



Community implementation of contingency management to address stimulant use

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ABSTRACT

Introduction: Contingency management (CM) is efficacious for reinforcing stimulant abstinence, and technical assistance (TA) is increasingly sought to aid its community-based implementation. In an interagency partnership involving a sponsoring single-state authority and statewide treatment agency in Oregon, an intermediary purveyor organization provided a robust TA package to support design, implementation, and evaluation of CM programming for an opioid treatment program (OTP) over the course of a 12-month implementation service project.

Methods: In addition to an online training offering OTP leaders and staff conceptual foundation for CM, the TA package included purveyor-led activities to: 1) engage leaders in collaborative design to customize CM programming; 2) assemble a local implementation team to logistically prepare OTP systems for CM delivery; 3) provide virtual coaching-to-criterion to assure readiness of counseling staff to deliver CM programming; 4) compile a tailored CM resource library of implementation support materials; and 5) avail ongoing consultation during implementation. Stimulant abstinence was targeted via a voucher-based protocol with escalating reinforcement, for which gift cards from local vendors served as reinforcers. Virtual coaching eventuated in individual role-play assessments, wherein staff delivery of CM programming with a standardized patient was scored via Likert scale (1 = Very Poor, 7 = Excellent) on six CM fidelity dimensions. This observational cohort design subsequently assessed clinical effectiveness during active implementation via OTP records review for CM-exposed and comparison client groups.

Results: In role-play assessments, all counseling staff exceeded an a priori fidelity benchmark signifying implementation readiness ($M = 31.33$, $SD = 3.72$). Among 73 clients enrolled in the CM programming, rate of stimulant-free urine drug screens was 11 % greater than among 120 clients serving as historical controls ($p < .01$; Cohen's $D = 0.40$). The study also identified secondary therapeutic benefit in six-month treatment retention, with clients enrolled in CM retained at a 14 % greater rate than 162 CM-ineligible clients concurrently enrolled in OTP services ($p < .05$).

Conclusions: Findings from this interagency partnership offer reason for optimism regarding community-based implementation. Beyond the demonstrated empirical support for this TA package and resulting clinical effectiveness of the CM programming, an eventual sustainment decision by OTP leadership strengthens the rationale for customizing CM to clinical settings' local needs and resources.

1. Introduction

Several domestic trends contribute to the resurgent interest in

stimulant use disorders, including both methamphetamine and cocaine, among which is a precipitous spike in overdose events attributable to synthetic opioids and fentanyl-involved adulteration of stimulants

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(Jones et al., 2022). National rates of stimulant and nonprescription opioid co-use steadily rose during the past decade, disproportionately so in western US states (Ellis et al., 2018; Strickland et al., 2019). Covid-19 mitigation efforts increased reliance on telehealth services (Molfenter et al., 2021), even as barriers persist to their access by workforce members who treat persons with polysubstance difficulties (Huskamp et al., 2018). These trends, taken together with the clinical challenges that persons who use stimulants traditionally pose for engagement and retention in addiction services, undermine the valuable care that opioid treatment programs (OTPs) may otherwise provide.

As for treatment options for stimulant use disorder, long-recognized dilemmas persist as efforts to identify useful pharmacotherapies remain in their infancy (Coffin et al., 2020; Trivedi et al., 2021). Conversely, contingency management (CM) has robust evidence as a behavior therapy to promote stimulant abstinence (Brown & DeFulio, 2020). The study of CM in addiction settings now spans a half-century, with its core ingredient—application of operant conditioning principles—utilized for wide-ranging clinical targets via a family of behavioral reinforcement paradigms (Higgins et al., 2008). Meta-analyses of logistically diverse CM paradigms (Benishek et al., 2014; Griffith et al., 2000; Lussier et al., 2006), defined by the reinforcers that a client earns (e.g., prizes, vouchers, clinic privileges) after demonstrating a treatment-adherent behavior, document mean effect sizes (Cohen's $D = 0.46\text{--}0.68$) suggestive of medium-to-large therapeutic benefits. Notably, research has recognized CM as the most effective among behavior therapies for addressing treatment adherence by persons with stimulant use disorder (De Crescenzo et al., 2018) or among those who are engaged in polysubstance use (Petry et al., 2017).

As reviewed by Hartzler et al. (2012), CM dissemination has historically been undermined by fiscal, logistical, and philosophical barriers—resulting in limited adoption by the addiction workforce (Ducharme et al., 2010; Herbeck et al., 2008; McGovern et al., 2004). Policy barriers more recently emerged concerning mistaken attribution of CM as violating federal anti-kickback statutes, for which the Motivational Incentives Policy Group (2021) has proposed risk management safeguards. Despite such challenges, the past decade witnessed large-scale success in implementation of prize-based CM via a Veterans Administration (VA) initiative—with intensive outpatient programs at VA-affiliated medical centers receiving funding to cover implementation costs (i.e., prize-based reinforcers, staff time) and technical assistance (Petry et al., 2014). The latter included didactic training at a national meeting, followed by consultative teleconferencing contacts to support local adaptation during implementation. Self-reported fidelity and client outcomes were promising (DePhilipis et al., 2018), albeit with unknown generalizability beyond the VA system.

Of direct applicability to OTPs, Hartzler et al. (2014) demonstrated single-site success implementing voucher-based CM at an urban OTP serving a large polysubstance-using population. A collaborative design process enabled customization of CM programming to the OTP's local needs and resources, with skills-focused staff training and systems preparation followed by as-needed consultative support during active implementation. Beneficial outcomes of this context-tailored approach were: 1) robust, durable impacts of staff training on CM Skillfulness; 2) 100 % penetration of CM programming into routine clinical practice of OTP staff; And 3) clinical effectiveness of CM programming, with significant targeted therapeutic benefits ($D = 0.46\text{--}0.53$), and 4) an OTP leadership decision for post-trial sustainment, maintained multiple years thereafter (Hartzler et al., 2016). Questions remain about scalability and—as with the VA initiative—whether adaptations may increase efficiency, utility, and reach.

How might the aforementioned technical assistance approaches (hereafter referenced as *TA packages*) inform future CM dissemination? While their scope and intensity clearly differed, both contain as common features a subject matter expert as a facilitator, a process involving setting leaders to enable local adaptations in the design of CM programming, initial staff training to instill foundational knowledge of CM

principles, and subsequent availing of consultative support to address practical challenges amid implementation efforts. Beyond these common features, identification of a clear source of fiscal support for implementation costs would surely benefit any CM dissemination effort. With Covid-19 spurring fundamental changes in the landscape of workforce development activities (Cross-Technology Transfer Center Workgroup on Virtual Learning, 2021), emerging workplace technologies reflect points of useful innovation in delivery of TA packages. Two examples are the integration of online trainings that offer the utility and convenience of asynchronous learning of didactic material among a set of busy clinical staff, and use of virtual meeting platforms to bridge geographic distances between TA facilitators and staff at partnering clinical settings to enable more frequent and direct connection.

The objective of the current work is to describe the work of an interagency partnership, formed to support the design and implementation of CM programming at OTPs in the state of Oregon for purposes of reinforcing stimulant abstinence. The Single State Authority identified the 2020–2022 State Opioid Response grant biennium as an opportunity to initiate a pilot project to support implementation of CM at a set of Oregon-based OTPs. Notably, such pilot projects are seen by this, and many other Single State Authorities across the country, as crucial for demonstrating feasibility of implementation and clinical utility that may subsequently foster larger initiatives to increase statewide treatment capacity for empirically supported services like CM. In this instance, the Single State Authority made use of existing relationships with both a statewide treatment organization and an intermediary purveyor organization to recruit these entities to serve as partners in the pilot project. The statewide treatment organization identified OTPs with interest in implementing CM, and the intermediary purveyor organization delivered a comprehensive CM-focused TA package to the participating OTPs. Herein, we detail the TA package and its virtual delivery with an identified OTP, for which the conceptualization is rooted in the widely cited Exploration-Preparation-Implementation-Sustainment (EPIS) implementation framework (Aarons et al., 2011). The article reports resulting staff- and setting-level implementation outcomes, along with initial evidence of the CM programming's local clinical effectiveness, and discusses implications for future dissemination.

2. Methods

2.1. Interagency partnership

This interagency partnership formed in response to workforce development needs in the state of Oregon identified by its single-state authority. Specifically, the state sought CM programming to address persistent clinical challenges posed by persons with stimulant use disorder, with initial demonstration of implementation feasibility and clinical utility at an OTP.

2.1.1. Oregon Health Authority (OHA)

The Single State Authority and recipient of federal funds in 2020–2022 to address the opioid epidemic (SAMHSA #1H79T1081716, *Oregon State Opioid Response*), OHA served as the project sponsor. Overseen by a nine-member Oregon Health Policy Board that continually works toward comprehensive, state-wide health reform, OHA is at the forefront of lowering and containing costs while improving both access and quality of health care for its citizenry. In this CM pilot project, OHA provided support to the local OTP in terms of funding for direct implementation costs, such as the involved reinforcers.

2.1.2. Oregon Recovery and Treatment Centers (ORTC, LLC)

The statewide treatment organization, ORTC was founded by experienced industry professionals who provide treatment for persons with substance use disorders. Its founders and staff share the belief that excellent, affordable treatment should be accessible to all, and this involves providing treatment services that have proven to effectively meet

this objective. ORTC aims to harness this passion and apply it to developing treatment centers that address the needs of underserved populations, integrating medication for addiction treatment and empirically supported treatment models into the continuum of care already provided by their medical and clinical providers. ORTC governs a set of diverse clinical settings including OTPs, among which the implementing site—Medford Treatment Center—was identified for participation in this CM pilot project.

2.1.3. Medford Treatment Center (MTC)

Located in southern Oregon, MTC serves persons with opioid use disorder residing within the city of Medford and its surrounding communities in Jackson County, for which population estimates exceed 220,000 citizens (U.S. Census Bureau, 2020). Available services include on-site dosing of opioid agonist medications as well as medical, psychosocial support, and case management services. Its interdisciplinary clinical staff includes physicians, nurses, certified medical assistants as well as a counseling staff of six certified counselors and recovery mentors—all serving a daily census of approximating 240 clients.

2.1.4. Northwest ATTC

One of ten regional centers in a SAMHSA-funded national network, the Northwest ATTC is an intermediary purveyor organization that promotes useful treatment and recovery practices in Health and Human Services Region 10—encompassing Alaska, Idaho, Oregon, and Washington State. Since 2017, the Northwest ATTC has been based at the University of Washington, under the direction of the lead author. A continuum of services are provided to support the addiction workforce, including: 1) *universal TA*, typically resource-sharing or one-time events that offer orienting information to promote awareness of a given therapeutic practice; 2) *targeted TA*, typically serial learning processes that increase individual workforce members' readiness to implement a therapeutic practice; and 3) *intensive TA*, typically longitudinal and systems-level support to health organizations to coordinate implementation of a therapeutic practice by the workforce members they employ. The described work constitutes intensive TA.

2.2. Northwest ATTC TA package

As is characteristic of the intensive TA that Northwest ATTC provides across clinical practices, implementation strategies from established sources like Powell et al.' (2015) Expert Recommendations for Implementing Change compilation were bundled and flexibly enacted to support organizational change. In this project, Northwest ATTC delivered its CM-focused TA package over a one-year span, October 2020–September 2021. This package included: 1) a comprehensive on-line training (available at: <https://attnetwork.org/centers/northwest-attc/cm>), with distinct modules for executives, clinical supervisors, and direct-care staff that provide conceptual foundation in CM principles and practices; 2) consultation to a local implementation team during initial design, systems preparation, and active implementation of customized CM programming; and 3) virtual coaching of counseling staff to a fidelity benchmark, emphasizing observational and experiential learning to cull clinical competencies in core CM skill domains.

As Table 1 summarized, Northwest ATTC delivery of this TA package adhered to the EPIS framework of Aarons et al. (2011). An initial nine-week *exploration phase* included a collaborative design process wherein the phase achieved consensus for custom parameters of CM programming (client group, target behavior, earned reinforcers, reinforcement paradigm). In a subsequent 12-week *preparation phase*, a subset of OTP staff formed a local implementation team to prepare systems (i.e., accounting, clinical documentation, staff supervision) for the logistics of implementing the CM programming. Meanwhile, corresponding online training modules were completed by clinical supervisors and direct-care staff, who later participated in a virtual coaching-to-criterion process. Upon determination of setting readiness following a multi-day

Table 1
Chronology of activities in CM-focused technical assistance package.

Phase	Implementation activities
Exploration Weeks 1–9	Collaborative design process Initial meeting of representatives from the single state authority (OHA), statewide treatment organization (ORTC), involved opioid treatment program (MTC), and intermediary purveyor organization (Northwest ATTC) to discuss implementation goals and timeline Completion of online 'decision-maker' training module by MTC leaders with initial drafting of parameters for customized CM programming, followed by collective review and suggested revisions of the CM programming by OHA, ORTC, and Northwest ATTC representatives Iterative process of CM programming revision among OHA, ORTC, MTC, and Northwest ATTC representatives, eventuating in its consensus finalization
Preparation Weeks 10–21	Training and coaching of clinical staff, preparation of setting systems Identification of MTC staff to serve as members of a local implementation team, with subsequent meetings to discuss and prepare the setting's systems (i.e. accounting, clinical documentation, staff supervision) for logistics of implementing CM programming Completion of online 'clinical supervisor' and 'direct-care staff' training modules by MTC staff, followed by virtual coaching-to-criterion process eventuating in individual readiness assessments with live trainer scoring and feedback until CM fidelity criterion reached Availing of electronic library of tailored CM resources (i.e., toolkit for clinical supervisor, memory aids for clinicians, onboarding materials to orient future staff) as reference material for MTC staff during their future implementation efforts
Implementation Weeks 22–46	Provisional implementation of CM programming MTC implementation dress rehearsal involving simulation of patient-involved procedures for identification, enrollment, and subsequent delivery of CM programming MTC leadership determination of start date and duration of provisional implementation period, and initiation of provisional implementation for a period of six months Recurrent meetings of MTC leadership and Northwest ATTC staff to integrate fidelity-monitoring into supervision-as-usual processes and troubleshoot implementation challenges
Sustainment Weeks 47–52	Examination of local clinical effectiveness, elicitation of sustainment decision Evaluation of the site-specific clinical effectiveness of CM programming by Northwest ATTC staff, utilizing anonymized clinical dataset provided by ORTC leadership Writing and distribution of corresponding summary report for OHA, ORTC, and MTC leadership, highlighting both process descriptions and data-based findings Meeting of OHA, ORTC, MTC, and Northwest ATTC representatives with elicitation of a sustainment decision from MTC leaders amidst discussion of both prospective funding sources and potential adaptation(s) to the CM programming

Table notes. Activities of this CM-focused TA package are presented as phased delivery according to the Exploration-Preparation-Implementation-Sustainment (EPIS; Aarons et al., 2011) implementation framework during the span of October 2021–September 2022.

organizational dress rehearsal, a 26 week *implementation phase* commenced during which MTC clients were identified and enrolled in staff-delivered CM programming. The program provided an electronic "CM resource library" of implementation support materials, as were recurrent meetings (1–2× per month) as consultative support for MTC leadership during these active implementation efforts. A concluding six-week *sustainment phase* consisted of review of anonymized clinical records to examine the effectiveness of the CM programming; synthesis of this information into a summary report distributed to all project partners; and an eventual collective meeting to elicit a decision from MTC leadership about whether the CM programming would be sustained,

adapted, or discontinued.

2.3. CM programming at Medford Treatment Center

2.3.1. Collaborative design

To maximize local utility of a complex, systems-level therapy like CM, implementation scientists advocate user-centered design principles (Lyon & Koerner, 2016). Further, Chambers et al.' (2013) *dynamic sustainability framework* stipulates that continual application of user-centered design principles will promote sustainable therapy implementation. Engagement of organizational leaders in CM programming design and implementation is linked to multiple examples of successful sustainment (Hartzler, 2015b; Kellogg et al., 2005). Accordingly, and amid their completion of the online "decision-maker" training module, MTC leaders drafted parameters for a prototype of CM programming for which internal consensus was developed. Upon reviewing this prototype, Northwest ATTC personnel provided recommendations to increase likelihood of implementation success and clinical impact. Over a series of meetings with project partners, the team discussed these recommendations and integrated them into the CM programming. While occurring virtually amid Covid-19, this replicates prior collaborative design efforts by Hartzler et al. (2014, 2015b, 2016).

2.3.2. The CM programming

Following completion of the collaborative design process, MTC leadership announced to its staff the core parameters of its customized CM programming. These parameters included: 1) a focal population of OTP clients demonstrating stimulant use, identified as eligible during the implementation phase of the project via a stimulant-positive urine drug screen (UDS) collected in the course of routine care; 2) targeting of stimulant abstinence (i.e., cocaine and methamphetamine) as the treatment-adherent behavior, demonstrated by stimulant-negative UDS result collected on a weekly basis; 3) gift cards for a variety of local vendors as available reinforcers, distributed up to a per-client annual maximum earning limit of \$75 (per federal constraints on the 2020–2022 State Opioid Response grants); and 4) an escalating reinforcement paradigm, occurring over a 13-week period after enrollment and incorporating a priming element for the initial favorable UDS result. A \$9 priming reinforcer was followed by progressive reinforcement ranging from \$3 to \$8 and that escalated with sustained stimulant abstinence by \$1 at two-week intervals (stimulant-positive UDS reset escalation to the base \$3 reinforcement level). To heighten compatibility with existing MTC services, counseling staff monitored client UDS results via communal records, discussed with clients their earned and prospective reinforcers in weekly clinical contacts, and ensured timely client receipt of earned reinforcement.

2.4. Implementation support

2.4.1. Coaching-to-criterion process

The program provided coaching to all counseling staff at this OTP. This consisted of a pair of two-hour virtual group sessions facilitated by the lead author, a psychologist with clinical experience in an OTP setting, scheduled seven days apart to promote reflective inquiry and practice. The coaching sessions occurred via Zoom conferencing platform, with technical support from a Northwest ATTC staff member. In prior online training modules, MTC clinical supervisors and direct-care staff had become oriented to the six fidelity domains of the Contingency Management Competence Scale (CMCS; Petry et al., 2010; Petry & Ledgerwood, 2010) that are both therapy-specific and universally applicable across CM paradigms: 1) notification of earned reinforcers, 2) planning for prospective reinforcers, 3) delivery of earned reinforcers, 4) assessment of client interest in reinforcers, 5) communication of social reinforcement, and 6) linkage of the target behavior to broader client treatment goals. Notably, prior research indicates that these six fidelity domains demonstrate strong scoring reliability, internal consistency,

durability, concurrent validity, and predictive validity in terms of future client behavior (Hartzler, 2015a; Hartzler et al., 2014; Hartzler et al., 2017). Virtual coaching sessions culled these CMCS domains as clinical competencies via a mix of observational and experiential learning activities (i.e., trainer demonstration, dyadic role-plays, performance-based feedback). The temporal structure and learning strategies employed in this coaching-to-criterion process are informed by documented preferences of a national sampling of OTP directors and staff (Hartzler & Rabun, 2014).

To conclude this coaching-to-criterion process, counseling staff scheduled 30-minute individual meetings with Northwest ATTC personnel to each complete a structured role-play. Employing standardized patient methodology (Fairburn & Cooper, 2011), the role-play involved Northwest ATTC staff portrayal of a representative client eligible to enroll in the CM programming. The character, set in circumstance of an early therapeutic visit wherein a priming reinforcer had been earned, provided opportunity to demonstrate skill in the six CMCS fidelity domains. The lead author observed each role-play; rated CMCS domains in real-time; and provided immediate, performance-based feedback. Readiness to implement CM programming was demonstrated by a configuration of CMCS ratings at or above an a priori benchmark (4 or higher on each CMCS domain), as employed in prior trials involving CM delivery by staff of community treatment programs (Hartzler et al., 2014; Petry et al., 2012a).

2.4.2. CM resource library

In advance of the implementation start date, Northwest ATTC personnel compiled an electronic library of implementation support materials tailored to the OTP and its CM programming. This library included materials from group coaching sessions, memory aids for counseling staff, a toolkit of skill-building activities for use in individual/group supervision, relevant publications about CM, and a setting-level implementation checklist. OTP leadership was asked to incorporate the materials in staff meetings, to avail them for staff referencing, and to include them in on-boarding of future OTP staff. To promote a sense of setting ownership, the study encouraged OTP staff to supplement the library with additional materials of their choosing.

2.5. Measurement

2.5.1. MTC staff

The project did not formally assess either the demography nor professional background of the six involved counseling staff. At project outset, all were gainfully employed at MTC in a clinical service capacity and remained employed for the remainder of the project. Each maintained a caseload of roughly 40 clients from which those eligible for the CM programming were identifiable and enrolled during the six-month period of active implementation. While the size of this staff sample is small, it is also broadly consistent with staffing reported at other OTPs in recent CM-focused implementation research (Becker et al., 2021; Scott et al., 2021).

2.5.2. Implementation outcomes

As a staff-level implementation outcome, CM skillfulness among counseling staff in individual readiness assessments involved ratings for six CMCS domains on a Likert scale (1 = Very Poor, 7 = Excellent), culminating in a total CMCS summary score for each of the MTC counseling staff sample (n = 6). Setting-level implementation outcomes were administrative in nature, with records kept of draft and final versions of CM programming as well as the eventual sustainment decision by MTC leadership.

2.5.3. MTC clients

The project provided anonymized demographic/background data for clients enrolled in OTP services (N = 253) during the 12-month project period. Available demographic data were: 1) age (in years); 2) gender

(female, male, transgender); 3) race (White, African American, Hispanic, Asian, American Indian/Alaska Native, Other); and 4) ethnicity (Hispanic, Non-Hispanic, Other). An additional treatment-related index available for MTC clients was the type of opioid agonist medication they had been prescribed (i.e., methadone, suboxone/subutex).

2.5.4. Clinical effectiveness outcomes

Select clinical/administrative data were provided for clients enrolled in MTC services during the 12-month period. These included: 1) dates(s) of service enrollment and (if relevant) CM programming; 2) all stimulant-relevant UDS results; and 2) date of discharge (if any). To evaluate stimulant abstinence as a focal treatment adherence target, we computed % stimulant-negative UDS as a universal metric to account for the variable UDS available among clients as a function of both the rolling basis whereby they were enrolled in CM programming and a historical control period wherein UDS occurred less routinely than the weekly frequency maintained for clients enrolled in the setting's CM programming. To evaluate secondary therapeutic benefit of CM programming, a client's discharge date (if any) from services enabled computation of a binary treatment retention outcome (e.g., retained in services, not retained in services).

2.6. Data analytic strategy

In terms of staff-based implementation outcomes, the CMCS ratings of MTC staff members' individual role-plays were compared against an a priori CMCS fidelity benchmark, and aggregated to compute descriptive statistics (i.e., range, mean, standard deviation) for the six MTC counseling staff. To describe the MTC census (N = 253), the program examined client demography/background data via descriptive statistics. We examined representativeness of MTC clients enrolled in the CM programming (n = 73) relative to the remainder of the census (n = 180) via paired sample t-test and χ^2 comparisons. To assess the clinical effectiveness of the CM programming, a paired-sample t-test compared % stimulant-negative UDS of MTC clients enrolled in the CM programming (n = 73) vs. MTC clients who used stimulants and were engaged in services prior to availability of the CM programming (n = 120), with a Cohen's D effect size computed to characterize magnitude of this between-group difference. To assess potential secondary therapeutic benefit of the CM programming, a χ^2 analysis compared rate of treatment retention among the MTC clients enrolled in the CM programming (n = 73) vs. MTC clients concurrently enrolled in MTC services during the project's implementation phase who did not use stimulants and where therefore ineligible for the CM programming (n = 162). Study staff computed all quantitative analyses in SPSS version 19.0 (Chicago, IL).

3. Results

3.1. Staff-based implementation outcomes

Given the nature of a coaching-to-criterion process, MTC counseling staff were highly motivated and all six attended both of the virtual coaching sessions as well as completed the concluding role-play. Available data from these role-plays suggests these staff members were also well-prepared to demonstrate skillful capability to implement the CM programming. As Fig. 1 illustrates, all CMCS summary scores (range of 27–38) surpassed the a priori fidelity benchmark with the mean (M = 31.33) exceeding that criterion by nearly two standard deviations (S.D. = 3.72). At the level of individual CMCS domains, all staff performances were rated at or above an Acceptable (4) skill level with modes corresponding to scale anchors of Good or Very Good. Distributional properties were: 1) notification of earned reinforcers (M = 5.33, SD = 1.21), 2) planning for prospective reinforcers (M = 5.00, SD = 0.89), 3) delivery of earned reinforcers (M = 4.83, SD = 1.17), 4) assessment of client interest in reinforcers (M = 5.33, SD = 1.21), 5) communication of social reinforcement (M = 4.67, SD = 0.82), and 6) linkage of target behavior to broader client treatment goals (M = 6.17, SD = 0.75). Overall, this CMCS score distribution is consistent with that reported in the aforementioned implementation trial by Hartzler et al. (2014), wherein the post-training skillfulness of OTP staff was effectively sustained via supervision-as-usual processes.

3.2. MTC census

As we outline in Table 2, the mean age of the overall MTC client census was 40.43 years (S.D. = 11.08) with a fairly even distribution of male/female gender. White race and non-Hispanic ethnicity were both prevalent (90%). Similarly, 90% of clients were receiving methadone as the opioid agonist medication. Table 2 additionally outlines that the series of paired sample t-test and χ^2 comparisons revealed the subset of 73 clients enrolled in the CM programming to be representative across these demography/background dimensions (all p-values > .15).

3.3. Clinical effectiveness outcomes

In examining the primary clinical effectiveness outcome of stimulant abstinence, paired-sample t-test revealed a statistically significant group difference in % stimulant-negative UDS, $t = 2.69$, $p < .01$. This favored the 73 clients enrolled in CM programming, among whom 28% of UDS were stimulant-negative relative to 17% stimulant-negative UDS observed among the 120 historical control clients. In terms of magnitude, this 11% difference is equivalent to a small-to-medium effect

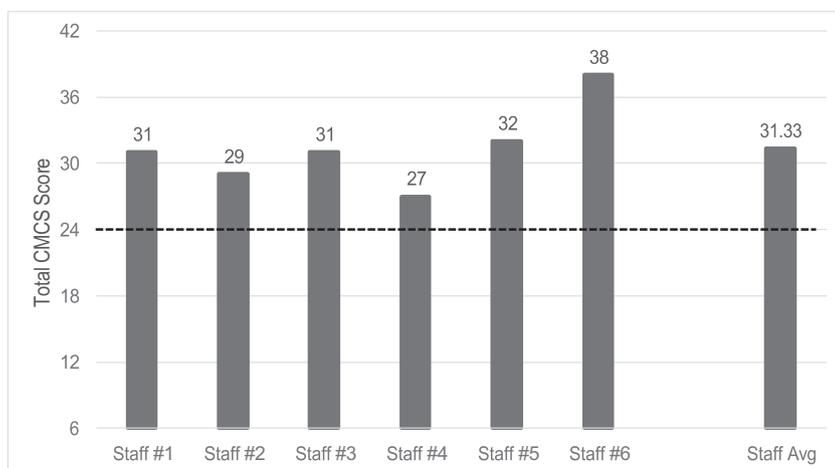


Fig. 1. Preparation of OTP staff to implement CM programming.

Figure notes: CM skillfulness by each individual clinical staff member during an observer-rated, virtual role-play with a standardized patient at conclusion of the coaching-to-criterion process; Total CMCS Score reflects aggregation of ratings for six CMCS fidelity domains, each rated on a Likert scale (1 = Very Poor, 7 = Excellent); Hatched line is the a priori fidelity benchmark representing readiness to implement, as employed in prior trials (Hartzler et al., 2014; Petry et al., 2012a); Staff Avg reflects mean score (S.D. = 3.72) of the six clinical staff, who are anonymized here to avoid personal identification.

Table 2
MTC client demography and background.

	Full census	CM-exposed clients	Non-CM clients	Statistical Significance
N	253	73	180	
Age (SD)	40.43 (11.08)	38.71 (9.55)	41.13 (11.60)	N.S. ^a
Gender				
Male	132 (52 %)	37 (51 %)	95 (53 %)	
Female	121 (48 %)	36 (49 %)	85 (47 %)	N.S. ^a
Race				
White	227 (90 %)	69 (94 %)	160 (89 %)	
American Indian/ Alaska Native	13 (5 %)	2 (3 %)	11 (6 %)	
Hispanic	10 (4 %)	2 (3 %)	7 (4 %)	
Asian	3 (1 %)	0 (0 %)	2 (1 %)	N.S. ^a
Ethnicity				
Non-Hispanic	228 (90 %)	69 (94 %)	158 (88 %)	
Hispanic	20 (8 %)	2 (3 %)	18 (10 %)	
Other	5 (2 %)	2 (3 %)	4 (2 %)	N.S. ^a
Prescribed agonist medication				
Methadone	235 (93 %)	70 (96 %)	162 (90 %)	
Suboxone/ subutex	18 (7 %)	3 (4 %)	18 (10 %)	N.S. ^a

Table notes. Full census reflects all OTP clients enrolled in clinical services at any point during 9/21/20–8/8/21, whereas enrollment of a continuous cohort of clients enrolled in CM programming began on 2/8/22.

^a All between-group comparisons failed to reach statistical significance (p -values $> .15$), suggesting that clients enrolled in CM programming were representative across these demography/background dimensions.

(Cohen's $D = 0.40$) per established interpretive ranges (Cohen, 1988). While the rolling nature of client enrollment in the CM programming as a continuous cohort precluded calculation of per-client earnings, clinical records indicate that 44 % of clients enrolled in the CM programming earned a postenrollment priming reinforcer for submitting at least one stimulant-negative UDS. As for the secondary outcome of treatment retention, a χ^2 analysis revealed a statistically significant group difference in six-month treatment retention in MTC services, $\chi^2 = 6.40$, $p < .05$. Retention among the 73 clients enrolled in CM programming was 90 %, whereas the retention rate among the 162 clients concurrently receiving MTC services but not enrolled in the CM programming was 76 %.

3.4. Sustainment decision

Following conclusion of the project's implementation phase, the project generated a summary report and distributed it to MTC leadership and partners at OHA and ORTC. The report contained a process description of the aforementioned Northwest ATTC TA package and results of preliminary analyses of the noted implementation and clinical effectiveness outcomes. As is typical of reports that Northwest ATTC provides to treatment community audiences, the process description and data representation were provided using translatable concepts and language.

Upon its review, the involved parties met to discuss a disposition for the CM programming at MTC based on its demonstrated feasibility (including issues of cost and logistical compatibility) and clinical utility. A consensus-based decision among OHA, ORTC, and MTC representatives was reached to sustain the CM programming initially via continuing SOR grant funding, with intention to seek support for longer-term sustainment through the Center for Medicaid/Medicare Services. Notably, MTC leadership opted to not modify the core parameters of this CM programming (i.e., its client group, target behavior, earned

reinforcers, and reinforcement paradigm).

4. Discussion

Governed by the EPIS framework (Aarons et al., 2011), this implementation project offers reason for optimism about community-based implementation of CM. A product of interagency partnership, the project yielded: 1) empirical support for an intensive TA package provided by Northwest ATTC in support of design, preparation, and implementation of locally- customized CM programming targeting stimulant abstinence at an OTP; 2) evidence of direct and secondary therapeutic benefits among clients enrolled in the CM programming; and 3) an eventual decision by OTP leadership, informed by six months of implementation experience, to sustain the CM programming among its routine clinical services. Given that very few published examples of sustainable CM implementation in addiction settings exist, others may benefit from distillation of a pair of key ingredients that appear to have aided implementation of this empirically supported, yet still vastly under-utilized, behavior therapy.

One key ingredient in MTC's successful implementation of CM was the engagement of its leadership in the collaborative design process to customize its CM programming. Consistent with Rogers' (2003) emphasis on compatibility as a critical attribute for successful innovations, this collaboration ensured that the CM programming was a contextual fit with this setting's existing clinical services and built a sense of local ownership for the CM programming among MTC leadership. This finding, in fact, replicates prior work wherein a collaborative design process undertaken with an OTP similarly resulted in sustained CM implementation (Hartzler, 2015b; Hartzler et al., 2016). Real-world uptake of behavior therapies like CM is strongly influenced by local notions of therapy-setting fit (Aarons et al., 2014), often requiring compromises and redesign to accommodate organizational characteristics on which settings vary considerably. Among OTPs, these include sources and levels of funding, the structure of clinical services, staff time and capability, and clients served (Ducharme & Roman, 2009; McCarty et al., 2008; Roman et al., 2006). Passage of time also contributes setting-level variance, with evolving challenges like Covid-19 prompting unique and continual adaptations of clinical services (Chan et al., 2022). Thus, allegiance to a single (even if previously efficacious) protocol can lead to broader perception of CM as a mismatch, thereby limiting interest in its adoption or, worse, unfortunate initial implementation experiences that result in what Rogers (2003) termed *disenchantment discontinuance*. Fortunately, some CM advocates have begun to more fully recognize and acknowledge realities faced by clinical settings, while understandably also voicing hesitancy about CM programming that clinical settings may independently design (DePhilippis et al., 2018; Pfund et al., 2021; Rash et al., 2020). This reality reflects a crucial purveyor dilemma—how to promote forms of CM programming that maintain conceptual integrity to core operant conditioning principles (e.g., magnitude, frequency, and immediacy of reinforcement), while also allowing sufficient flexibility for adaptation so clinical settings can realistically envision and proceed with implementation. The described collaborative design process—and its pooling of conceptual expertise of a purveyor with informed perspectives of setting leaders about local needs and resources—is one empirically supported method of striking a balance to address the noted dilemma.

A second key ingredient in this project was the coaching-to-criterion process undertaken with the OTP's counseling staff, which followed initial completion of relevant modules of a comprehensive online training by these staff members. Taken together, this sequence of learning activities reflects effort by Northwest ATTC to opportunistically *flip the classroom* (Bergmann & Sams, 2012), combining asynchronous learning of conceptual material about CM principles and practices via initial online training with synchronous learning of CM delivery skills via subsequent group-based virtual coaching. In emphasizing observational and experiential learning, the virtual coaching sessions enabled

all counseling staff of this OTP to demonstrate implementation readiness to deliver CM programming—with a level of skillfulness previously shown to predict favorable outcomes among future clients exposed to CM programming (Hartzler et al., 2017; Petry et al., 2012b). In contrast, some past CM dissemination efforts have instead scheduled communal events wherein a subset of staff from numerous settings travel to attend a didactic workshop (Becker et al., 2016; Petry et al., 2014). Beyond the time and expense this requires, the didactic nature of instruction at such events does little to develop the noted clinical skills or to address how any skill acquisition that may occur among attendees would then transfer to co-workers not in attendance. Beyond benefits in both cost and convenience, the Northwest ATTC approach in delivering this CM-focused TA package—notably completed amid the Covid-19 pandemic—holds great potential for expanding accessibility of intensive TA for CM as well as other useful behavior therapies.

With a 2020–2022 State Opioid Response grant as its funding source, CM programming in this project was constrained by a federally imposed \$75 per-client annual limit. An oft-cited CM study of stimulant users linked higher magnitude reinforcement—defined by Petry et al. (2004) as a \$240 per-client limit—to greater efficacy in achieving abstinence. Thus, the observed effect size in this project ($D = 0.40$) unsurprisingly fell below the mean effect sizes ($D = 0.46–0.68$) in earlier-referenced meta-analyses of CM efficacy trials. The current effect size does, however, compare more favorably when viewed against findings of a recent meta-analysis by Pfund et al. (2022), wherein the mean effect size of CM trials reinforcing attendance-based targets ($D = 0.47$) more than doubles that for trials reinforcing substance abstinence ($D = 0.22$). In this light, the clinical impact of staff efforts at this OTP to implement CM programming to reinforce stimulant abstinence among their clients appears to have *outperformed* the mean impact observed in a set of RCTs of CM similarly targeting substance abstinence. This finding underscores the value of sufficiently preparing counseling staff to skillfully deliver CM as a therapy, irrespective of the particular CM paradigm chosen or treatment-adherent behavior it may target. How beneficial might the current CM programming have been were it financed at the \$240 per-patient threshold of Petry et al.' (2004) study? If current legislative efforts are successful in creating pathways for funding and reimbursement for CM programming, such questions may be addressed soon.

In addition to its targeted effect on stimulant abstinence, the CM programming in the current project was also associated with a 14 % greater rate of client retention in OTP services. A secondary therapeutic benefit of CM such as this may initially seem counterintuitive, given the behavioral specificity inherent in targeting a single treatment-adherent behavior and rewarding its occurrence. However, the current finding is consistent with a recent review of psychosocial approaches for stimulant use disorder wherein CM added to delivery of other empirically supported therapies was associated with increased treatment retention (Tran et al., 2021). Whether the increased retention rate observed of clients enrolled in CM programming in this project was the result of their lessened stimulant use, a function of rapport developed with OTP staff through delivery of CM programming, or some combination of these and other factors is difficult to say. In any event, the direct and secondary therapeutic benefits of this CM programming—considered alongside the costs of its implementation—resulted in an OTP leadership decision to sustain it among the setting's routine clinical services.

As an implementation service project rather than controlled research trial, the current work bears several methodological caveats. Among these are its single-site design that may limit generalizability of findings—though notably this TA package has been employed with multiple other settings and comparable implementation success. Nevertheless, the small number of counseling staff at this OTP suggests the reported implementation outcomes be interpreted with caution. Also, the quasi-experimental design for evaluating clinical effectiveness does not preclude potential influence of third-variables, a Hawthorne effect wherein perceived scrutiny may influence the behavior of MTC staff or clients, and history. That the project occurred entirely during a

global pandemic is a testament to the efforts of all involved, but admittedly did allow for a host of possible unintended and uncontrolled influences. A further caveat concerns the review of OTP records to assess clinical effectiveness, for which efforts to maintain anonymity of the involved staff and clients constrained the scope and sophistication of current analytic methods and consequent reporting. As one example, inconsistent UDS frequency at this OTP prior to CM implementation prevented comparative exploration of other abstinence-related metrics, such as UDS duration. Similarly, a simple dichotomous representation of a discharge date as present or absent prevented consideration of precipitating circumstances (i.e., voluntary, administrative) when a discharge date was indicated. Finally, the project did not directly assess the quality of CM delivery by staff to their caseload clients. We should note that, once developed, CM skillfulness has proven durable when paired with active clinical supervision (Hartzler et al., 2014; Petry et al., 2012a). To that end, the Northwest ATTC TA package included consultative support for MTC's clinical supervisors throughout the six-month implementation period, and its resource library offered a supervisor toolkit that was filled with skill-building activities to be integrated into individual/group supervision sessions as well as pragmatic fidelity-monitoring methods to aid supervisory oversight of clinical staff.

Caveats notwithstanding, findings of this implementation project provide hope for future initiatives to disseminate CM to the addiction treatment community. Project success was a product of interagency partnership involving initiation and sponsorship by a single state authority, site identification and governance by a statewide treatment agency, and delivery of a robust TA package by an intermediary purveyor organization. This underscores the value of established relationships between entities like single state authorities and the SAMHSA-funded Addiction Technology Transfer Centers, which exist throughout the country and are crucial to the formulation and conduct of pilot implementation projects like this one. Project success may then open doors to other funding pathways to increase treatment capacity for empirically supported practices like CM throughout a local jurisdiction. In the current work, the partnership forged by OHA, ORTC, and Northwest ATTC culminated in the leadership and staff at a participating OTP contributing in the design of CM programming customized to its local needs and resources, demonstrating sufficient preparedness for its clinical delivery, undertaking its implementation over a six-month period, and ultimately deciding to sustain it among routine clinical services thereafter. While apprehension about CM implementation may persist in some corners of the addiction treatment community due to constraints that current policies have placed on funding appropriation, such restrictions may soon be loosened, thereby broadening the number and scope of similar state-level efforts to disseminate CM to community-based addiction settings. For those undertaking such initiatives, we hope this work serves as a helpful template for their efforts to design and sustainably implement CM programming that addresses individual treatment settings' local clinical needs with available resources.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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CRedit authorship contribution statement

Dr. McIlveen and Ms. Payne-Smith successfully applied for the funding to support this project. All authors contributed to the project conceptualization, methodology, and its administration. Mr. Gray, Ms. Marx, and Ms. Kirk-Lewis provided supervision of the MTC site and personnel. Dr. Hartzler directed all technical assistance activities provided by Northwest ATTC, including the conduct of all statistical analyses. All authors contributed to an iterative process whereby the manuscript was drafted, reviewed, and edited, culminating in its initial submission. All authors reviewed editor/referee feedback, and contributed in revising of the manuscript for resubmission.

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