Outcomes of Integrated Assertive Community Treatment for Homeless Consumers with Co-occurring Disorders

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Abstract:

The objective of this research was to evaluate the impact of Integrated Assertive Community Treatment (I-ACT) on psychiatric symptoms, drug use, housing status, and service utilization. A single-group repeated measures evaluation of outcome indicators at intake, 6 months, and 12 months examined changes over time with 555 respondents receiving outpatient treatment. While 555 received baseline interviews, figures vary on follow-up sample sizes and are listed as they are discussed in the paper. The study was implemented by a community treatment provider. The primary analyses used in this study were repeated measures ANOVA and the Friedman's two-way analysis test. Significant reductions in substance use ($F(1.69, 553.02) = 94.30$, $p < .01$) and psychiatric symptoms ($F(1.98, 299.19) = 43.73$, $p = .0001$) were found from baseline to 6 months and changes were sustained from the 6- to 12-month follow-up points. Similar results were found in housing status with the number of participants in stable housing rising significantly. Utilization of substance use and psychiatric treatment declined significantly across all three follow-up points, and physical health service use remained unchanged. I-ACT has demonstrated efficacy through controlled research studies, and this evaluation extends on these findings to demonstrate that I-ACT is effective in community service provision settings in reducing substance use and psychiatric symptoms. Further, the reduction in service use found across follow-up points indicates cost containment.

Article:

Rates of co-occurring substance abuse and mental illness are presently high (Regier et al., 1990;Mueser, Noordsy, Drake, & Fox, 2003) and expected to double in the United States from 7 million to 10 million (U.S. Department of Health and Human Services, 2003) to 15 million in 30 years (New Freedom Commission on Mental Health, 2003). While the prevalence of co-occurring disorders grows, the current treatment system is not structured to meet the needs of this population. The National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration [SAMHSA], 2008) illustrates this mismatch of co-occurrence to two treatment systems that operate in parallel to one another as opposed to an integrated system of care. An estimated 24.3 million adults aged 18 or older experienced serious psychological distress (SPD) within the past 12 months. Of those with SPD, 10.8 million (44.6%) reported receiving some form of mental health treatment within the same period, and 5.4 million reported a dependency on alcohol or illicit drugs. Among the 5.4 million reporting a co-occurring SPD and substance use disorder, 33.3% received mental health treatment only compared to 2.8% receiving only substance use treatment. More importantly, 10.4% received both mental health and substance use treatment concurrently, while 53.7% received no treatment for either. Only 1 in 10 persons with a co-occurring disorder receives treatment for both mental illness and substance abuse (SAMHSA, 2008).

Due to the parallel systems to treat mental illness and substance abuse, clinicians treating these disorders are faced with the dilemma of where to focus treatment. To address this, SAMHSA (2009) currently endorses an integrated treatment model for co-occurring disorders that provides a unified and comprehensive program that is delivered through a multidisciplinary team that has received specialized training in co-occurring disorders. Critical components of an integrated program can include assertive outreach; comprehensive assessment; motivational and staged interventions; risk reduction; tailored mental health and substance abuse treatment/counseling; social support interventions; a long-term perspective of remission and recovery; and cultural sensitivity and competence (Minkoff, 1991; Drake et al., 2001; Drake, Mercer-McFadden, Mueser, McHugo, & Bond, 1998). Ideally, integrated programs combine and build upon existing programs wherever possible. Despite federal and local government awareness, many community-based service providers lack the range of services, specialized staffing resources, and funding to offer a continuum of care approach, which is embedded in an integrated treatment approach.

To address the problematic treatment environment described above, Foundations Associates (FA) created an integrated treatment program for persons with substance abuse disorders and severe and persistent mental illness. Because of the severity of mental illness faced by the clients served by FA, Assertive Community Treatment (ACT) was delivered through an existing integrated treatment model. This approach allowed for simultaneous treatment of substance abuse and mental illness as well as intensive open-ended services for the severe and persistent mental illness faced by FA clients that ACT provides.

ACT was developed approximately 30 years ago as mental health care was undergoing radical changes in the United States. Inpatient treatment for the mentally ill was being eschewed for community-based treatments during the deinstitutionalization of the 1960s. ACT was developed to meet the needs of severely mentally ill consumers in the community. In the years since ACT was developed, it has been evaluated with a wide range of consumers including homeless persons (Coldwell & Bender, 2007;Lehman et al., 1999; Lehman, Dixon, Kernan, Deforge, & Postrado, 1997; Meisler, Blankertz, Santos, & McKay, 1997), mentally ill persons involved in the criminal justice system (Cosden, Ellens, Schnell, & Yamini-Diouf, 2005;Cosden, Ellens, Schnell, Yamini-Diouf, & Wolfe, 2003; McCoy, Roberts, Hanrahan, Clay, & Luchins, 2004; Meisler et al., 1997), and persons with co-occurring mental illness and substance use disorders (Drake, McHugo et al., 1998; Meisler et al., 1997). Additionally, studies have been conducted to determine ACT's impact on housing stability (Drake, Yovetich, Bebout, Harris, & McHugo, 1997; Lehman et al., 1997; Meisler et al., 1997), homeless persons with co-occurring mental health and substance use disorders (Young, Clark, Moore, & Barrett, 2009), mental illness symptom reduction (Coldwell & Bender, 2007; Cosden et al., 2005; Lehman et al., 1997), cost-effectiveness compared to traditional models (Essock, Frisman, & Kontos, 1998; Lehman et al., 1999), and drug and alcohol use (Cosden et al., 2005; Drake et al., 1998a,1998b). Across populations and variables, ACT has consistently performed as well as other models of care, and in many instances it has outperformed other approaches on one or more of the outcomes discussed above.

BACKGROUND

In 2000, SAMHSA designated FA, located in Nashville, Tennessee, one of three exemplary program models in the United States for integrated treatment for co-occurring disorders. FA was featured at the Co-occurring Institute of the State System Development Program 5th Conference (SSDP V). FA's residential services were also selected as a finalist for the American Psychiatric Association's Gold Achievement Award (2000). FA participated in the National Dialogue on Co-occurring Mental Health and Substance Abuse Disorders (National Association of State Alcohol/Drug Abuse Directors, 1998). As a result of this think tank effort, a conceptual framework requiring three levels of service coordination (a consultation ensuring that both psychiatric and substance problems are addressed; collaboration ensuring that both substance and psychiatric problems are included in the treatment regimen; and service integration that merges all treatment efforts) was later used as the foundation for SAMHSA's (2002) Report to Congress.

FA's extensive involvement in providing services to persons with co-occurring disorders was further advanced by the addition of the ACT treatment model, hereafter referred to as I-ACT. Two studies have been conducted to date on Integrated ACT treatment (Drake, McHugo et al., 1998; Essock et al., 2006). Both of these studies used standard case management (SCM) as a comparison group with the I-ACT intervention with populations experiencing both severe mental illness and substance abuse. Drake et al. had a total of 223 participants, while Essock et al. had 198. Both studies found that the I-ACT groups had fewer actual hospitalizations and fewer mean

days hospitalized than the SCM. Similarly, while both groups in both studies improved in terms of days in stable housing, the I-ACT groups in both studies showed significantly greater gains in stable housing days. No significant differences were found between I-ACT and SCM in either study in terms of psychiatric symptom reduction. Both studies did find that psychiatric symptoms were reduced.

Drake et al. (1998a) found in their study that, while both groups showed improvements in substance use outcomes, the I-ACT group demonstrated greater gains on some metrics. Outcomes were similar for both groups in terms of substance use reduction, with the I-ACT showing more significant gains in the last year of the study. Significant differences were not found for drug or alcohol remission between groups. Essock et al. (2006) report similar findings. Participants reported more steady reductions in drug use among the I-ACT groups, while the SCM groups had greater reductions in alcohol use.

SERVICE DELIVERY MODEL

The general efficacy of ACT programs is well-documented in the research literature. Additionally, there is a substantial evidence for the use of an integrated treatment approach in treating persons with co-occurring disorders (Bride, MacMaster, & Webb, 2006). More research is needed on combined ACT and integrated treatment approaches for persons with co-occurring disorders. Toward addressing this gap in the I-ACT literature, this study will analyze the outcomes of an I-ACT intervention on housing, psychiatric symptoms, substance use, and service utilization of the participants in this study.

The I-ACT model employed for this study paired derivate characteristics of ACT with key components of effective integrated treatment (i.e., assertive outreach, motivational enhancement, stage-wise approaches, counseling/support, and long-term and comprehensive interventions); the model integrated core competencies by developing a team with mental health and substance abuse training as well as expertise in housing, vocational rehabilitation, outreach, and peer support. Consistent with the ACT model, the team members included substance abuse counselors, a psychiatrist, a nurse practitioner and several case managers providing vocational rehabilitation, housing assistance, homeless outreach, and a consumer paraprofessional. Weekly and daily treatment teams were conducted to ensure a team approach to treatment. In addition to the ACT model, an existing outpatient co-occurring disorders treatment center provided individual and group mental health and substance abuse counseling.

All team members maintained low caseloads and addressed consumer needs across clinical domains. Caseloads averaged 10 to 15 consumers per case manager in order to provide more intensive time-unlimited services and outreach efforts in the community. Outreach activities included initial engagement and ongoing reengagement contacts when necessary. The frequency of contacts and specific interventions utilized were based on individual needs. Most participants received more frequent case management contacts initially and then gradually reduced as

symptoms improved and consumers became more stable. Reduced caseloads allowed the treatment team to deliver a comprehensive array of services, including psychopharmacologic treatments and monitoring, individual and group therapy, support groups, illness management and recovery skills, intervention with support networks (family, friends, neighbors, landlords), vocational training and support, along with assistance with activities of daily living, and a variety of support services (transportation, medical care, housing, and benefits).

METHOD

Design

This study utilized a single-group design (aggregating program participants over the duration of the project), with repeated measures of program outcome indicators at program intake (baseline) and 6 months and 12 months post-intake to examine changes over time (Cook & Campbell, 1979). The major strengths of the evaluation for establishing program effectiveness were (1) using program participants as their own controls with data from baseline and 6- and 12-month follow-up interviews (combined with data on their service use) and (2) basing the evaluation on a centralized management information system to allow program monitoring and outcome evaluation.

Sample

The modified ACT program enrolled 555 participants from March 2002 to January 2004. Approximately half were male, 62% were White and 37% were Black, and 68% were between 26 and 45 years of age. Participants generally remained in programming for a full 12 months and beyond, although the engagement was frequently interrupted. Consumers would often stop showing up for services and not be able to be contacted and then show up again at a later date. Given this pattern of use, it is difficult to determine how long participants were actively engaged. To manage this irregular pattern, baseline interviews were conducted upon initial entry, and even after a period of absence consumers would be administered the follow-up interview (6 or 12 months) based on the date of their baseline interview.

Almost half of participants did not complete high school (42%), 27% reported full- or part-time work, and 56% reported less than $300 income in the last 30 days from all sources. Table 1 depicts the above data graphically. Of this total baseline admission of 555, varying numbers of participants completed all three follow-up points with all the instruments. Interviewers were service staff and were focused on achieving the 80% Government Performance and Records Act (GPRA) follow-up rate, and when participants indicated that they did not want to complete follow-ups the worker would offer to do just the GPRA or start with the GPRA and allow the participant to stop when they wished.

Table 1. Baseline Sociodemographic Characteristics of Sample

Variable						n
Race	White			Black		
	n	%	n	%		
	349	63.30	202	36.70		551
Sex	Male			Female		
	n	%	n	%		
	276	50.08	275	49.92		551
Housing	Street		Shelter/Institution		Housed	
	n	%	n	%	n	%
	61	11	308	55.44	186	33.56	555
	M		Min	Max	SD		n
Education (highest grade completed)	11.61		6	17	2.14		552
Total legal income in last 30 days	$316.95		$0	$12,000.00	$729.53		549
Nights in jail in last 30 days	2.20		0	30	6.91		554
Number of arrests in last 30 days	0.13		0	10	0.64		555
Global Assessment of Functioning	47.38		30	63	5.66		444
Alcohol use to intoxication in last 30 days	5.44		0	30	8.99		555
Illegal drug use in last 30 days	8.41		0	30	10.62		555

To ensure equality of participants only receiving baseline administrations to those who received follow-up interviews, several analyses were run to determine any differences. Chi-square analyses were run comparing the race ($\chi^2 = 4.52$, $p = .104$), sex ($\chi^2 = 5.39$, $p = .067$), housing status ($\chi^2 = 2.11$, $p = .716$), diagnoses of alcohol abuse ($\chi^2 = 1.05$, $p = .591$) or dependence ($\chi^2 = 1.21$, $p = .271$) and drug abuse ($\chi^2 = 9.28$, $p = .002$) or dependence ($\chi^2 = 10.00$, $p = .002$) of those completing no follow-up to those completing one and both follow-up interviews. For these analyses, no significant differences were found except in the case of the drug and alcohol abuse and dependence measures. Participants who completed one follow-up interview were more likely to have an alcohol or drug use disorder diagnosed than those completing only the baseline. Further, those completing both follow-up interviews were even more likely to experience drug or

alcohol abuse or dependence than those completing only one follow-up or baseline only interviews.

To compare the psychiatric symptoms of participants completing baseline only to those completing one or both follow-up interviews, an ANOVA was run comparing the Brief Symptom Inventory (BSI) subscale scores. No significant differences were found on any of the subscales and the F scores and p values for each analysis are reported in Table 2.

Table 2. BSI Comparisons: Baseline Only to One and Two Follow-Ups

	Baseline Only $n = 45$		One Follow-Up $n = 159$		Two Follow-Ups $n = 313$		ANOVA		
Subscale	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	**Total *N***
Somatization	1.33	0.96	1.23	0.97	1.27	0.90	0.266	.767	517
Obsessive compulsive	2.16	1.05	2.15	1.11	2.11	1.07	0.114	.892	517
Interpersonal sensitivity	1.91	1.16	1.91	1.20	1.96	1.11	0.117	.890	517
Depression	2.22	0.97	2.11	1.17	2.15	1.12	0.162	.850	517
Anxiety	2.13	0.99	2.07	1.12	1.92	1.05	1.565	.210	517
Hostility	1.51	1.00	1.38	1.08	1.41	1.04	0.232	.793	517
Phobic anxiety	1.50	1.05	1.39	1.08	1.33	1.01	0.518	.596	517
Paranoid ideation	1.93	1.05	1.72	0.98	1.84	1.00	1.090	.336	517
Psychoticism	2.04	1.07	1.80	1.05	1.82	0.98	0.997	.370	517
Global Severity Index	1.89	0.81	1.76	0.91	1.77	0.84	0.387	.679	517
Positive symptom distress index	2.47	0.63	2.37	0.73	2.33	0.67	0.953	.386	517
Positive symptom total	38.00	10.03	36.88	12.14	37.95	11.47	0.481	.619	517

Illegal drug use was reported more frequently than alcohol use (57.8% compared to 49.4%), while cocaine use (42.1%) was more common than alcohol use to intoxication (39.2%). General quality of life domains indicated lowest satisfaction with finances, while health-related quality of life indicated poorer quality of life for mental health compared to physical health–related quality of life.

Relative to BSI normative data for psychiatric outpatient consumers, program participants' *t* scores tend to fall around the 60th to 70th percentile in psychiatric severity (i.e., the average participant in this study scores higher than 60% to 70% of typical psychiatric outpatients). This trend can be seen across all psychiatric domains, and although there is some fluctuation across domains, the global severity category indicates that the average of participants in this study report higher symptom severity than almost 75% of psychiatric outpatients and almost 99% of the general population. Figure 1compares the BSI scores of FA program participants to BSI outpatient norms and BSI census norms.
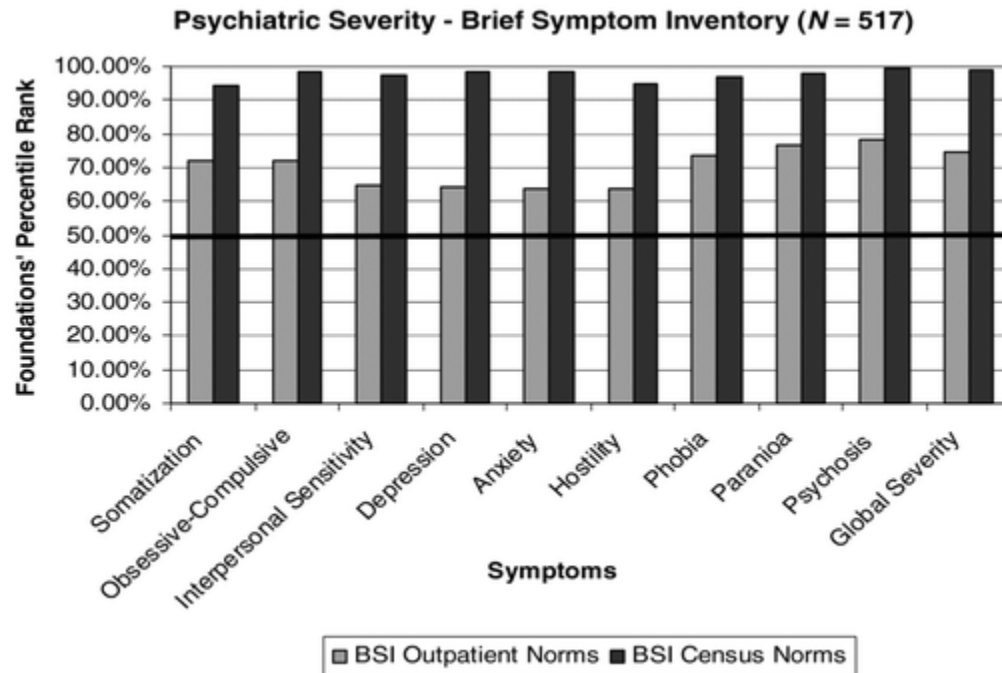

Figure 1. Comparison of participants' BSI t scores to outpatient norms

Inclusion Criteria

All clients receiving services from the program were included in the study. In order to be included, participants must report having a diagnosed Axis I or II mental disorder and be assessed to have an abuse or dependence problem with alcohol or other drugs using the Triage Assessment for Addictive Disorders (TAAD) interview. Assessment of mental disorders were conducted by master's-level clinicians using a comprehensive psychosocial interview. The TAAD interview is designed to identify symptoms of a possible current DSM-IV diagnosis of

abuse or of dependence for alcohol or other drugs. The TAAD assesses both dependence and abuse by establishing a pattern of behaviors or consequences rather than simply a pattern of use.

The TAAD has 16 items that address drug dependence and 19 that address alcohol dependence. According to TAAD scoring procedures (Campbell, Hoffman, Madson, & Melchert, 2003), possible dependence is indicated if the individual endorses items from at least three of the *Diagnostic and Statistical Manual of Mental Disorders, 4th ed.* (*DSM-IV*) categories for dependence. A more stringent dependence criterion requires positive responses on at least five different dependence items. Similarly, possible abuse is indicated if the individual endorses at least one item in any of the four DSM-IV abuse categories, while the more stringent abuse criteria require at least two different indications of abuse in one or more of the categories. For our purposes, indications for abuse or dependence reflect the more stringent criteria.

Procedures

After enrolling in the project, trained intake staff explained to participants that the evaluation component of the project involved a baseline interview with follow-up interviews at 6 and 12 months. Participants were assured that they could refuse to participate in the interviews and still receive services. Confidentiality procedures were explained and informed consent obtained. To facilitate follow-up interviews, extensive locator information was collected including alternate contacts (friends, family, or others). Institutional review board approval for research with human subjects was applied for and obtained through the dual diagnosis management institutional review board.

Measures

Consistent with previous research on ACT, the authors sought to examine changes in substance use, psychiatric symptoms, housing status, and utilization of services. The measures used to examine theses changes are described below.

Substance Use. Substance use frequency is based on days of self-reported use in the last 30 days for alcohol use, alcohol use to intoxication (greater than four drinks), and other illegal drug use as captured by Addiction Severity Index items employed in the GPRA (Kosten, Rounsaville, & Kleber, 1983). Substance use abstinence is a dichotomous variable indicating any substance use in the past 3 months.

Psychiatric Symptom Severity. The BSI (Derogatis, 1993) was used as an indicator of psychiatric severity. The BSI is a subset of the Symptom Checklist-90–Revised (with similar validity and reliability and a shorter administration time). The BSI contains 53 items corresponding to nine symptom dimensions: somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Additionally, the BSI allows for the calculation of three global indices: a global symptom index, a positive symptom

distress index, and a positive symptom total. The Global Assessment of Functioning, the fifth axis of the multiaxial diagnostic system used in the *DSM IV-TR*, was also used.

Housing Status. Individuals' housing status was measured with items from the GPRA that were again drawn from the Addiction Severity Index (Kosten et al., 1983). These items measure the number of days out of the past 30 days that the participant was homeless, housed, or in an institution. To create the categorical variable reported, participants' responses were recoded to reflect the housing condition they experienced for the majority of the previous 30 days.

Service Utilization. The Treatment Services Review (TSR) was developed to measure the amount of particular services persons in alcohol and drug treatment receive. The TSR-6, a revision of the original TSR that was designed to allow for collection of past-month service use, was used in this study (Cacciola et al., 2008). Initial study of the reliability and validity of this revision indicates acceptable test-retest reliability on the 28-day review period and discriminate validity comparable to the original TSR.

Data Analysis

Descriptive statistics were analyzed to characterize the study sample in terms of demographics, substance use, psychiatric severity, and housing status (see Table 1). These analyses provided a baseline description of the study sample from which changes over time could be assessed.

Analyses of changes from baseline to 6 and 12 months on substance use outcomes were assessed using ANOVA techniques. The basic research design was a single-factor repeated measures ANOVA with three levels (baseline and 6-month and 12-month follow-up). Several variables were measured at the ordinal level, and in such cases the Friedman's two-way analysis by ranks test was used. The important analytic questions regarding program effectiveness involved the magnitude of changes from baseline on outcomes and the maintenance or stability of changes from baseline, at 6 months, and at 12 months.

RESULTS

Psychiatric Symptom Severity

Severity of psychiatric symptoms was reduced significantly at the first follow-up point, and the reduction was maintained at 1-year follow-up. The means and results of the repeated measures ANOVA for each domain of psychiatric symptom are listed in Table 3. Analysis of the positive symptom total was conducted using the repeated measures ANOVA. The Huynh-Feldt correction was used ($\epsilon = .99$). The findings indicate a significant effect on the number of psychiatric symptoms across categories experienced by participants at each follow-up point, $F(1.98, 299.19) = 43.73$, $p = .0001$. Similarly, the repeated measures ANOVA indicated a significant decline in problem symptom distress index scores at each follow-up point, $F(2, 302) = 38.75$, $p = .0001$).

Table 3. Psychiatric Symptom Severity Outcome

	Baseline		6 Months		12 Months		ANOVA		
Outcome Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	*N*
Somatization	1.24	0.92	0.85	0.89	0.80	0.75	38.70	.0001	152
Obsessive compulsive	2.08	1.03	1.48	1.11	1.39	1.10	49.95	.0001	152
Interpersonal sensitivity	1.97	1.08	1.37	1.13	1.19	1.11	59.56	.0001	152
Depression	2.10	1.13	1.45	1.11	1.28	1.09	63.03	.0001	152
Anxiety	1.89	1.05	1.19	1.03	1.06	0.97	96.27	.0001	152
Hostility	1.47	1.07	1.02	1.01	0.96	0.96	26.58	.0001	152
Phobic anxiety	1.29	1.03	0.88	0.96	0.79	0.88	22.91	.0001	152
Paranoid ideation	1.85	0.98	1.45	1.11	1.25	0.97	49.71	.0001	152
Psychoticism	1.79	0.98	1.25	1.03	1.07	0.96	67.44	.0001	152
Global Severity Index	1.76	0.84	1.22	0.88	1.09	0.83	82.68	.0001	152
Positive symptom distress index	2.32	0.69	1.92	0.74	1.83	0.79	53.74	.0001	152
Positive symptom total	38.11	10.96	29.83	14.36	27.04	15.38	76.39	.0001	152

Note. 152 participants completed all three follow-up administrations of the BSI.

Housing Status

Evidence of greater access to permanent housing arrangements following enrollment in the program were strongly supported by several housing outcome indicators. Almost 70% of participants were housed in their own or someone else's apartment room or house 12 months after enrollment compared to approximately 33.5% at baseline. The percentage living in a shelter or on the street decreased from 11% at baseline to 7% at 12 months following enrollment in the program. Those who indicated not having enough money for housing decreased from 60.2% at baseline to 32.8% at 12 months.

Service Utilization

The TSR was used to measure service utilization. Several measures of utilization are reported, including inpatient and outpatient physical health, mental health and substance abuse services, as well as emergency department services for physical and mental health and substance abuse.

Findings for each are reported below; in addition, the findings for service use are reported in Table 4.

Table 4. Service Utilization

Outcome Measure	Baseline		6 Months		12 Months		ANOVA		
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	*N*
Physical health service use (inpatient)	0.33	2.65	0.03	0.24	0.02	0.25	1.85	.17 [a]	143
Physical health service use (outpatient)	0	0	0.19	0.93	0.14	0.96	2.26	.11 [a]	144
Mental health service use (inpatient)	2.27	5.80	0.84	2.77	0.57	3.03	8.06	.001 [a]	148
Mental health service use (outpatient)	0.60	1.76	4.47	7.17	2.57	6.42	19.06	.0001 [a]	158
Mental health service use (emergency department)	0.30	0.63	0.16	0.55	0.14	0.69	3.09	.05 [a]	147
Inpatient substance abuse treatment	1.42	4.95	0.62	2.31	0.26	1.68	4.68	.019 [b]	148
Outpatient substance abuse treatment	1.08	3.96	4.42	7.73	2.39	6.55	10.53	.0001 [a]	150

[a]Hunyh-Feldt correction; [b]Greenhouse-Geisser correction.

Physical Health. Significant differences in the utilization of inpatient, outpatient, or emergency department physical health services were not found. While the mean number of visits in each service category did decline, they were not significant.

Mental Health. Significant decreases in all mental health service utilization were found. Analysis of inpatient mental health service use indicated that the assumption of sphericity was violated, necessitating the Huynh-Feldt correction ($\epsilon = .746$; $F(1.49, 219.18) = 8.06$, $p = .001$). Outpatient mental health service use also decreased significantly. Again, the Huynh-Feldt correction was used to correct the violation of sphericity ($\epsilon = .851$). The results support a significant effect on service use across follow-up points, $F(1.70, 267.22) = 19.05$, $p = .0001$. Finally, emergency department mental health services also decreased significantly across follow-up points using the same correction for sphericity ($\epsilon = .954$), $F(1.90, 278.59) = 3.09$, $p = .05$.

Substance Use Service Use. Inpatient substance use service utilization declined across all three points. The assumption of sphericity was not met in analysis of inpatient substance use service utilization. The Greenhouse-Geisser correction was used ($\epsilon = .72$). The findings indicate a significant effect on inpatient service use across follow-up points $F(1.44, 208.71) = 4.68$, $p = .019$. Outpatient service use increased significantly at the 6-month follow-up and declined, although not to baseline levels, at the 1-year follow-up. The Huynh-Feldt correction was used to correct the violation of sphericity ($\epsilon = .916$). An effect was again found across follow-up points $F(1.83, 272.95) = 10.53$, $p = .0001$. There were not enough reported substance use emergency department visits at any point to allow for meaningful analysis.

Substance Use

The frequency of substance use and relapse rates were reduced at both 6 and 12 months following enrollment in the program. For participants who reported illegal drug use at baseline, relapse rates were 35% 6 months and 28% 12 months later. The majority (56%) of participants who were using illegal drugs at baseline were abstinent from illegal drug use at both 6 and 12 months. Positive outcome trends were similar across all major substance use categories. Repeated measures ANOVA was conducted to further analyze the data using the variables number of days in the past 30 days using alcohol to intoxication and the number of days using various drugs in the past 30 days.

Alcohol Use. Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2(2) = 125.44$, $p > .05$; therefore degrees of freedom were corrected using the Huynh-Feldt estimates of sphericity ($\epsilon = .761$). The findings indicate a significant difference in alcohol use to intoxication across follow-up points, $F(1.52, 497.5) = 57.31$, $p < .01$. Means for baseline and 6 and 12 months are displayed in Table 5.

Table 5. Drug Use Outcomes

	Baseline		6 Months		12 Months		ANOVA		
Outcome Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	*N*
Alcohol use	7.55	10.27	2.77	6.88	2.55	6.67	57.74 [a]	.0001	328
Alcohol use > 4	5.91	9.51	1.54	5.4	1.43	5.09	57.31 [b]	.0001	328
Marijuana use	4.1	8.7	0.89	3.65	1.44	5.58	30.27 [b]	.0001	327
Cocaine use	5.6	9.18	1.34	4.85	1.8	5.46	50.26 [b]	.0001	327
Illegal drug use	9.51	11.15	2.26	6.01	2.85	7.21	94.30 [b]	.0001	328

Note. 328 participants completed the GPRA at all three follow-up points. [a]Hunyh-Feldt correction; [b]Greenhouse-Geisser correction.

To further understand the data across the follow-up points, a paired samples t-test was run using the 6- and 12-month follow-up points and baseline and 6-month follow-up points. Change was significant from baseline to 6 months ($t(480) = 9.27$, $p = .0001$). Significant change was not found, however ($t(327) = .582$, $p > .05$) for the 6- to 12-month analysis.

Illegal Drug Use. Very few participants used drugs other than marijuana or cocaine, and these drugs, along with a composite of all illegal drugs, are the only ones analyzed in this study. Means for each follow-up point for these three variables are displayed in Table 5. Again, the assumption of sphericity was violated, $\chi^2(2) = 67.89$, $p > .05$, necessitating the Huynh-Feldt correction to degrees of freedom ($\epsilon = .846$). A significant difference was found in illegal drug use across the three follow-up points as well, $F(1.69, 553.02) = 94.30$, $p < .01$. When cocaine and marijuana were examined separately, similar reductions were found. Cocaine use dropped significantly ($F(1.65, 538.75) = 50.25$, $p < .01$), as well marijuana use ($F(1.62, 532.04) = 30.27$, $p < .01$).

Drug-Related Problems. Three measures of drug-related harm were collected that provided a 4-point Likert scale response to the questions of whether the respondent experienced drug-related stress, changed activities due to drug use, and had emotional problems due to use. The Friedman's two-way analysis by ranks test was used to determine differences in these variables across follow-up points. Drug-related stress was reduced significantly across follow-up points (based on the Friedman's test $\chi^2(2) = 117.41$, $p = .0001$). Reduction in activity due to drug use also was reduced significantly ($\chi^2(2) = 155.8$, $p = .0001$) as were emotional problems due to drug use ($\chi^2(2) = 141.31$, $p = .0001$). Table 6 summarizes change in these variables across follow-up points.

Table 6. Drug Use-Related Harms

	Baseline		6 Months		12 Months		Friedman		
Outcome Measure	**M**	**SD**	**M**	**SD**	**M**	**SD**	x^2	p	**N**
Drug use-related stress	2.87	1.22	1.87	1.17	1.79	1.17	117.41	.0001	263
Reduced activity due to drug use	2.76	1.28	1.51	1.0	1.58	1.06	155.80	.0001	263
Emotional problems due to drug use	2.84	1.63	1.69	1.1	1.63	1.08	141.31	.0001	263

Note. 263 participants completed these items at all three follow-up points.

As seen in Table 6, the significant reduction in drug-related harm occurred from baseline to follow-up. To further describe this difference, a Wilcoxon signed-rank test was used because the data are ordinal and related samples are being compared. The drug-related stress from baseline to 6 months z score was -10.36 ($p = .0001$), and from 6 months to 12 months the z score was -0.82

($p > .05$), indicating that a change in drug-related stress took place in the first 6 months of service receipt and that these changes were maintained from the 6-month to 12-month follow-up. The remaining drug-related harm variables, reduction in activity (baseline to 6 months, $z = 12.82$, $p = .0001$; 6 months to 12 months, $z = -0.96$, $p = .339$) and emotional problems due to drug use (baseline to 6 months, $z = 11.63$, $p = .0001$; 6 months to 12 months, $z = -0.54$, $p = .59$), followed a similar pattern. Drug use–related harm dropped significantly from the baseline to 6 months follow-up period, while only modest reductions took place from 6 to 12 months for all three variables.

DISCUSSION

The results of this research provide additional support for the application of the ACT model for use with individuals with co-occurring mental health and substance abuse disorders, and these results may be useful in improving substance abuse treatment for these individuals. Specifically, and consistent with previous findings (Drake, McHugo et al., 1998; Essock et al., 2006; Young et al., 2009), data from the project indicate that those participating in this integrated treatment model showed statistically significant improvements in substance abuse and mental health symptoms at 6-month follow-up, and it appears that continued service use may have contributed to these gains.

While these gains in and of themselves are important, from a service delivery perspective the model is also likely an important tool in containing costs. Consistent with cost-effectiveness research on ACT, the results clearly demonstrated that individuals who participated in the project experienced statistically significant decreases in inpatient mental health and inpatient substance use service use (Latimer, 1999), typically the most expensive mode of service delivery. Additionally, outpatient substance abuse treatment and mental health outpatient treatment both rose at the 6-month follow-up interview but dropped at the 12-month follow-up interview. This could be seen as a cost-saving measure as consumers are utilizing outpatient treatments as opposed inpatient, which in this study dropped steadily in both mental health and substance abuse treatment. Additionally, emergency department visits for mental health crises (also typically expensive) decreased at statistically significant rates. Consistent with previous findings on ACT, individuals in the project also enjoyed higher levels of permanent housing and lower levels of homelessness (Essock et al., 1998; Nelson, Aubry, & Lafrance, 2007).

The generalizability of the findings from this evaluation is limited, and the results from this study are only truly applicable to the individuals who participated in the evaluation. As a nonexperimental design without a randomized control group of individuals who did not experience the intervention, these findings are only suggestive of the possibility that these results are due to the participants' involvement in the program, although they are highly suggestive of this idea due to the significance of the change found in the group. Clearly, programs of this type need to be further evaluated through a study with a more rigorous design.

Another limitation of this study is the lack of fidelity measures to ensure there is not drift from the original intervention (Bond, Drake, Mueser, & Latimer, 2001; Siskind & Wiley-Exley, 2009). Within the program, supervision was provided to staff on a regular basis to ensure fidelity, but no measure of this is available. This was recognized as a problem in this study and in a subsequent grant supporting the implementation of a similar I-ACT intervention in Memphis, Tennessee, the Dartmouth Assertive Community Treatment Scale.

Additionally, research based on this type of sampling runs the risk of sampling bias, as those individuals who were in the sample may not accurately represent the pool of potential service recipients. For example, in the current study, the number of participants who provided baseline and 6- and 12-month follow-up data ($n = 313$) represent 63% of the total number of service recipients. To control for this, analyses were run comparing baseline demographics and outcome data, which indicated that the only significant difference in those who completed baseline only to those that had follow-up interviews was a higher percentage of drug-dependent and -abusing individuals. Surprisingly, participants with diagnosed drug dependence or abuse using the TAAD were more likely to complete the follow-up interviews. While this analysis indicates equality of groups and higher severity of drug use among those maintained in the study, results should still be viewed tentatively due to the difficulties with follow-up.

Despite all of these limitations, the results of this evaluation do remain important. Consistent with other studies using an ACT treatment model with consumers with co-occurring disorders (Drake, McHugo, et al., 1998; Essock et al., 2006), several of the major outcome measures showed significant improvements, including alcohol and drug use, psychiatric symptom severity, and housing stability. These results can be utilized to develop and/or enhance the services to similar individuals in other areas. The project clearly demonstrated the positive impact the combined I-ACT intervention had on mental health, substance abuse, and service use, making it an important intervention for service providers to employ. The fact that this was done in a cost-reducing manner that improved community stability only enhances the idea that this intervention should be more readily utilized for similar populations of individuals with co-occurring disorders. This is a population that has been historically described as hard to reach and/or noncompliant with traditional models of service delivery. The simple fact that individuals engaged with these services at a high rate cannot by itself be understated. Clearly, further study using randomized control designs and comparison groups are needed to further support the adoption of the I-ACT intervention.

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