialized substance abuse treatment. We address the following research question: Are the

changes in substance use and negative consequences of use over the 6-month and 12-month periods following admission to treatment different for adolescents enrolled in managed care versus those not enrolled?

## **METHODS**

### **Context**

Medicaid managed care was implemented in the Commonwealth of Massachusetts in July 1992 with the objective to reduce costs while at the same time increase access and quality. Medicaid recipients could either join a health maintenance organization (HMO) or they could choose a physician that was participating in the Primary Care Clinician (PCC) program. Those persons who choose the PCC program would receive medical care from a primary care clinician and obtain mental health and/or substance abuse services through referral (including self-referral) to a behavioral health carve-out vendor. This was the first state-wide Medicaid mental health and substance abuse carve-out in the nation and Massachusetts was also one of the first states to rely upon a for-profit private entity, Mental Health Management of America, to manage a state behavioral health program. In July 1996 Medicaid awarded a new contract to the Massachusetts Behavioral Health Partnership (MBHP). The new contract included an introduction of performance standards, performance bonuses and more complicated formulas for provider profit and risk. Early assessment of MBHP has been positive with respect to quality of care and utilization (22, 23).

### **Participants**

The SAMHSA Managed Care and Vulnerable Populations Cooperative Agreement was a multi-site study focusing on the impact of Medicaid managed care for populations with mental illness or substance use problems. The data used in this article were collected for the Massachusetts study site for adolescent substance users; this part of the overall SAMHSA study was funded by Center for Substance Abuse Treatment within SAMHSA. Participants were 293 Massachusetts adolescents admitted to residential (83%) and outpatient (17%) specialty substance abuse treatment programs from 1998 through 2000. Adolescents were recruited from 10 programs in Massachusetts serving relatively large numbers of publicly funded adolescents. Of the 5 residential programs, one is a therapeutic community program. Two of the 5 outpatient programs provide intensive outpatient services. All 10 programs provide

individual and group therapy along with offering family therapy services. All 10 programs provide addictions recovery and treatment services. Just one of the outpatient programs serves adults as well as adolescents.

## Procedures

Eligible adolescents were Massachusetts residents aged 12 to 19 receiving publicly supported substance abuse treatment. Participants were contacted upon admission to participating treatment providers. Because it was necessary to gain informed consent from the adolescent's parent or guardian, provider representatives approached the client and the client's guardian, informed them about the study, and obtained informed consent. An interview with the study interviewer was then scheduled. The interviewer requested informed assent from the adolescent at the time of the interview to ensure that the adolescent had the opportunity to change his or her mind without a parent or counselor present. All baseline interviews were conducted while the adolescent was still in treatment under the index admission. Interviews were conducted within 6 weeks of the index treatment entry and the vast majority of interviews (88 percent) were held within three weeks. Average length of stay for the index admission was about five weeks for residential treatment and just under two weeks in the outpatient setting. Follow-up interviews were conducted at 6- and 12-months post-baseline. Follow-up interviews were usually conducted in the respondent's home. Respondents received \$20 for each completed interview in appreciation for their time and willingness to participate. Facilities received a \$10 incentive payment for referring each baseline subject. The Institutional Review Board at New England Research Institutes approved the study protocol and all consent/assent forms. The study was also granted a Federal Certificate of Confidentiality as well as comparable Massachusetts Section 24A protection.

Program staff identified a total of 405 adolescents eligible for the study. Of these, 348 consented to be interviewed (85.9%). Two hundred and ninety-three adolescents completed the baseline interview. Three of the 54 adolescents who were not interviewed refused to participate at the time of the scheduled interview. The majority of the remaining non-participants were discharged or left the program before interviews could be conducted. Due to issues of confidentiality, we were unable to obtain information on nonparticipants. The follow-up response rate was 89% (261/293) for the 6-month interview and 81% (237/293) for the 12-month interview. Twenty adolescents with only baseline data were excluded from the analyses presented here. A power analysis was conducted during the developmental stage of the study to determine a target sample size

necessary to detect small to medium effect sizes (24). The power was estimated to be at least .80, with a Type I error rate of .01 to account for multiple two-sided significance testing. Moreover, the sample size accounted for the correlation of pre- and post-treatment measurements anticipated to be as high as .40 and was inflated to account for 20% attrition between baseline and the 12-month follow-up interview. We met our goal, which was to obtain at least 288 completed baseline interviews in order to have at least 230 adolescents (115 in each group), after accounting for attrition between the baseline and 12-month follow-up interview.

Medicaid Enrollment data were merged with client self-report data, using the following approach. We pilot-tested a data-matching and retrieval process, and then refined the information on respondents used to identify matching public database records. Searches involved retrieving records with the same or similar names and/or the same social security number. All retrieved data were examined to identify exact matches and imperfect matches, comparing several data elements (name, social security number, gender and date of birth). Imperfect matches were hand-checked and accepted only when errors appeared to be typographical, such as transposed digits or characters. Information sent to and from the public data source was password-protected to ensure client confidentiality. The Medicaid enrollment database maintains records of all enrollment periods for each respondent who has ever enrolled in Massachusetts Medicaid. This database was used to determine managed care status at the time of the baseline interview. There was very little change in this enrollment status over the one month following admission. Adolescents enrolled in Medicaid were either in an HMO and therefore receiving managed behavioral health integrated with primary care, or in the PCC plan and receiving managed behavioral health care through the carve-out. However, we found 18 adolescents with Medicaid enrollment data indicating they were enrolled in Medicaid yet not enrolled in the managed care program. These adolescents were also excluded from these analyses because their status was most likely temporary, and it would have been inappropriate to group them either with the managed or the comparison (not enrolled in Medicaid) group. This resulted in an analytic sample of 255, or 87% of all adolescents. At the time of the baseline interview, 142 (56%) of the adolescents were in the managed care group and 113 (44%) were not enrolled in Medicaid and comprise the comparison group.

## Measures

Measures in our analyses include variables that control for baseline differences in the two subject groups on factors that may potentially affect

outcomes. These measures fall into five domains: index treatment setting, demographics, family functioning, motivation for treatment, and psychological functioning. Nights in a confined setting were measured at every time period to control for limited opportunities for substance use at baseline, 6 and 12 months. Managed care status was the independent variable of interest.

*Index treatment setting* was either residential or outpatient treatment. The setting may signify the severity of substance abuse problems, or the degree of social support for the adolescent at home or in the community.

*Demographics* were measured by self-report at the baseline interview and include gender, age and ethnicity. Gender is an important consideration given that some prominent theories of adolescent substance use suggest different outcomes on the basis of gender (18). Due to the small sample size for individual minority groups, ethnicity was assessed with a dummy variable for White/non-White (African American or Latino). Differences have previously been found between white and nonwhite adults regarding therapeutic involvement and treatment retention (25).

*Family Functioning* was measured using two indicators, the family cohesion and family conflict scales from the widely used Family Environment Scale (FES) (26). Each of these scales consists of 9 true/false items. The conflict scale includes items related to open expression of anger and amount of family fighting, e.g., "We fight a lot in our family," and "Family members hardly ever lose their temper." The cohesion scale includes items related to the degree of commitment, help, and support family members provide for one another, e.g., "Family members really help and support one another," and "There's a feeling of togetherness in our family." Negatively worded items were reverse-scored and all items were summed to produce summary scores. Family functioning may facilitate or impede the treatment process, for example, even getting transportation to treatment, and may affect the content or effectiveness of treatment (e.g., contributing to anxiety and conflict).

*Psychological functioning* was measured using the externalizing and internalizing subscales of the Youth Self Report (YSR) (27). The YSR contains 118 items to assess adolescent behavior problems over the past 6-months. The externalizing scale consists of 30 items tapping aggressive and delinquent behavior. The YSR's internalizing scale contains 31 items assessing somatic complaints and withdrawn and anxious/depressed behaviors. Higher scores on both scales represent greater problems. Scores for both the externalizing and internalizing scales have been found to be significantly elevated in youth referred for mental health treatment (27). Many of these maladaptive behaviors can accompany or substitute

for substance abuse, and can reflect similar underlying psychological distress that could affect treatment engagement and outcomes.

*Motivation for treatment* was measured by a modification to the motivation and readiness subscales of the Circumstances, Motivation, Readiness, and Suitability Scales (CMRS) (28). The motivation subscale measures an individual's inner reason for change. The readiness subscale refers to the individual's perceived need for treatment as compared to other options such as the use of social support alone. Responses to items are on a Likert scale rated from 1 (strongly disagree) to 5 (strongly agree). For this study, Cronbach's alphas for the Motivation and Readiness scales were .63 and .76, respectively. An additional measure of motivation, court ordered index treatment, was based on adolescent self-report during the baseline interview. The degree to which an adolescent is motivated for treatment may affect engagement and success in treatment.

*Nights in a confined setting* was measured using self-reported data and defined as the number of days in the past 30 before a research interview that the adolescent was in a confined setting. This variable was created by summing the adolescents' responses to individual questions about the number of nights spent in a general hospital, psychiatric hospital, residential treatment center, group residence, or other type of residential setting days in the past month. Confinement could affect the extent to which an adolescent has access substances, and therefore could affect the reported days of use and negative consequences.

*Managed Care Status* was measured at the time of the baseline interview using the Medicaid enrollment data.

## Outcome Measures

Substance use (days of use in past month) was measured from self-reported responses regarding alcohol and 10 other drugs adapted from the Comprehensive Addiction Severity Index for Adolescents (CASI-A) (29). CASI-A is an adolescent version of the widely used Addiction Severity Index. Respondents provide details on a range of substance use measures. Three substance use measures were used in this article: the number of days of alcohol use in the past month; the number of days of cannabis use in the past month; and the number of days of any substance use (including alcohol and/or cannabis) in the past month. These outcomes were collected at the baseline, 6-month, and 12-month interviews. Each of these measures clearly relates to outcomes and relative success in treatment for substance abuse problems.

Negative consequences were measured by a 20-item instrument developed for use in the multi-site cooperative study. The scale adapts

the format and context of the Health Behavior Questionnaire (HBQ) (30) Consequences Sub-scale with selected diagnosis-related items from the Substance Use Disorders Diagnostic Schedule – 4th edition (SUDDS-IV) (31). The consequences covered in the scale include tolerance, withdrawal, inability to regulate use, sacrifice of other activities to use, legal consequences, hazardous use, and interpersonal problems. The study participants were asked to indicate any consequences that had happened while using alcohol or drugs in general (excluding tobacco). Thus, outcomes from substance abuse treatment services can include these secondary measures, which often result from or accompany substance abuse behavior.

### Statistical Analyses

Differences in independent variables and outcomes between the managed and comparison groups at baseline were investigated via Student's *t*-test and the Pearson Chi-square test of independence, as appropriate. Repeated measures analysis of covariance (ANCOVA) was used to assess change with time of measurement and managed care status as main effects, and the interaction of time and managed care included to measure differences between the groups over time. In addition, the pretreatment and control variables described above were included. Traditional repeated measures ANCOVA does not allow the inclusion of any observation with missing data. In order to overcome this limitation, these analyses were conducted in a mixed model framework, utilizing SAS Procedure Mixed Software (32). Adjusted means for each group at each time point were computed from the models, as well. Tukey–Kramer adjusted *p*-values were used to reduce the likelihood of spurious conclusions due to multiple comparisons (33).

The main research question relates to differences between the managed care and comparison groups in terms of the substance abuse outcomes. Since subjects were not randomly assigned to these respective analytic groups, it is important to control for potential baseline differences between the subject groups on factors that could significantly affect treatment outcomes. Family functioning, client motivation, and so forth are potentially important to treatment outcomes because they can affect the degree to which clients stay in treatment, engage in the process, and commit to or succeed with specific treatment goals. Without controlling for these influences, it would be more difficult to attribute outcomes solely to the effects of managed care. While many of these covariates were measured again at the 6- and 12-month follow-ups, any change in them could be associated with changes in the substance use variables. Hence, we did not include these later covariate measurements in our analytic models.

Table 1. Baseline characteristics by group (n = 255)<sup>a</sup>

Characteristic	Baseline status	
	Managed care (n = 142) (%)	Comparison group (n = 113) (%)
Male	67.6	73.5
Non-White	28.9	15.0**
Outpatient treatment	21.1	9.7*
Court order for treatment	62.7	55.8
	Mean (SD)	Mean (SD)
Age	15.7 (1.1)	16.2 (1.1)**
Motivation	3.4 (0.9)	3.6 (0.9)
Readiness	3.3 (0.9)	3.5 (0.9)
Nights in a confined setting (past month)	6.8 (10.7)	5.1 (8.7)
YSR internalizing scale	18.1 (9.3)	19.4 (10.0)
YSR externalizing scale	25.8 (8.7)	27.5 (9.6)
FES cohesion scale	5.3 (2.0)	5.0 (2.0)
FES conflict scale	4.4 (2.4)	4.7 (2.3)
Number of consequences	5.3 (4.8)	7.2 (5.2)**
Days of alcohol use	5.5 (8.0)	6.7 (8.7)
Days of cannabis use	14.2 (13.5)	15.1 (12.7)
Days of any substance use	16.3 (12.6)	18.5 (12.1)

<sup>a</sup>Tests for differences in percentage and means are based on the Pearson chi-square statistic and Student’s t-test, respectively. All tests are two-sided.

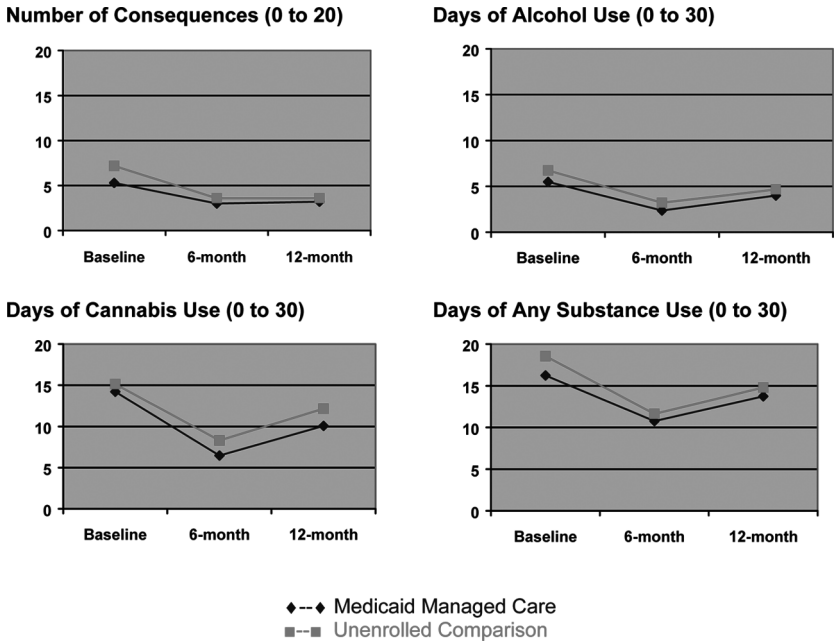
\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

RESULTS

Baseline Differences Between Managed and Comparison Group

Selected baseline characteristics for managed and comparison group adolescents are displayed in Table 1. Managed care adolescents were on average, younger, more likely to be nonwhite, and to be recruited from an outpatient setting (*p* < . 001, *p* < . 01, *p* < . 05, respectively), which suggests at least the possibility that managed care was altering treatment entry patterns across modalities.<sup>1</sup> In addition, the adolescents in managed care had a smaller number of negative consequences.

<sup>1</sup>We examined and found no differences in the pattern of outcomes by treatment modality.



**Figure 1.** Change in outcomes from baseline to 12-month follow-up (unadjusted) ( $n = 255$ ).

### Outcome Measures Over Time By Group

Figure 1 shows the trends over time by group for each of the four outcomes. These mean values were unadjusted for covariates. As was shown in Table 1, there were no statistically significant differences between the two groups at baseline on any of the days of use measures. A similar pattern can be seen in the trends for all four outcomes: Substance use levels and consequences were highest at baseline, decreased at 6 months, and then increased to levels still below what they had been at baseline by the time of the 12-month follow-up. The declines from baseline to 6 months were all statistically significant changes, while the only significant increases from 6- to 12-months were for alcohol use ( $p = .043$ ) and cannabis use ( $p = .004$ ). There were no statistically significant differences in trends by treatment group (managed care vs. comparison group).

### Effect of Managed Care on Outcomes

Table 2 presents the adjusted means for the repeated measures analysis of covariance for each of the outcome variables. Unlike in Table 1 and

**Table 2.** Negative consequences and substance use outcomes by group and time<sup>a</sup>

Outcome (last 30 days)	Group	Baseline		6		12		Tukey-Kramer adjusted <i>p</i> -value			
		mean	(se)	Months mean	(se)	Months mean	(se)	P-value for Group and Time			
		Group	Time	Group × Time	BL to 6 mo	6 mo to 12 mo	BL to 12 mo				
Number of consequences	Managed	5.7 (0.4)	3.5 (0.3)	3.2 (0.3)	3.2 (0.3)	.392	<.0001	.233	<.001	.987	<.001
	Comparison	6.8 (0.4)	3.5 (0.4)	3.1 (0.4)	3.1 (0.4)				<.001	.942	<.001
	Overall	6.2 (0.3)	3.5 (0.2)	3.2 (0.2)	3.2 (0.2)		<.0001		<.001	.514	<.001
Days of alcohol use	Managed	5.9 (0.7)	2.7 (0.5)	3.8 (0.5)	3.8 (0.5)	.513	<.0001	.840	.001	.400	.112
	Comparison	6.2 (0.8)	3.4 (0.5)	4.0 (0.6)	4.0 (0.6)				.015	.948	.151
	Overall	6.0 (0.5)	3.0 (0.4)	3.9 (0.4)	3.9 (0.4)		<.0001		<.001	.115	<.002
Days of cannabis use	Managed	14.9 (1.1)	7.4 (0.9)	9.6 (1.1)	9.6 (1.1)	.383	<.0001	.826	<.001	.239	.003
	Comparison	15.1 (1.2)	8.7 (1.0)	11.1 (1.2)	11.1 (1.2)				<.001	.369	.117
	Overall	15.0 (0.8)	7.9 (0.7)	10.3 (0.8)	10.3 (0.8)		<.0001		<.001	.011	<.001
Days of any substance use	Managed	16.8 (1.0)	11.7 (0.9)	12.9 (1.1)	12.9 (1.1)	.489	<.0001	.840	.001	.890	.053
	Comparison	18.3 (1.1)	12.2 (1.1)	13.3 (1.2)	13.3 (1.2)				<.001	.947	.019
	Overall	17.5 (0.7)	11.9 (0.7)	13.1 (0.8)	13.1 (0.8)		<.0001		<.001	.353	<.001

<sup>a</sup>From a mixed models repeated measures analysis of covariance. All means and contrasts adjusted for gender, age, race (White vs. non-White), residential treatment at baseline, court order for baseline treatment, nights confined over past month, baseline YSR internalizing and externalizing scores, baseline FES cohesion and conflict scores, as well as motivation and readiness for treatment at baseline. Means for consequences are also adjusted for average alcohol and cannabis use in the 6 months prior to baseline.

Figure 1, all means and contrasts in Table 2 were adjusted for demographic characteristics, index treatment setting, baseline family functioning scores, psychological functioning, and motivation for treatment as described above. In addition, the means for consequences were also adjusted for average alcohol and cannabis use in the six months prior to baseline. The table is divided into 3 parts. The first 3 columns present the adjusted mean values for the outcomes by time of measurement and managed care status. Overall adjusted means for each time period are also shown. These mean values illustrate the similarity in outcomes for the managed and comparison groups, while clearly showing the change in outcomes over time and its similarity for the two groups. Also, as with the unadjusted mean values shown in Figure 1, measures of substance use (alcohol, cannabis, and “any”) fall at 6 months and then rise again at the 12-month interview. Once adjusted for covariates, the baseline difference in the number of negative consequences of use between the managed and comparison groups was no longer significantly different. Negative consequences of use decline between baseline and 6 months, and then essentially remain similar at 12 months.

The middle 3 columns of the table provide *p*-values for the coefficients for the main effects of group (managed or comparison) and time of measurement (baseline, 6-, or 12-month interview), and the interaction of group and time. No differences were found between the managed care and comparison group for any of the four outcomes, either overall or by time. There was, however, evidence of change across time for all outcomes ( $p < .0001$ ).

Finally, the last 3 columns provide the Tukey–Kramer adjusted *p*-values for the adjusted mean differences in outcomes over time, separately for the managed and comparison groups as well as for the overall sample. The decline in substance use (alcohol, cannabis, or “any”) and negative consequences from baseline to 6-months follow-up was found to be statistically significant ( $p < .01$ ), for both the managed and comparison groups and in total. The increase observed within groups from 6-months to 12-months follow-up for each outcome was not statistically significant. However, the change from 6-months to 12-months for days of cannabis use was significant overall ( $p = .011$ ). Despite the increase from 6-month to 12-month follow-up, the 12-month change in negative consequences and days of substance abuse from baseline to 12-months follow-up was a net decrease for all outcomes. The change in number of consequences was found to be statistically significant for both the managed and comparison groups, with a 44% drop in the number of negative consequences for the managed care group and a 54% drop for the comparison group, although a difference between the groups was not detected. Cannabis use dropped by just over 5 days, on average, from

baseline to 12-months follow-up in the managed care group ( $p = .003$ ). By comparison, a decrease of 4 days in the comparison group did not reach statistical significance ( $p = .117$ ). Similar average decreases of 4 days (managed group;  $p = .053$ ) and 5 days (comparison group;  $p = .019$ ) were seen from baseline to 12-month follow-up for any substance use. There were no statistically significant changes from baseline to 12-month follow-up for alcohol use for either group although there was a significant change for the overall average.

## DISCUSSION

In this study we compared the managed care system impact on client outcomes for adolescents enrolled in Medicaid managed care with non-enrolled adolescents receiving publicly funded substance abuse treatment services. We interviewed adolescents upon entry into specialized substance abuse treatment, and examined substance use and negative consequences of use over a 12-month period. We found no evidence of an impact of managed care for any of the 4 outcomes. Although several changes across time were detected for all 4 outcomes, there were no differences detected between managed care and the comparison group. Generally, the managed care group reported average problem severity levels that were slightly but not significantly lower than the comparison group at all time periods.

Recent reviews of the adolescent substance abuse treatment literature have found that problem severity is typically much lower on average after entry into treatment (16–19, 34). The results from this study clearly reflect this pattern for publicly funded adolescents, with highly significant reductions in all outcome measures of severity between treatment entry and 6-month follow-up for Medicaid and uninsured treatment clients. Reported average days of use of any substance were between 16 and 18 days for the managed care and comparison groups, respectively, out of the 30 days prior to treatment entry. For the most part, this substance use was of marijuana and/or alcohol. There were averages of 5 and 7 negative consequences of substance use also reported, respectively for the 2 groups, at baseline. When interviewed at the 6-month follow-up, subjects reported that substance use had declined significantly, although on average they still reported using during more than 10 days of the previous month. This reduction in use could reflect effective treatment and/or the possibility that, prior to admission, the adolescents were in a time of crisis from which they emerged and improved.

The use of 12-month follow-up data allowed us to look at outcomes that were further removed in time from the treatment episode and,

presumably, the precipitating crises. The number of negative consequences of use remained fairly stable between 6 and 12 months, suggesting sustained improvement in an important dimension affecting other individuals, and society generally. Days of substance use increased between 6 and 12 months, but did not reach average levels observed at baseline.

This study has a number of limitations. First, as is similar to other studies, relying on self-reporting of substance use has obvious pitfalls. For example, regardless of when the baseline interview occurred, all participants were asked to respond to questions about substance use and service utilization prior to entering treatment. This may introduce recall bias that may be expected to be worsen with greater lengths of time between entry into treatment and the baseline interview. However, the length of time between entry and baseline interview was similar for the managed care and comparison group. Further, the use of trained interviewers rather than program staff to conduct the interviews ensured confidentiality and consistency in the interview process. As such, there is no reason to suspect that the veracity of the self-report data would have varied systematically by managed care group. The insurance status variable was derived from Medicaid enrollment data rather than self-report.

Second, due to logistical constraints, the majority of this sample was selected from specialized adolescent residential treatment programs and a few outpatient programs that serve the largest number of adolescent clients. Both the managed care adolescents and the comparison group were receiving services from the same provider network. This may have biased the results if these self-selecting providers were not representative of other providers in the state, for example, by having unusually progressive or comprehensive treatment programs that, in turn, were applied to all clients regardless of payer status. Similarly, the fact that these providers were serving client populations with differing payer status may reflect treatment approaches that incorporate the demands and limitations of managed care, but apply them broadly to all clients served.

Finally, by only looking at users of adolescent substance treatment, we learn nothing about who is accessing the system and whether enrollment in managed care has an effect on getting adolescents into treatment.

Despite these limitations, this study does provide an opportunity to examine the outcomes for a population of potentially vulnerable publicly served adolescents. The results of our study do not support the fears of some practitioners that behavioral managed care, by imposing limits on services provided, would substantially reduce the effectiveness of substance abuse treatment for adolescents. At the same time, the results do not support those who believe that the continuity of care and improved resource utilization claimed for managed care would improve outcomes.

One possibility is that, at least in Massachusetts, managed care had little impact on adolescent treatment outcomes. It is also possible, of course, that both positive and negative potential effects of managed care occurred in Massachusetts adolescent substance abuse treatment system resulting in no significant effects overall. Future studies would have to examine potential managed care effects in finer detail to find out if any such offsetting effects occur.

The purpose of this article was to investigate the direct effect of managed care on substance use outcomes over a 12-month period. We have not looked at the potential managed care effects on the other psychosocial issues often affecting substance abusing adolescents: criminal involvement, school and social functioning, and psychiatric distress.

Furthermore, this article examined aggregate differences in outcome between the system under managed care as compared to the comparison group. Differences in outcomes could result from potential differences in service delivery, treatment, access and coordination of care. For example, the literature suggests that continuity of care, participation in family therapy, and cognitive-behavioral interventions contribute to better outcomes (16, 17, 19, 34–37). Irrespective of these potential differences we found no direct impact of managed care on outcomes. It is not clear yet whether the managed care condition led to differences in process measures of care. Future work will take a closer look at the use of services between the baseline index admission and the 12-month follow-up period.

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