



## Effect of an Organizational Linkage Intervention on Staff Perceptions of Medication-Assisted Treatment and Referral Intentions in Community Corrections<sup>☆</sup>



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### ABSTRACT

**Introduction:** Medication-assisted treatment (MAT) is effective for alcohol and opioid use disorders but it is stigmatized and underutilized in criminal justice settings.

**Methods:** This study cluster-randomized 20 community corrections sites to determine whether an experimental implementation strategy of training and an organizational linkage intervention improved staff perceptions of MAT and referral intentions more than training alone. The 3-hour training was designed to address deficits in knowledge, perceptions and referral information, and the organizational linkage intervention brought together community corrections and addiction treatment agencies in an interagency strategic planning and implementation process over 12 months.

**Results:** Although training alone was associated with increases in familiarity with pharmacotherapy and knowledge of where to refer clients, the experimental intervention produced significantly greater improvements in functional attitudes (e.g. that MAT is helpful to clients) and referral intentions. Corrections staff demonstrated greater improvements in functional perceptions and intent to refer opioid dependent clients for MAT than did treatment staff.

**Conclusion:** Knowledge, perceptions and information training plus interorganizational strategic planning intervention is an effective means to change attitudes and intent to refer clients for medication assisted treatment in community corrections settings, especially among corrections staff.

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### 1. Introduction

Criminal justice populations have high rates of substance use disorders (SUDs), including opioid use disorders and alcohol use disorders (Lee & Rich, 2012; Polcin & Greenfield, 2003). Both can be effectively

treated with pharmacotherapy, reducing the likelihood of substance use (Cornish et al., 1997; Gryczynski et al., 2012), overdose deaths, and re-incarceration (Ball & Ross, 1991; Digiusto et al., 2006; Schwartz et al., 2009). Although the World Health Organization supports the use of pharmacotherapy within the criminal justice system, few community corrections agencies in the U.S. provide or fund programs to deliver pharmacotherapy to individuals under their supervision (Bahr, Masters, & Taylor, 2012; Friedmann et al., 2012; Kastelic, Pont, & Stover, 2008; Kubiak, Arfken, Swartz, & Koch, 2006; Marsch, 1998).

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The community corrections field has recently begun to evaluate methods designed to increase access to evidence-based practices to address substance use (Bonta et al., 2011; Chandler, Fletcher, & Volkow, 2009; Markarios, McCafferty, Steiner, & Travis, 2012), including access to pharmacotherapy for individuals on probation and parole (Marlowe, 2003; Vaughn, DeLisi, Beaver, Perron, & Abdon, 2012). Stigmatizing beliefs and inadequate knowledge of the effectiveness of medication-assisted treatment (MAT) are barriers to its adoption (Friedmann et al., 2012; Lee & Rich, 2012; Nunn et al., 2009; Rich et al., 2005). Social-cognitive theory and the theory of planned behavior suggest that successful implementation of MAT will require addressing dysfunctional attitudes, subjective norms and knowledge that inhibit the desired behavior (Ajzen, 2012; Godin, Belanger-Gravel, Eccles, & Grimshaw, 2008)—viz., referral of criminal justice clients for effective addiction pharmacotherapy. Few studies have tested strategies to increase referral to pharmacotherapy for offenders under community corrections supervision.

The Medication Assisted Treatment Implementation in Community Correctional Environments (MATICCE) study addresses this gap in the literature. Using a cluster randomized design, this study compares two implementation strategies, which are “systematic intervention process (es) to adopt and integrate evidence-based health innovations into usual care” (Powell et al., 2012, p. 124). Specifically, this cluster randomized trial compares the effectiveness of training alone (comparison condition) to an experimental condition that paired training with a 12-month interorganizational linkage intervention on staff perceptions of and willingness to refer to addiction pharmacotherapy. The primary hypotheses were that the experimental intervention would yield greater increases in knowledge, attitudes, and referral intentions regarding MAT than the comparison condition that only included training.

In addition to comparing the two conditions for all participants, this paper isolates the effects of the experimental condition on attitudes among community corrections staff. Given the substantial resistance to MAT documented in prior research on correctional staff (cf., Friedmann et al., 2012; Lee & Rich, 2012; Rich et al., 2005), the research team was interested in the impact of the experimental intervention on this specific population. Furthermore, it was anticipated that there would be ceiling effects on attitude improvement for treatment staff given that they worked in agencies that delivered MAT services. For these reasons, additional analyses compared the two study conditions with the sample restricted to community corrections staff as well as moderation effects between correctional and treatment staff.

## 2. Methods

### 2.1. Study design

The MATICCE study began in late 2011 and ended in early 2013 as one of three protocols within the National Institute on Drug Abuse's Criminal Justice Drug Abuse Treatment Studies-II (CJDATS-II) multisite cooperative agreement (Ducharme, Chandler, & Wiley, 2013). Nine research centers partnered with multiple stakeholder organizations, including community corrections, SUD treatment providers, and Treatment Alternatives for Safe Communities (TASC), to collaboratively design and carry out this research protocol. The focus on community corrections was based on the results of a planning survey showing low utilization of addiction pharmacotherapy despite high need (Friedmann et al., 2012). Also, the potential to effect change was evident, since the main barrier to increased use, i.e., having weak referral relationships with MAT providers, was especially amenable to an implementation intervention. Other barriers (e.g. poor knowledge and philosophical opposition) could be addressed by training.

The MATICCE study protocol has been fully detailed in a separate article (Friedmann et al., 2013). Briefly, the study utilized cluster randomization of 20 community corrections agencies. Each of the 9 research centers recruited 2 community corrections agencies with non-overlapping administrative structures (i.e., such that the participation

of one would not contaminate the other). One research center recruited a second pair of agencies from a different corrections system, bringing the total to 20 sites. Randomization was blocked by research center.

### 2.2. Training

Delivery of training is a core component of implementation models (Fixsen, Blase, Naom, & Wallace, 2009). In addition to diffusing information, training can help individuals to reconcile beliefs that an innovation, such as pharmacotherapy, is incompatible with the values of their profession (Marinelli-Casey, Domier, & Rawson, 2002). Criminal justice and corrections staff often have limited knowledge regarding addiction pharmacotherapy as well as negative attitudes toward this form of treatment (Lee & Rich, 2012; Rich et al., 2005), but training has been previously shown to improve attitudes and knowledge (Gjersing, Butler, Caplehorn, Belcher, & Matthews, 2007; McMillan & Lapham, 2005).

Prior to randomization, staff from community corrections (e.g., probation, parole, prison, and TASC) and community health agencies (SUD treatment providers, health departments) in all 20 sites were invited to attend a 3-hour in-person training on medication-assisted treatment, which included background on the neurobiology of addiction, the form and appropriate uses of FDA-approved pharmacotherapies, the compatibility of MAT and behavioral counseling, and the availability of MAT in the local area (see <http://www.uclaisap.org/slides/cjdats-pcra/KAI%20TRAINING%202011-01-20.ppt>). In each study site, the training was delivered by staff affiliated with the regional Addiction Technology Transfer Center.

### 2.3. Experimental condition: organizational linkage intervention (OLI)

Because the broader literature on implementation suggests that training is a necessary but not sufficient condition for changing organizational cultures and processes (Fixsen et al., 2009), the experimental implementation strategy combined the training session with an organizational linkage intervention. Drawing on theoretical and empirical perspectives regarding interorganizational relationships (Friedmann, D'Aunno, Jin, & Alexander, 2000; Oliver, 1990; Van den Ven & Ferry, 1980; Van den Ven & Walker, 1984) this experimental strategy sought to bring together corrections stakeholders and community treatment providers to address the issue of limited referrals to pharmacotherapy for probationers and/or parolees with opioid or alcohol use disorders. In part, this strategy reflects the recognition that correction agencies lacked the infrastructure to directly deliver pharmacotherapy when it was available in the community (Friedmann et al., 2012), but that attitudinal changes towards referring offenders to pharmacotherapy may increase the reach of this effective treatment.

After completion of the training, sites randomized to the experimental condition were asked to nominate members for a “Pharmacotherapy Exchange Council” (PEC), which comprised up to 10 key staff from the community corrections agency and a local treatment provider agency where MAT services were available. The PEC designated two co-chairpersons (one from corrections and one from treatment), and was administratively supported by a designated “connections coordinator”—someone determined to be well-positioned to build collaborations between the agencies involved. PEC members engaged in a structured, multi-part strategic planning process over the course of 12–15 months.

The group process of the PEC allowed the concerns of all parties to be vetted in an action-oriented open dialogue between treatment programs and community corrections in order to understand fully the issues surrounding greater use of MAT. This communication process was guided through manualized strategic planning, designed to clearly specify the goals, procedures and boundaries of the group, and was facilitated by the PEC co-chairpersons (PEC Organizational Linkage Manual available on request). During the strategic planning process, PEC members completed manualized activities in which they collectively assessed the corrections agency's needs related to MAT referrals

(Assessment Phase—3 months average duration); decided on up to 4 priority objectives to be achieved in the course of the project (Strategic Planning Phase—3 months duration); worked together to address those goals (Implementation Phase, e.g., obtained additional training; developed interagency communication protocols—average 6 months duration); and developed a plan for sustainability of progress beyond the life of the research study (Sustainability Phase—average 2 months duration) (Friedmann et al., 2013). The designated connections coordinator worked closely with the PEC to implement the strategic plan.

The primary goal of the experimental intervention was to facilitate and enhance inter-organizational linkages and collaboration between community corrections and community-based treatment settings where addiction pharmacotherapy is available, while educating criminal justice employees about the effectiveness of MAT for individuals with opioid and/or alcohol dependence. The rationale was that improved linkages to effective substance abuse treatment were likely to yield significant benefits to the clients as well as benefits to public health and public safety.

#### 2.4. Data collection

Quantitative survey data were collected at baseline and approximately 12-months later. Data were obtained from surveys of staff within the participating agencies; staff were identified and recruited by the 9 research centers. Participants from community corrections and community agencies included: (a) directors, (b) supervisors, (c) community corrections officers, (d) counselors, (e) case managers, and (f) medical staff. Individuals were selected based on their involvement in the continuum-of-care for offenders released from incarceration, or under community supervision, to community-based treatment. Where appropriate, TASC staff were also recruited to provide data. At baseline, data collection focused on attitudes toward MAT as well as organizational characteristics, while the follow-up data collection only measured attitudes toward MAT. Survey response rates ranged from 69 to 75% for the experimental group and from 88 to 97% in the training only group. The difference in response rate between the two study conditions was the result of one experimental site experiencing an unusually low response rate compared to other study sites because some union representatives discouraged voluntary study participation as unnegotiated extra work, with response rates for this site ranging from 16 to 47%.

#### 2.5. Measures

##### 2.5.1. Opinions About MAT Survey (OAMAT)

The purpose of this survey was to measure knowledge, perceptions, and intentions regarding the use of pharmacotherapy for the treatment of opioid and alcohol dependence. This survey was administered to participants prior to the training and approximately 12 months later, which coincided with the end of the Organizational Linkage Intervention in the experimental condition. Measures from this survey instrument serve as the outcome variables in these analyses.

Items were derived from several different surveys about attitudes toward MAT: (1) a survey of clinicians affiliated with the NIDA-funded National Drug Abuse Clinical Trials Network (CTN) that assessed beliefs about whether MAT should be expanded for individuals with opioid or alcohol dependence (Fitzgerald & McCarty, 2009; McCarty et al., 2007); (2) an instrument used in the NIDA-funded National Treatment Center Study (NTCS) to survey large samples of substance abuse treatment counselors across the U.S. about alcohol treatment medications (e.g. naltrexone, acamprosate, and disulfiram (Abraham, Knudsen, Rieckmann, & Roman, 2013) and buprenorphine for the treatment of opioid dependence (Knudsen, Ducharme, & Roman, 2007; Knudsen, Ducharme, Roman, & Link, 2005); (3) an instrument to assess abstinence orientation and disapproval of drug use (Gjersing et al., 2007); and (4) items to assess current and future intent to refer clients to pharmacotherapy (Varra & Hayes, 2007; Varra, Hayes, Roget, & Fisher, 2008).

The resulting survey instrument consisted of sixty-seven Likert-type items (1 = strongly disagree, 5 = strongly agree) broken down into nine subscales with higher scores indicating more favorable attitudes toward MAT. The first subscale (19 items, Cronbach's  $\alpha = .91$ ) assessed general attitudes toward MAT. Eight additional subscales, one for each of eight specific types of medication, included questions about familiarity with the medication, receipt of training, knowledge of referral sources, perceptions of its helpfulness to clients, and likelihood of referring clients to this type of treatment both now and in the future. The eight medication-specific subscales were created: methadone for opioid dependence (6 items); buprenorphine (Suboxone®/Subutex®) for opioid dependence (6 items); naltrexone (ReVia®) for opioid dependence (6 items); naltrexone (ReVia®) for alcohol dependence (6 items); injectable depot naltrexone (Vivitrol®) for alcohol dependence (6 items); injectable depot naltrexone (Vivitrol®) for opioid dependence (6 items); acamprosate (Campral®) for alcohol dependence (6 items); and disulfiram (Antabuse®) for alcohol dependence (6 items).

Exploratory factor analysis examined for underlying structures to all items measuring respondent's MAT familiarity, training received, referral knowledge and intent. Using the six factors with Eigenvalues greater than one were retained: familiarity, training and referral knowledge about non-agonists loaded on the first factor; intent to refer to non-agonists now and in the future loaded on the second; and the third through sixth factors each contained all survey questions regarding one specific drug (buprenorphine, disulfiram, methadone and acamprosate). However, confirmatory factor analysis rejected good model fit, suggesting that there was insufficient evidence to justify summary scoring. Thus, each survey item would require analysis individually.

##### 2.5.2. Baseline survey of organizational characteristics

In order to consider the similarities and differences between sites prior to this implementation study, a survey instrument was administered at baseline. Specifically, this baseline survey yielded descriptive data on the characteristics of each participating organization to support comparisons between the experimental and comparison sites. Most of the scales were derived from the Texas Christian University's Organizational Readiness for Change and Survey of Organizational Functioning instruments (Broome, Knight, Edwards, & Flynn, 2009; Lehman, Greener, & Simpson, 2002). Survey items measured organizational climate and culture from the perspective of personnel at different levels of the participating community corrections and MAT treatment agencies. Five primary domains, which represented 34 sub-scales, were assessed: (1) needs/pressures for change, (2) resources, (3) staff attributes, (4) organizational climate, and (5) other (e.g., support for evidence-based practices). Response options typically ranged from 1 = strongly disagree to 5 = strongly agree. In addition, this survey instrument measured demographic characteristics including age, race, gender, education, and number of years' experience. Although these surveys were administered at baseline only, its subscales serve as covariates to adjust for cross-agency differences in organizational characteristics at baseline.

#### 2.6. Statistical methods

Prior to testing hypotheses about the effect of the experimental condition on MAT attitudes, comparisons were made between the two study groups. Equality of distributions between study groups for the categorical demographic variables of race, gender, respondent type, ethnicity and education level was compared using chi square tests. Study group means for continuous variables including years at unit/employer/position, client contact hours, active caseload and hours worked, were compared using t-tests. Equality of organizational attitudes between the study groups was tested using site-level mean scores obtained through the baseline survey of organizational characteristics; mean scores were computed for each of the 20 study sites and t-tests

were used to test the equality of the site-level means between study conditions. All available demographic and organizational data were utilized when investigating the adequacy of study group randomization. Because study participants who were added later in the study were not administered the demographic or organizational instruments, approximately 32% of study participants did not provide organizational data and approximately 14% did not have demographics data collected. Additional missing data arose from participants failing to fill out a study form or incorrectly entering their respondent codes leading to an inability to link records. Lastly, since not all items on each questionnaire were answered by each participant, there were some differences in the number of responses to different items.

Hierarchical linear modeling (HLM), using the SAS Proc Mixed procedure, was utilized to investigate changes in staff attitudes and perceptions regarding pharmacotherapies, recognizing that the outcomes violate assumptions of normality. We adopted a three level model for testing our hypotheses, with study sites and repeated measures on the same study participant within these sites comprising clusters, specified as random effects in our models. For all models the maximum likelihood method was used, with random intercepts for study sites and individuals nested within study sites. To test the robustness of the results from the mixed procedures we performed sensitivity analysis using the Glimmix procedure and found equivalent results (not shown).

Study group, study interval and the interaction of study group and study interval were entered as fixed effects, to determine if there was differential change over time between study conditions. Significance of the interaction term was used to determine if the data showed evidence of greater change in each outcome variable for the experimental group compared to the comparison group. We also determined whether study interval was a significant predictor of outcome in each study group independently by testing the interval main effect.

Targeted analysis was performed for community corrections study participants. All models were run for corrections staff only to determine the effects of the experimental intervention on this group. Additional HLM models were specified to determine whether community corrections staff in the experimental group had a greater change in expected outcome compared to treatment staff. An indicator variable signifying membership in the corrections group was created and this corrections indicator variable, study interval, and their interaction were included as main effects in these models, with our predictor of interest being the interaction term. Random effects were the same as previous HLM regressions, i.e., study sites and individuals.

### 3. Results

#### 3.1. Study cohort

After exclusion of records from respondents in neither or both study conditions (39 records) and those we were unable to identify and link across study intervals (10 records), a total of 1551 survey forms regarding MAT attitudes from 847 respondents were included in this analysis. The experimental group comprised 45.2% of the sample.

#### 3.2. Demographics and organizational characteristics

At baseline, there were no significant differences found between the experimental and comparison groups in regards to race, gender, education, years worked in corrections/treatment, years at current unit, hours worked per week, active caseload, client contact hours or respondent type. Differences between groups were found in age, ethnicity and years at current employer, with the experimental group having a higher mean age, a lower percentage of Hispanic staff and fewer years at current position (Table 1).

Of the 34 organizational structure and climate scales which were computed using the BSOC instrument, no significant differences were found between site-level mean scores comparing the experimental

and comparison groups (results available upon request). Because of the lack of significant baseline differences between study conditions, it was unnecessary to balance the groups through the addition of organizational covariates.

#### 3.3. MAT familiarity, training and referral knowledge

Both the experimental and comparison implementation strategy groups showed increases in familiarity with all 8 types of medication-assisted treatment from baseline to end of study (study interval  $p < .01$  for all measures; see Table 2). Both groups also reported increases in the amount of training they had received about all 8 types of MAT (study interval  $p < .0005$  for each type of MAT) and how knowledgeable they were about where to refer clients for each treatment (study interval  $p$  values range from  $<.0001$  to  $.02$ ). However, there was no evidence of a greater increase in the experimental group, with study group by study interval interaction term  $p$  values above  $.05$  for all types of MAT. In analyses that only included corrections staff, the experimental group showed greater improvement than the comparison group for familiarity and training received for naltrexone for alcohol dependence ( $p = 0.04$ ), as well as training received and referral knowledge for extended release injectable naltrexone (XR-NTX) for opiate dependence ( $p = 0.007$ ).

#### 3.4. Intent to refer clients to MAT

For the experimental group, study interval was found to be a significant predictor of current referral intentions and future referral intentions for all medications except disulfiram. Model-predicted estimated mean increases, from baseline to end of study, with regard to intent to refer clients now ranged from  $.21$  points for disulfiram for alcohol dependence to  $.60$  points for XR-NTX for opioid dependence. Model-predicted increases in future referral intentions ranged from  $.15$  for disulfiram for alcohol dependence to  $.60$  points for XR-NTX for opioid dependence. For the comparison group, the only evidence of significant increase in referral intentions was found for injectable naltrexone for alcohol abuse (intent to refer now  $p = .01$ ).

The experimental group, in contrast to the comparison group, showed a greater increase in both current and future intentions to refer clients to methadone and oral NTX for opioid dependence, and in the intent to refer clients to buprenorphine for opioid dependence in the future. Greater increases were also found for the experimental group current and future intentions to refer clients to acamprosate for alcohol dependence. Corrections staff in the experimental group, when examined alone, showed a greater increase compared to the comparison group in intent to refer clients to methadone, buprenorphine and XR-NTX for opiate dependence both now and in the future (Table 2).

#### 3.5. Perceptions and knowledge about MAT

When compared to training only group, respondents in the experimental group showed a greater increase over the study in many functional perceptions of MAT (Table 3). Greater increases in the overall average score for the 19 perception and knowledge items as well as the specific methadone and buprenorphine subscores were found for the experimental group. Notably, the experimental group showed greater increased awareness that methadone should be available as a lifelong treatment option and that it and buprenorphine reduce opioid dependent clients' risk of dying and consumption of illicit opioids than the comparison group. The experimental group also reported greater reductions in the perception that methadone is just substituting one addiction for another, and greater increases in the perception that methadone maintenance reduces opioid dependent clients' criminal activity. Greater increases in the experimental group's attitudes regarding buprenorphine reducing addicts' HIV risk were detected, relative to the comparison group.

**Table 1**  
Characteristics of study groups.

	Total N	Experimental training plus OLI <sup>a</sup>		Comparison training-only		p value <sup>b</sup>
		n	%	n	%	
Respondent type						
Correctional director	46	20	5.88	26	6.67	.20
Correctional staff	396	191	56.18	205	52.56	
Treatment director	47	27	7.94	20	5.13	
Treatment staff	241	102	3.00	139	35.64	
Gender						
Male	269	128	35.85	141	38.01	.55
Female	459	229	64.15	230	61.99	
Race						
African American	187	93	27.51	94	26.04	.24
White	431	213	63.02	218	60.39	
Other	81	32	9.47	49	13.57	
Ethnicity						
Not Hispanic	602	306	86.20	296	80.22	.03
Hispanic	122	49	13.80	73	19.78	
Education						
Post graduate degree	279	133	39.58	146	37.73	.61
Bachelors/associates	444	203	60.42	241	62.27	
		n	Mean	n	Mean	p-value <sup>c</sup>
Respondent age, years	714	353	48.15	361	44.71	<.0001
Years in corrections or treatment	729	339	11.83	390	12.64	.33
Years at unit	728	339	6.08	389	6.91	.09
Years at current employer	730	340	8.77	390	10.34	.01
Years at current position	730	340	5.36	390	6.75	.003
Direct client contact hours per week	549	251	25.80	298	25.87	.98
Active caseload	573	267	66.16	306	60.82	.36
Hours per week worked	719	333	38.33	386	39.01	.20

<sup>a</sup> OLI = organizational linkage intervention.

<sup>b</sup> Chi-square test for equality of group distributions.

<sup>c</sup> T-test for equality of group means.

When corrections staff responses were isolated, greater improvements in functional perceptions were found in the experimental group in the following attitudes: methadone should be available as a lifelong treatment option; methadone and buprenorphine are just substituting one addiction for another (reverse coded); methadone and buprenorphine decrease an addict's chance of using illicit opioids; and methadone and buprenorphine are not needed after prison because there is no drug use in prison (reverse coded).

### 3.6. Differences between corrections and treatment personnel

The final set of analyses compared corrections and treatment staff within the experimental condition (Table 4). In general, treatment staff reported more positive scores than corrections staff across all MAT-related measures at both baseline and follow-up. However, corrections staff in the experimental group experienced greater improvements over time than treatment staff in the experimental group for the following areas:

**Familiarity with treatment, training received and referral knowledge:** Corrections staff had greater estimated score increases compared to treatment staff for familiarity with, training received, and referral knowledge for buprenorphine, oral naltrexone for opioid dependence, and oral naltrexone for alcohol dependence. In addition, corrections staff had greater increases for familiarity with and training received about methadone, although the difference regarding referral knowledge for methadone was not significant (data not in table).

**Intent to refer:** No evidence was found indicating corrections and treatment staff differed in predicted change from baseline to 12-month follow up except for referral intentions for buprenorphine. With buprenorphine, corrections staff

were found to have a greater increase in both current and future referral intentions compared to treatment staff.

**Reducing negative perceptions of MAT:** Corrections study participants, compared to treatment provider participants, were found to have greater decreases in the perception that treating opioid dependent clients with methadone and buprenorphine is just substituting one addiction for another (methadone difference =  $-.52$ ,  $p = .0006$ ; buprenorphine difference =  $-.58$ ,  $p < .0001$ ). Corrections staff were also found to have a greater decrease in the perception that methadone and buprenorphine are not needed after release from prison because there is no drug use in prison (methadone difference =  $-.34$ ,  $p = .05$ ; buprenorphine difference =  $-.38$ ,  $p = .02$ ) (data not shown).

## 4. Discussion

Although training was associated with increases in familiarity with pharmacotherapies and knowledge of where to refer clients for medication-assisted treatment (MAT), the addition of the organizational linkage intervention produced greater improvements in functional attitudes such as the belief that MAT is helpful to clients and intent to refer clients to MAT. Compared with treatment staff, corrections staff demonstrated greater improvements in functional perceptions and intent to refer opioid dependent clients for buprenorphine treatment.

One can speculate several possible explanations as to why the organizational linkage intervention in the experimental condition improved functional attitudes and referral intentions over and above the training alone. Teleological approaches to organizational change like the inter-organizational strategic planning process in MATICCE commonly place a strong emphasis on addressing values, attitudes and norms in order to

**Table 2**  
Comparison of mean estimates for familiarity, training, referral knowledge and intent to refer, by implementation group<sup>a</sup>.

	Implementation Group								E v. C <sup>c</sup>	E v. C CC only <sup>d</sup>
	Experimental Training plus OLI <sup>b</sup>				Comparison Training-Only					
	Baseline	12 months	Diff	p-Value <sup>e</sup>	Baseline	12 months	Diff	p-Value <sup>e</sup>		
Familiarity with the medication										
Methadone	3.31	3.71	.40	<.0001	3.30	3.56	.26	<.0001	.14	.13
Buprenorphine	3.01	3.41	.40	<.0001	2.96	3.35	.39	<.0001	.94	.89
Oral NTX for opiates <sup>f</sup>	2.01	2.51	.50	<.0001	2.04	2.43	.39	<.0001	.36	.99
XR-NTX for opiates <sup>f</sup>	1.73	2.33	.60	.001	1.42	2.08	.66	.0003	.84	.14
Oral NTX for alcohol <sup>f</sup>	1.91	2.46	.55	<.0001	2.09	2.41	.32	<.0001	.06	.04
XR-NTX for alcohol <sup>f</sup>	1.69	2.30	.61	<.0001	1.88	2.36	.48	<.0001	.31	.45
Acamprosate	1.70	2.18	.48	<.0001	1.68	1.98	.30	<.0001	.11	.77
Disulfiram	2.45	2.80	.35	<.0001	2.35	2.58	.23	.009	.38	.87
Training										
Methadone	2.72	3.35	0.63	<.0001	2.59	3.15	0.56	<.0001	.67	.63
Buprenorphine	2.58	3.16	0.58	<.0001	2.45	3.01	0.56	<.0001	.96	.67
Oral NTX for opiates <sup>f</sup>	1.79	2.35	0.56	<.0001	1.85	2.27	0.42	<.0001	.22	.31
XR-NTX for opiates <sup>f</sup>	1.50	2.20	0.70	<.0001	1.41	1.93	0.52	0.002	.28	.007
Oral NTX for alcohol <sup>f</sup>	1.76	2.27	0.51	<.0001	1.89	2.29	0.40	<.0001	.32	.04
XR-NTX for alcohol <sup>f</sup>	1.55	2.10	0.55	<.0001	1.79	2.21	0.42	<.0001	.23	.17
Acamprosate	1.56	2.05	0.49	<.0001	1.56	1.86	0.30	<.0001	.09	.47
Disulfiram	2.04	2.43	0.39	<.0001	1.88	2.27	0.39	<.0001	.86	.55
Referral knowledge										
Methadone	3.60	3.88	0.28	<.0001	3.43	3.67	0.24	.003	.83	.83
Buprenorphine	3.11	3.52	0.41	<.0001	3.01	3.35	0.34	<.0001	.59	.47
Oral NTX for opiates <sup>f</sup>	1.97	2.42	0.45	<.0001	2.05	2.36	0.31	.0004	.21	.45
XR-NTX for opiates <sup>f</sup>	1.69	2.20	0.51	.009	1.57	2.01	0.44	.02	.71	.05
Oral NTX for alcohol <sup>f</sup>	1.90	2.34	0.44	<.0001	2.07	2.40	0.33	.0003	.29	.08
XR-NTX for alcohol <sup>f</sup>	1.64	2.23	0.59	<.0001	1.96	2.32	0.36	<.0001	.05	.11
Acamprosate	1.71	2.18	0.47	<.0001	1.70	1.99	0.29	.0008	.15	.56
Disulfiram	2.22	2.54	0.32	.0002	2.12	2.37	0.25	.007	.67	.88
Intent-to-refer now										
Methadone	3.44	3.87	0.43	<.0001	3.35	3.40	0.05	0.54	.0006	.004
Buprenorphine	3.40	3.70	0.30	.0002	3.32	3.47	0.15	0.09	.20	.04
Oral NTX for opiates <sup>f</sup>	2.32	2.64	0.32	.0004	2.52	2.58	0.06	0.46	.05	.17
XR-NTX for opiates <sup>f</sup>	1.87	2.47	0.60	.005	2.21	2.31	0.10	0.63	.15	.05
Oral NTX for alcohol <sup>f</sup>	2.24	2.63	0.39	<.0001	2.49	2.64	0.15	0.11	.08	.18
XR-NTX for alcohol <sup>f</sup>	2.13	2.50	0.37	.0002	2.38	2.61	0.23	0.01	.28	.18
Acamprosate	2.15	2.51	0.36	.0001	2.14	2.21	0.07	0.43	.03	.35
Disulfiram	2.56	2.77	0.21	.02	2.53	2.57	0.04	0.72	.18	.24
Intent-to-refer in the future										
Methadone	3.57	3.93	0.36	<.0001	3.54	3.48	−0.06	0.46	.0002	.002
Buprenorphine	3.53	3.78	0.25	.002	3.53	3.51	−0.02	0.83	.02	.001
Oral NTX for opiates <sup>f</sup>	2.46	2.75	0.29	.002	2.68	2.68	0.00	0.94	.03	.07
XR-NTX for opiates <sup>f</sup>	2.01	2.61	0.60	.006	2.30	2.43	0.13	0.56	.17	.03
Oral NTX for alcohol <sup>f</sup>	2.44	2.74	0.30	.001	2.67	2.79	0.12	0.23	.17	.20
XR-NTX for alcohol <sup>f</sup>	2.32	2.60	0.28	.004	2.57	2.73	0.16	0.09	.40	.09
Acamprosate	2.29	2.61	0.32	.0007	2.34	2.30	−0.04	0.65	.008	.10
Disulfiram	2.71	2.86	0.15	.09	2.70	2.62	−0.08	0.34	.06	.09

<sup>a</sup> Estimated means from hierarchical linear regression models.

<sup>b</sup> OLI = organizational linkage intervention.

<sup>c</sup> Testing interval by group interaction for experimental group (E) versus comparison group (C) among all participants.

<sup>d</sup> Testing interval by group interaction for experimental group (E) versus comparison group (C) among community corrections (CC) staff.

<sup>e</sup> Testing interval fixed effect for experimental group (E) versus comparison group (C).

<sup>f</sup> NTX = naltrexone. XR-NTX = extended-release injectable naltrexone.

help the change initiative overcome resistance (Carr, Hard, & Trahan, 1996). Social-cognitive theory and the theory of planned behavior suggest that attitudes and subjective norms correlate to behavioral intentions, and ultimately to the desired behavior (Ajzen, 2012; Eccles, Grimshaw, Walker, Johnston, & Pitts, 2005; Eccles et al., 2007). Changing attitudes and subjective norms is a social process through which contact with others exposes individuals and groups to new information, different behavioral norms or best practices that challenge prior beliefs, norms and practices. In this study, training initiated attitudinal changes by allowing individuals to learn new information (e.g. scientific evidence that MAT works, where to make referrals). The interorganizational exchanges in the PEC process might have augmented the effects of training through interpersonal contacts with service providers with differing beliefs, norms and practices; the enhancement of perceived behavioral control over the referral process; and the development of

organizational processes that legitimized and facilitated the new world-view (Carr et al., 1996).

These findings bring additional empirical data to bear on the theoretical propositions of the emerging field of implementation science. Models of implementation often point to the interplay between organizations and the outer context as setting the stage for the implementation of evidence-based practices (Aarons, Hurlburt, & Horwitz, 2011; Damschroder & Hagedorn, 2011; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). The organizational linkage intervention in this study specifically addressed such an intersection by bringing together community corrections and key actors in the external context, particularly community treatment providers of MAT. While this study focused on pharmacotherapy, future research might consider whether this organizational linkage approach can be extended to other situations in which community corrections may partner with external agencies to

**Table 3**  
Perceptions of medication-assisted treatment (MAT) for opiate dependence, by implementation group<sup>a</sup>.

	Implementation group								E vs. C <sup>c</sup>	E vs. C CC only <sup>d</sup>
	Experimental training plus OLI <sup>b</sup>				Comparison training-only					
	Baseline	12 months	Diff	p-Value <sup>e</sup>	Baseline	12 months	Diff	p-Value <sup>e</sup>		
Overall score	3.37	3.55	0.18	<.0001	3.32	3.34	0.02	.60	.002	.0005
Methadone	3.42	3.63	0.21	<.0001	3.37	3.38	0.01	.76	.0004	.0003
Buprenorphine	3.46	3.62	0.16	.0001	3.42	3.45	0.03	.49	.02	.005
MAT reduces the effects of opioids										
Methadone	3.72	3.82	0.10	.19	3.65	3.75	0.10	.19	.99	.79
Buprenorphine	3.78	3.88	0.10	.20	3.77	3.81	0.04	.55	.56	.29
MAT should be available as a lifelong treatment option										
Methadone	2.66	2.94	0.28	.0003	2.70	2.67	−0.03	.72	.006	.0007
Buprenorphine	2.83	2.95	0.12	.13	2.83	2.87	0.04	.65	.50	.17
Goal of MAT is eventual detox and sobriety										
	3.71	3.80	0.09	.20	3.86	3.96	0.10	.23	.97	.50
MAT is just substituting one addiction for another <sup>f</sup>										
Methadone	2.76	2.40	−0.36	<.0001	2.75	2.72	−0.03	.76	.003	.001
Buprenorphine	2.52	2.33	−0.19	.009	2.57	2.52	−0.05	.46	.22	.01
MAT maintenance reduces addicts' criminal activities										
Methadone	3.48	3.63	0.15	.05	3.38	3.32	−0.06	.33	.04	.08
Buprenorphine	3.46	3.61	0.15	.04	3.38	3.39	0.01	.90	.16	.61
MAT maintenance reduces addicts' HIV risk										
Methadone	3.42	3.62	0.20	.01	3.36	3.39	0.03	.69	.13	.49
Buprenorphine	3.37	3.58	0.21	.009	3.35	3.31	−0.04	.67	.03	.13
MAT maintenance reduces addicts' risk of dying										
Methadone	3.45	3.67	0.22	.0009	3.32	3.29	−0.03	.71	.02	.07
Buprenorphine	3.43	3.60	0.17	.02	3.34	3.30	−0.04	.57	.04	.14
MAT increases addicts' chances of using illicit opioids <sup>f</sup>										
Methadone	2.37	2.16	−0.21	.007	2.41	2.45	0.04	.55	.02	.05
Buprenorphine	2.41	2.23	−0.18	.02	2.42	2.43	0.01	.90	.07	.05
MAT reduces addicts' consumption of illicit opioids										
Methadone	3.57	3.75	0.18	.01	3.58	3.52	−0.06	.35	.02	.01
Buprenorphine	3.58	3.72	0.14	.04	3.62	3.55	−0.07	.23	.02	.006
Do not need MAT after prison because no drug use in prison <sup>f</sup>										
Methadone	2.38	2.19	−0.19	.03	2.35	2.36	0.01	.92	.08	.05
Buprenorphine	2.37	2.21	−0.16	.06	2.31	2.35	0.04	.62	.09	.03

<sup>a</sup> Estimated means from hierarchical linear models.

<sup>b</sup> OLI = organizational linkage intervention.

<sup>c</sup> Testing interval fixed effect for experimental group (E) versus comparison group (C) among all participants.

<sup>d</sup> Testing interval by group interaction for experimental group (E) versus comparison group (C) among community corrections (CC) staff.

<sup>e</sup> Testing interval by group interaction.

<sup>f</sup> Lower score implies better result (reverse coded).

better address the complex needs of individuals, such as mental health services or psycho-social treatment for substance use disorders for which medication is not available.

These findings are subject to several limitations. First, the self-reported ratings of the respondents are subject to distortions from cognitive and social desirability biases. Indeed, involvement in the strategic planning process might have made some respondents in the experimental group more likely than the comparison group to feel that they should report more favorable views of MAT and make more referrals. However, the great majority of respondents had no direct contact with the activities of the Pharmacotherapy Exchange Councils (PEC). Second, several of the PECs' strategic plans recommended and

implemented more staff training over and above the training delivered initially; that additional training likely reached more staff and influenced their knowledge, perceptions and behavioral intentions. This observation suggests that the initial 3-hour training did not reach the optimal depth and penetration among staff, and the organizational linkage intervention might have worked partly because it had the unintended consequence of delivering more staff training than anticipated. Furthermore, we do not know if more functional perceptions, knowledge and behavioral intentions translate into actual referral. We did attempt to measure actual referrals, both through chart abstractions for notations of treatment referral and a monthly survey of POs asking about referrals made. Unfortunately, many correctional sites lacked

**Table 4**  
Corrections vs. treatment staff by implementation group moderation effects on improvements in perceptions<sup>a</sup>.

	Familiarity		Training		Referral knowledge		Intent-to-refer now		Intent-to-refer in future	
	Estimate	p value	Estimate	p value	Estimate	p value	Estimate	p value	Estimate	p value
Methadone	.28	.03	.52	.0005	.20	.16	.26	.10	.20	.21
Buprenorphine	.42	.005	.62	<.0001	.56	.0009	.42	.008	.30	.05
Oral NTX <sup>b</sup> for opiates	.30	.05	.36	.03	.40	.03	.12	.49	.12	.48
XR-NTX <sup>b</sup> for opiates	.02	.95	.20	.51	−.08	.83	−.84	.05	−.76	.08
Oral NTX <sup>b</sup> for alcohol	.46	.003	.56	.0004	.54	.002	.08	.68	.004	.98
XR-NTX <sup>b</sup> for alcohol	.02	.86	.16	.34	.10	.59	−.04	.81	−.04	.86
Acamprosate	.10	.51	.08	.63	.08	.64	−.20	.30	−.16	.38
Disulfiram	.16	.34	.42	.008	.20	.25	−.02	.89	−.08	.65

<sup>a</sup> Estimated means and p-values for study implementation group by perception category by study interval interaction term from hierarchical linear models.

<sup>b</sup> NTX = naltrexone. XR-NTX = extended release injectable naltrexone.

adequate record-keeping systems (electronic or paper), the recording of treatment referrals was very inconsistent, and a very low return rate for the monthly surveys made them unusable. Nonetheless, several studies suggest that behavioral intentions predict actual behavior (Armitage & Conner, 2001; Eccles et al., 2006). It seems plausible that functional attitudes, knowledge and behavioral intentions are necessary but may be insufficient to increase referrals for MAT. Greater changes in ratings over time in subgroups (e.g. corrections versus treatment staff) might have resulted from ceiling or floor effects, or regression to the mean. While the organizational linkage intervention appeared to influence the context in which decisions about referral were made (as intended), changes in individual attitudes or organizational culture might be for-naught without system-level changes that make MAT readily accessible to clients and referral to MAT an easy default behavior for staff.

Despite these limitations, we conclude that the knowledge, perceptions and information training plus interorganizational strategic planning intervention in the MATICCE study are effective means to change attitudes and referral intentions regarding medication assisted treatment in community corrections settings. The intervention appears particularly useful for changing the perceptions and referral intent of corrections staff. Importantly, the combined intervention produced better results than training alone, which is often synonymous with “implementation as usual” in many service delivery settings. Involving key decision makers in change processes and providing a structured approach to problem solving may yield practical tools and procedures through which intentions motivated through training can be translated into action. Likewise, fostering a process of organizational change allows for implementation of routines that are likely to have more traction than staff training alone, the sustainability of which is mitigated by staff turnover. Future research should examine whether changes in attitudes and behavioral intent produce more actual referrals for pharmacotherapy and improved treatment outcomes in community corrections populations. Additional work should be directed at knowledge and perception changes in policymakers who have the capacity to initiate systems-level changes that make MAT more accessible to community corrections populations.

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