Outcomes from a Randomized Controlled Trial of a Co-Response Police-Mental Health Team

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MCAT
MOBILE CRISIS ASSISTANCE TEAM

RTI INTERNATIONAL

TABLE OF CONTENTS

FIGURES

TABLES

List of Abbreviations			
BH	Behavioral Health	IRB	Institutional Review Board
BHU	Behavioral Health Unit	MCAT	Mobile Crisis Assistance Team
ED	Emergency Department	RCT	Randomized Controlled Trial
EMS	Emergency Medical Services	SEMHC	Sandra Eskenazi Mental Health Center
IEMS	Indianapolis Emergency Medical Services	TAU	Treatment As Usual
IMPD	Indianapolis Metropolitan Police Department		

Executive Summary and Key Findings

This report summarizes findings from a randomized controlled trial (RCT) of a police–mental health co-response team in Indianapolis, Indiana called the Mobile Crisis Assistance Team (MCAT). The MCAT consisted of one police officer and one mental health clinician who self-dispatched and co-responded to mental or behavioral health-related emergencies. Researchers worked with MCAT members, leadership, and community stakeholders to first conduct a formative evaluation of the MCAT upon its launch in 2017, followed by a quasi-experimental study that found promising preliminary results but indicated a need for a more rigorous study to assess program effectiveness. An RCT of the MCAT followed from January 2020 to March 2021 whereby behavioral health 911 calls for service were randomized 1-to-1 to receive either an MCAT response or a police-as-usual (or treatment-as-usual [TAU]) response. Key outcomes were count and binary variables representing subsequent emergency medical services (EMS) events, jail bookings, outpatient behavioral health treatment encounters, and emergency department (ED) visits at 6 and 12 months following the randomized crisis incident. In this report, we describe the study design and report outcome results, cost analyses, and MCAT team member and leadership perspectives on study involvement.

The following were our key findings:

- A successful randomization protocol resulted in 211 MCAT and 224 TAU cases.
- We found no significant differences in key outcomes between MCAT and TAU cases at 6- or 12-month follow-up periods.
- Although overall findings were null, the MCAT is associated with greater costs relative to TAU at the 12-month follow-up period due to a greater number of subsequent ED visits and outpatient behavioral health treatment encounters among this group.
- A few key factors, including the COVID-19 pandemic, limited our capacity to acquire the necessary sample size for a fully powered study, which contributed to null findings.
- MCAT members and leadership provided insights related to the importance of a strong and flexible researcher-practitioner partnership, considerations for site selection and challenges associated with consistent staffing needed for a long-term study, and ethical challenges associated with not responding to TAU cases.

This study represents an important step forward in our understanding of co-response team effectiveness and demonstrates the feasibility of conducting a randomized study of a co-response team in a real-world setting. Rigorous evaluation of the effectiveness of alternative police and mental health crisis programs is key as they expand and evolve across the United States. Such evidence can help decisionmakers understand what works in their efforts to connect people with the resources necessary for reducing emergency service utilization and involvement of persons with mental illness in the criminal-legal system.

Section 1. Background of Co-Response Teams in Indianapolis

Across the United States, persons with mental illness are disproportionally represented in criminal-legal systems (1). These patterns are also found in Marion County, Indiana—the largest county in the state by population and home of the state capital, Indianapolis, which is the second largest city in the Midwest and 12th largest city in the United States—where nearly half of all detainees in the county jail have a mental health disorder (2).

To address this problem, Indianapolis Metropolitan Police Department (IMPD) Deputy Chief Catherine Cummings (then Major) established a Behavioral Health Unit (BHU) within the department in 2015. This newly formed unit included a sworn police officer and a trained mental health clinician from the Sandra Eskenazi Mental Health Center (SEMHC) who responded with follow-up services (via phone or in-person) within 48-hours after an immediate detention[1] of a person with mental illness and/or substance use disorder (Indiana Code sec. 12-26-4). Then in 2016, following criminal justice reform task force recommendations, work began to develop a specialized co-response team, similar to the BHU, but charged with providing immediate response to 911 calls for service involving mental and behavioral health-related emergencies to manage or support the incident.

After several months of planning, the MCAT pilot program launched in 2017 and included an officer from IMPD who had completed Crisis Intervention Training (CIT), a master's degree–level mental health clinician from the SEMHC, and a paramedic from Indianapolis Emergency Medical Services (IEMS). This was a truly innovative approach at the time, as the team received cross-training in mental health and de-escalation strategies developed by agency leadership. The MCAT began operating in August 2017 as a 24/7 immediate co-response unit that worked in 12-hour shifts in one of six IMPD districts.

As originally conceived, the MCAT listened to 911 calls for service and self-dispatched to events where they could potentially de-escalate and resolve issues at the scene, divert persons with a mental health disorder into social or treatment services, or relieve other first responders from the scene of potentially time-consuming and complicated mental health emergency situations. MCAT units could also respond to the scene of an emergency at the request of other responding police officers. Team members, including officers, wore plain clothes uniforms and operated out of a non-emergent van equipped with a medical equipment bag, automated external defibrillator, and standard issued IMPD equipment. Following an MCAT response, members of the BHU team conducted follow-up services within 48 hours of the initial contact to determine if additional connections to care were needed.

Following a pilot launch of the MCAT program between August and December 2017, the MCAT reformulated to include only an IMPD officer and SEMHC clinician. IEMS exited the partnership during this time because leadership felt paramedics were underutilized on MCAT runs and already available to the community via 911 (3). Following this reformulation, the MCAT program was expanded to have one team in each IMPD district, for a total of six teams. Moreover, the teams no longer responded to calls 24/7 but instead between the hours of 10:00 a.m. and 6:00 p.m., Monday through Friday, a shift that allowed for warm hand-offs to service providers during regular business hours and eased administrative burdens of scheduling shifts between agencies. The MCAT units also began to operate out of police patrol vehicles instead of the non-emergent van, allowing them to respond more quickly to relevant emergencies. Of note, the BHU follow-up teams continued to operate in all IMPD districts but expanded their services to conduct follow-up as deemed necessary for mental and behavioral health–related emergencies regardless of whether a person was subject to immediate detention

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[1] Through this involuntary admission, a person with mental illness in Indiana can be detained at a designated hospital facility for 24 hours if officers believe they are a threat to themselves or others, or in immediate need of treatment.

Section 2. Prior Research on the MCAT

2.1 Formative Evaluation

During the MCAT pilot period (August through December 2017) researchers conducted a formative evaluation of the program that included interviews and focus groups with community stakeholders and MCAT members, ride-along observations, and analysis of administrative data collected by the MCAT team (4). This study reported that in two-thirds of incidents, the MCAT was able to take over the scene and relieve other first responder units (IMPD, EMS, fire) to return to duty. The MCAT transported people in crisis to a hospital, crisis center, shelter, or other location in 65% of incidents. Most were transported to a hospital, while few were arrested and transported to jail (5). Stakeholder interviews conducted for the formative evaluation revealed the need to formalize MCAT policies and procedures to reduce confusion among team members about their roles and responsibilities (5).

2.2 Quasi-Experimental Study

To assess the effectiveness of co-response models and develop an evidence base for the MCAT program, researchers employed a quasi-experimental method to compare MCAT responses using administrative data from the pilot period with police-as-usual responses using IMPD Computer Aided Dispatch (CAD) data system. For this study, more than 300 MCAT crisis incident responses were one-to-one matched with similar police responses based on emergency type as well as participant race, sex, and incident date, with propensity scores computed and entered into weighted statistical models. Moreover, instead of relying solely on administrative records, researchers record-linked the crisis incident data to jail booking records to assess the rate of arrest at and following those incidents. Findings revealed that the participants who received an MCAT response had a lower likelihood of jail booking within 24 hours of the crisis incident relative to participants who received a police-as-usual response (5% and 9%, respectively), but there were no differences in jail booking rates or number of jail bookings at 6-month and 12-month follow-up between the two groups (6). Persons who received an MCAT response were more likely to experience an EMS event at 6-month and 12-month follow-up relative to those who received a police-as-usual response (46% of the MCAT vs. 32% of the police-as-usual group had at least one EMS event at 12-month follow-up). Researchers also assessed the role of follow-up BHU services on outcomes, finding that receiving a BHU follow-up after an MCAT response did not reduce the rate of jail bookings or EMS events at 6- and 12-month follow-up. It is probable that these results reflect that persons who receive both an MCAT response and BHU follow-up have more severe needs and thus are more likely to have subsequent emergencies.

In the process of developing the quasi-experimental study, it was evident that the MCAT responded to individuals with higher rates of prior EMS events than those in the police-as-usual comparison group. Because the MCAT is a self-dispatching unit that utilizes 911 dispatch information but also relies on prior experience with community members to make decisions about when and where to respond, the MCAT may be more likely to respond to people who have more severe needs or frequently utilize emergency response services. Thus, although researchers were able to use propensity score matching techniques to statistically account for pre-incident differences between groups, plausible unobserved factors associated with MCAT operations may have contributed to our quasi-experimental results. An experimental study design was the logical next step to manage selection effects and deliver a rigorous assessment testing whether the MCAT is more effective than a police-as-usual response.

Section 3. Overview of the Randomized Controlled Trial

Following the quasi-experimental study, the research team developed an RCT study design to detect MCAT effectiveness. The study site was a single IMPD district where an MCAT had not yet been implemented. This site was chosen due to relatively high rates of mental and behavioral health-related emergency calls for service and because stakeholders felt initiating the study with a new MCAT team, rather than one in operation, would facilitate the randomization procedures and minimize confusion among emergency responders in other IMPD districts who were habituated to working in tandem with an MCAT. For the RCT, eligible 911 calls for service in one IMPD district were randomized to receive an MCAT response or police-as-usual response. The study design randomization component involved a researcher who listened to a radio provided by IMPD through which 911 dispatchers routed calls for service in the IMPD district involved in the study.

Given that the MCAT was designed as a self-dispatch unit with discretion to opt into a call for service, one of the immediate challenges for the RCT was pre-defining call types that would be eligible for response and thus randomization. The research team worked with IMPD and SEMHC leadership to publish a policies and procedures manual that outlined the types of emergency calls for service that are eligible for an MCAT response (Table 1) and further outlined team members' roles and responsibilities. After determining a 911 call was eligible, the researcher conducted a randomization protocol to determine whether the MCAT would respond

(experimental group) or not respond (standard practice; treatment-as-usual, or TAU) to resolve the call for service.

The MCAT members collected data on each randomized call for service using Research Electronic Data Capture (REDCap) data collection software; this included data for both the MCAT and TAU responses. The MCAT members were granted access to REDCap and trained on how to enter data during the pilot randomization period. For 911 calls randomized to receive an MCAT response, MCAT members recorded in REDCap information on primary crisis type; demographic information of the person in crisis (name and date of birth); time and location of the event; time the run was resolved and how much time was spent on the scene; final crisis disposition (arrest, issue resolved at the scene, immediate detention, or voluntary transport to other location); and whether other first responders (IMPD, EMS, or fire department) were relieved from the scene to return to service upon the arrival of the MCAT. Similar information was collected for the TAU group, including primary crisis type, limited demographic information on the person in crisis, and crisis disposition. MCAT members were able to collect more information on the MCAT responses than the TAU responses, but key pieces of information needed for record linkage (first name, last name, and date of birth) were obtained by the MCAT police officer for TAU responses by searching the IMPD Computer Aided Dispatch (CAD) data system and entering relevant information into REDCap at the end of shifts.

The RCT protocols and related hypotheses about the expected impact of the MCAT program were pre-registered with the Open Science Foundation (OSF) (https://osf.io/8ndkg). Based on stakeholder feedback, the total number of subsequent EMS events in the year following the initial calls for service was identified as the primary outcome, and secondary outcomes included arrest, treatment encounters, and ED visits (Table 2). To measure outcomes, researchers record-linked the information from REDCap to three data sources: IEMS, the Marion County Sheriff's Office, and the Regenstrief Institute Center for Biomedical Informatics. IEMS provided call-for-service emergency events, and the Sheriff's Office provided data on all jail bookings, which we used to measure arrest. Treatment and ED data was acquired through a contract with the Regenstrief Institute, a local organization that houses and manages the broadest array of medical services information in Indianapolis for research purposes. The research team developed data sharing protocols to purchase the data, which provides counts of ED visits and behavioral health outpatient encounters as well as patient deaths. Following institutional review board (IRB) procedures approved by Indiana University, researchers matched records and created counts of jail bookings, EMS events, outpatient behavioral health treatment encounters, and ED visits at 6-months and 12-months following each randomized crisis incident.

Consistent with the study pre-registration, we calculated descriptive statistics on all outcome variables at 6- and 12-month follow-up and performed a series of logistic and negative binomial regression models to examine effects of study condition on binary (i.e., any event) and count (i.e., number of events) outcomes, respectively. To assess the success of randomization procedures, we calculated comparisons of pre-assignment participant characteristics

Table 1. Eligible Calls for MCAT

Emergency Type	Key Dispatch Terms/Phrases
Mental/behavioral health	• "10-96" (Possible mental health subject) • History of mental illness • Dementia/Alzheimer's • Hallucinations • Off medication • Mental/emotional • Mental writ • Specific request for behavioral health services
Substance use related	• Narcotics involved • Person intoxicated • Under the influence of narcotics
Self-harm/attempted suicide	• Suicidal
Check the welfare	• Any mention or indication of mental/behavioral health issue
Domestic violence	• Any mention or indication of mental/behavioral health issue in conflict
Homeless	• Any mention of a person experiencing homelessness
Other	• Any mention of a person in crisis or address associated with person known to have past mental/behavioral health issues

Table 2. MCAT Randomized Controlled Trial (RCT) Outcome Measures

Outcome	Description
EMS events	(1) Total number of EMS events in follow-up period* and (2) any subsequent EMS event
Arrest (jail bookings)	(3) Same-day jail booking, (4) any booking into the county jail, and (5) total number of jail bookings in follow-up
Behavioral health (BH) outpatient encounters	(6) Same-day BH outpatient encounter, (7) any BH outpatient encounter, and (8) total number of BH outpatient encounters in follow-up
ED visits	(9) Same-day ED visit, (10) any ED visit ,and (11) total number of ED visits in follow-up

Notes. *Primary outcome

between the experimental (MCAT) and TAU groups, finding no significant differences on observable variables (see Appendix A). Preliminary analyses conducted on all count variables suggested that the conditional variance on all outcomes exceeded the conditional mean (i.e., within each condition), justifying use of the negative binomial distribution to account for overdispersion. In the figures that follow, we presented predicted probabilities or predicted incidence rates (i.e., average number of events) and 95% confidence intervals produced from average marginal effects.

Although not part of our pre-registration, we also conducted a series of sensitivity analyses to examine how BHU follow-up after an MCAT or TAU response impacted the treatment effect. The BHU team conducted follow-up services following both MCAT and TAU responses in cases where they considered such

services to be necessary. Consistent with our prior work (6), we examined three separate levels of BHU follow-up: within 48 hours of an initial encounter; one or more follow-ups during the 12-month period; or two or more follow-ups during the 12-month period. For brevity, we discuss only the 48-hour findings below as it is standard practice for BHU to attempt follow-up within 48 hours of the initial encounter. We present additional BHU follow-up analyses in Appendix B.

Beyond the results from the RCT, we include two additional supplementary analyses that are not outlined in the pre-registered study. First, we present the results from a cost analysis comparing the costs of the MCAT relative to TAU. Then we conclude with analysis of qualitative data from focus groups with MCAT members and leadership on their perceptions of participating in the RCT.

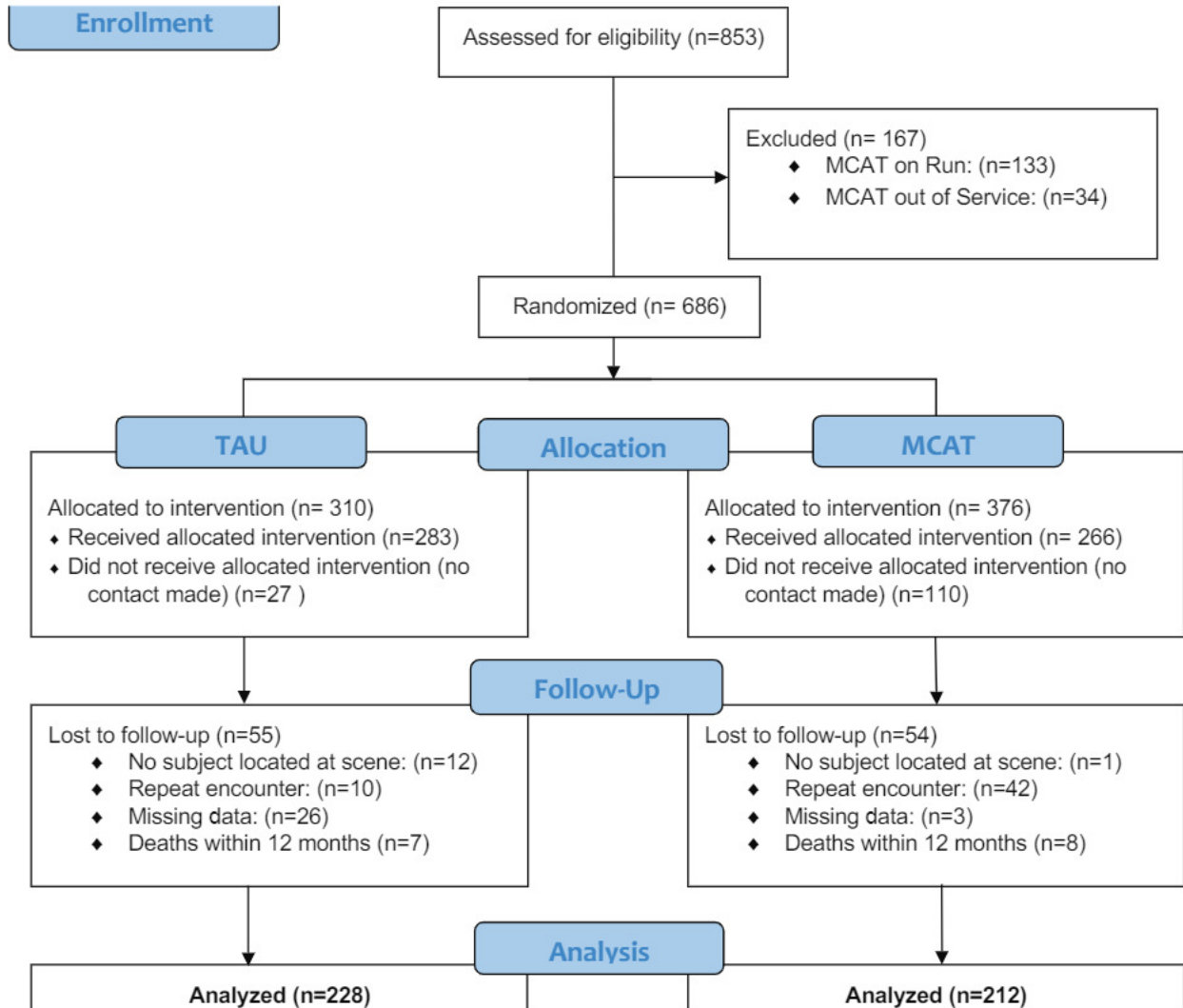## Section 4. MCAT Randomized Controlled Trial Results

After a week-long pilot randomization period in December 2019, random assignment began January 6, 2020 and ended March 31, 2021. Figure 1 displays the RCT groups using a Consolidated Standards of Reporting Trials (CONSORT) diagram. There were 686 emergency calls for service randomized; of these, 310 resulted in a TAU response, and 376 resulted in an MCAT response. Among those randomized, some did not receive the allocated intervention. Incidents were removed when a responding unit was unable to make contact with the person in crisis (i.e., no contact made). Among those who were allocated to experimental conditions, some were lost to follow-up. Incidents were removed when the person in crisis had at least one subsequent randomized response to a call for service during the study period (i.e., repeat encounter). In these cases, researchers retained the initial crisis incident in analysis. Incidents were also removed when missing data precluded record linkage. Finally, incidents in which persons were later indicated as deceased were removed. The count of crisis incidents included in the final analysis was 435 with 211 MCAT responses and 224 TAU responses.

On the same day of the initial crisis incident, less than 10% of participants had a jail booking (2.8%, n = 12) or behavioral health treatment encounter (7.1%, n = 31). In contrast, higher

proportions of participants had a concurrent EMS event (30.8%, n = 134) or ED visit (41.6%, n = 181). By the 6-month follow-up period, participants had an average of 0.20 jail bookings (SD = 0.70, range: 0 to 7), 1.02 EMS events (SD = 3.72, range: 0 to 54), 9.44 ED visits (SD = 15.67, range: 0 to 97), and 4.42 outpatient behavioral health treatment encounters (SD = 10.16, range: 0 to 84). Across participants, 11.7% had any jail booking (n = 51), 27.1% had any EMS event (n = 118), 75.4% had any ED visit (n = 328), and 51.0% had any outpatient behavioral health treatment encounter (n = 222) by the 6-month follow-up period.

At the 12-month follow-up period, participants had an average of 0.38 jail bookings (SD = 1.13, range: 0 to 11), 1.80 EMS events (SD = 6.24, range: 0 to 93), 17.24 ED visits (SD = 29.95, range: 0 to 213), and 8.25 outpatient behavioral health treatment encounters (SD = 19.84, range: 0 to 168). Across participants, 18.2% had any jail booking (n = 79), 34.7% had any EMS event (n = 151), 81.6% had any ED visit (n = 355), and 62.3% had any outpatient behavioral health treatment encounter (n = 271).

Figure 1. CONSORT Diagram of MCAT Randomized Controlled

C O N S O R T
TRANSPARENT REPORTING of TRIALS

Enrollment

Assessed for eligibility (n=853)

Excluded (n= 167)
♦ MCAT on Run: (n=133)
♦ MCAT out of Service: (n=34)

Randomized (n= 686)

TAU　　　　**Allocation**　　　　**MCAT**

Allocated to intervention (n= 310)
♦ Received allocated intervention (n=283)
♦ Did not receive allocated intervention (no contact made) (n=27)

Allocated to intervention (n= 376)
♦ Received allocated intervention (n=266)
♦ Did not receive allocated intervention (no contact made) (n=110)

Follow-Up

Lost to follow-up (n=55)
♦ No subject located at scene: (n=12)
♦ Repeat encounter: (n=10)
♦ Missing data: (n=26)
♦ Deaths within 12 months (n=7)

Lost to follow-up (n=54)
♦ No subject located at scene: (n=1)
♦ Repeat encounter: (n=42)
♦ Missing data: (n=3)
♦ Deaths within 12 months (n=8)

Analysis

Analyzed (n=228)　　　　**Analyzed (n=212)**

4.1   Same-Day Outcomes

Results for logistic regression models of same-day outcomes are presented in Table 3. As shown, there were no significant differences between MCAT and TAU conditions across any same-day outcomes (ps ≥ .465).

Table 3. *Logistic Regression Results of Same-Day Outcomes*

Same-Day Outcome	exp (B)	95% CI	p
Any EMS event	1.00	0.67, 1.50	> .999
Any jail booking	1.50	0.47, 4.81	.492
Any outpatient behavioral health treatment encounter	1.31	0.63, 2.74	.465
Any ED visit	1.13	0.77, 1.65	.533

Notes. Exp (B) represents odds ratio. TAU represents reference condition.

4.2   Primary and Secondary Outcomes

Logistic and negative binomial regression results for all primary and secondary outcomes are presented in Table 4. The primary outcome was a count of EMS events at the 12-month follow-up period, and there were no significant differences between MCAT and TAU conditions on this outcome (p = .504) at either follow-up period. Moreover, across all other outcomes and models, we found no significant differences between groups at either the 6-month (ps ≥ .090) or 12-month (ps ≥ .179) follow-up periods.

Table 4. *Logistic and Negative Binomial Regression Results of Primary and Secondary Outcomes at 6- and 12-Month Follow-Up*

	Follow-Up					
	6-Month			12-Month		
Outcome	exp (B)	95% CI	p	exp (B)	95% CI	p
Count of Events						
EMS events*	0.73	0.44, 1.24	.245	0.85	0.52, 1.37	.504
Jail bookings	0.66	0.34, 1.27	.210	0.89	0.51, 1.54	.668
Outpatient BH treatment encounters	1.09	0.73, 1.63	.667	1.29	0.89, 1.88	.179
ED visits	0.98	0.73, 1.33	.913	1.18	0.88, 1.59	.274
Any Event						
Any EMS event	1.25	0.82, 1.91	.304	1.26	0.85, 1.88	.246
Any jail booking	0.59	0.33, 1.08	.090	0.87	0.53, 1.41	.564
Any outpatient BH treatment encounter	1.22	0.83, 1.77	.308	1.24	0.84, 1.83	.272
Any ED visit	1.34	0.86, 2.08	.189	1.88	0.73, 1.93	.488

Notes. *Primary outcome at 12-month follow-up. Exp (B) represents incidence rate ratio for count outcomes and odds ratio for binary outcomes. TAU represents reference condition.

Figures 2 and 3 present the predicted number of events for each condition across both the 6-month and 12-month follow-up periods along with 95% confidence intervals. As shown, although there were slight differences in mean incidence rates across conditions, confidence intervals were generally wide and considerably overlapping, indicating there were no significant differences in outcomes between groups.

Figure 2. Predicted Number of Events for MCAT and TAU Conditions at 6 Months
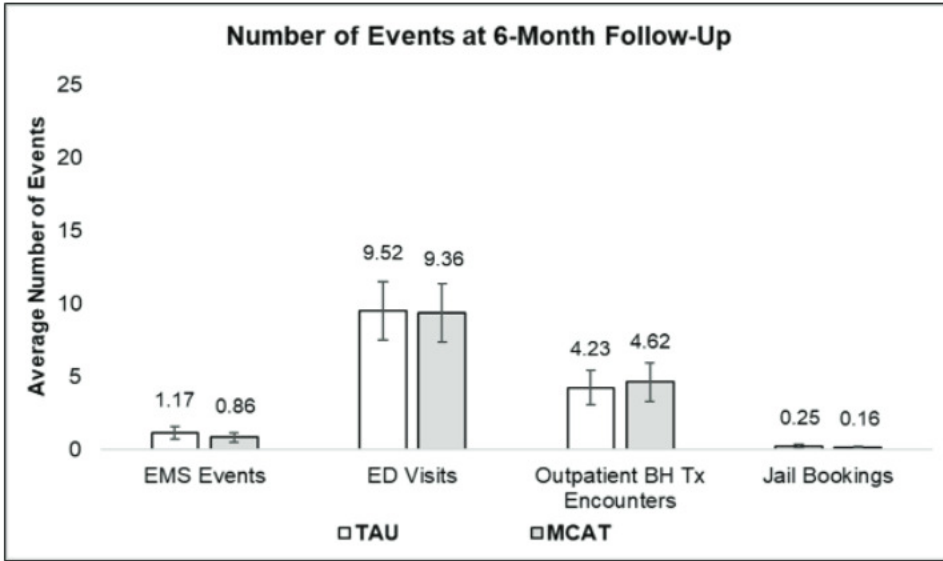
Figure 3. Predicted Number of Events for MCAT and TAU Conditions at 12 Months
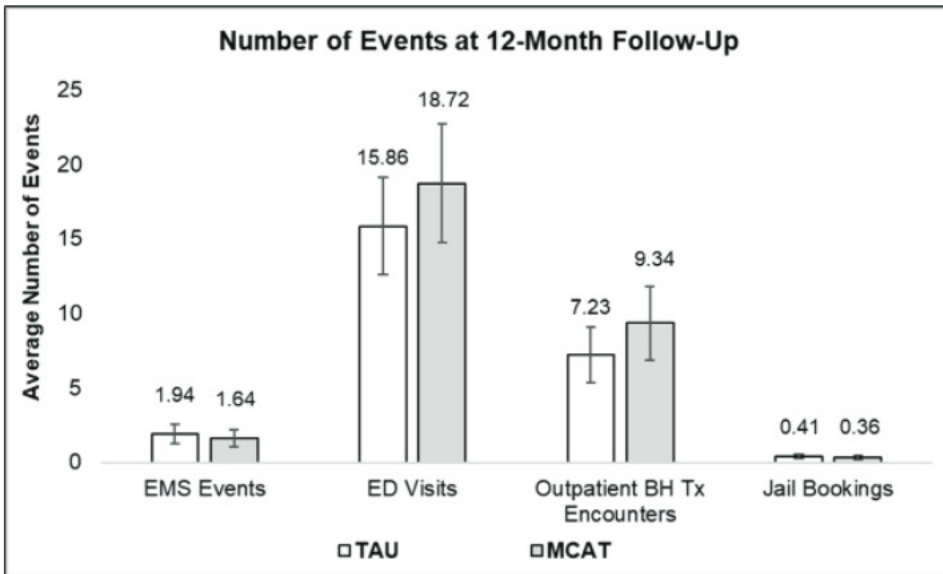
We observed similar trends across conditions for the predicted probability of any event. Figures 4 and 5 present predicted probabilities by condition for both the 6- and 12-month follow-up periods. As shown, there were few differences between groups in the likelihood of each event occurring. Where differences emerged, estimates were not sufficiently stable to infer a statistically significant difference.

Figure 4. Predicted Probability of Any Event for MCAT and TAU Conditions at 6 Months

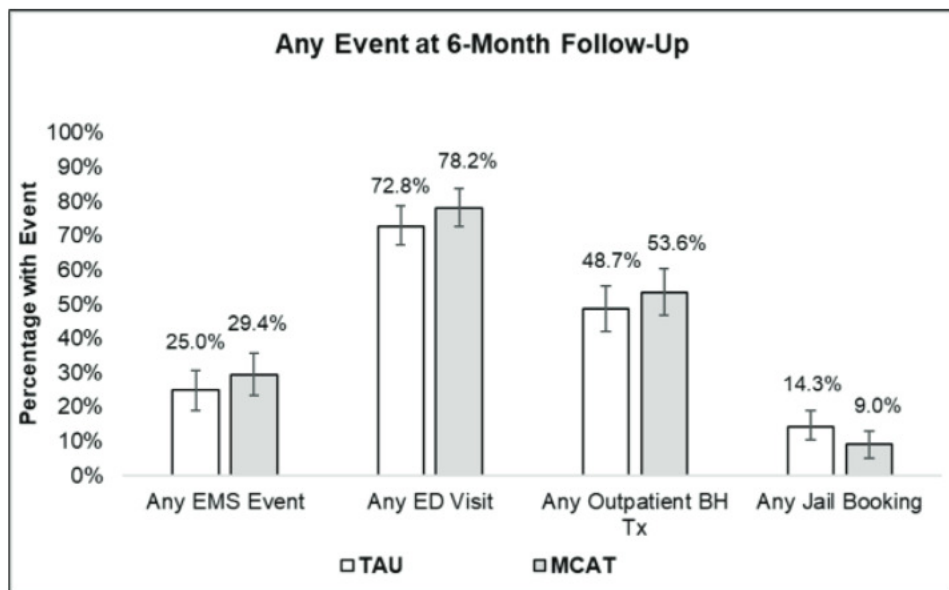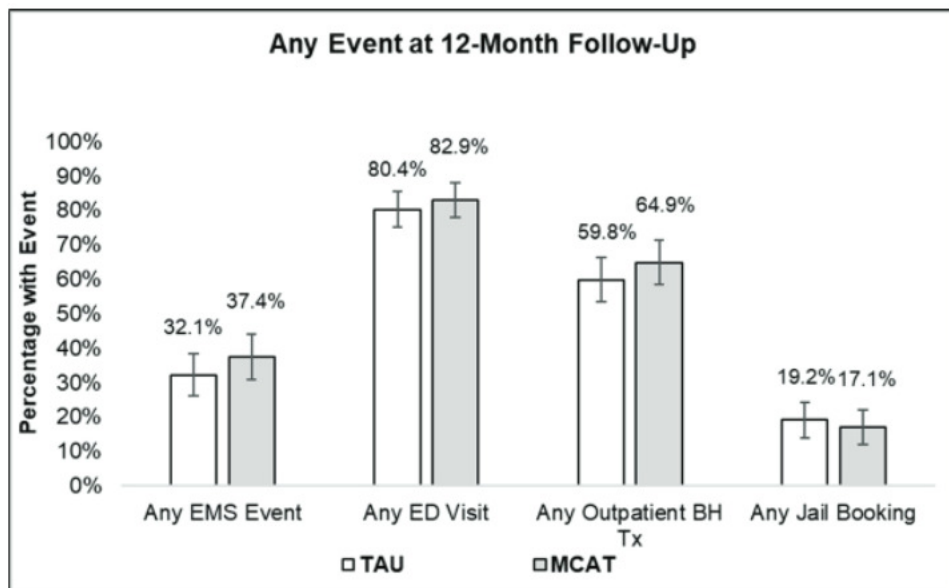*Figure 5. Predicted Probability of Any Event for MCAT and TAU Conditions at 12 Months*

4.3   Sensitivity Analysis of Behavioral Health Unit (BHU) Follow-Up

Finally, we conducted a sensitivity analysis to examine whether the null treatment effect was robust to BHU follow-up contacts within 48 hours of an initial MCAT or TAU response. Results of these analyses for primary and all secondary outcomes are presented in Table 5. As shown, treatment effects varied depending on BHU contact. MCAT participants who did not receive a BHU contact within 48 hours had significantly fewer EMS events at 6-month (OR = 0.33, 95% CI [0.12, 0.94]) and 12-month (OR = 0.27, 95% CI [0.10, 0.71]) follow-up periods relative to TAU participants (ps ≤ .039). Similarly, MCAT participants without a BHU contact had fewer ED visits across both 6-month (OR = 0.31, 95% CI [0.18, 0.55]) and 12-month (OR = 0.34, 95% CI [0.19, 0.59]) follow-up periods relative to TAU participants (ps ≤ .001). Similar effects were observed for outpatient behavioral health treatment encounters across both follow-up periods (6-month: OR = 0.30, 95% CI [0.14, 0.64]; 12-month: OR = 0.31, 95% CI [0.15, 0.63]), (ps ≤ .002). Conversely, at the 12-month follow-up period, MCAT participants who had a BHU contact had significantly more outpatient behavioral health treatment encounters (OR = 1.49, 95% CI [1.02, 2.20]) relative to TAU participants (p = .041). There were no differences in the number of jail bookings across conditions (ps ≥ .161). Figures 6 and 7 present the predicted number of events for each condition across outcomes.

In assessing the likelihood of any event occurring, treatment effects were limited to any ED visit at the 6- and 12-month follow-up periods and any outpatient behavioral health treatment encounter at the 12-month follow-up period. There were null effects on likelihood of any EMS event or any jail booking (ps ≥ .082). Results showed that MCAT participants without a BHU contact had a lower likelihood of any ED visit at 6-month (OR = 0.37, 95% CI [0.18, 0.77]) and 12-month (OR = 0.34, 95% CI [0.16, 0.72]) follow-up periods relative to TAU participants (ps ≤ .005). Conversely, MCAT participants with BHU contact were more likely to have an ED visit at both 6-month (OR = 1.96, 95% CI [1.19, 3.23]) and 12-month (OR = 1.79, 95% CI [1.02, 3.15]) follow-up periods relative to TAU participants (ps ≤ .042). There were similar effects for the likelihood of an outpatient behavioral health treatment encounter at the 12-month follow-up period. MCAT participants without a BHU contact had a lower likelihood of any outpatient behavioral health treatment encounter (OR = 0.38, 95% CI [0.18, 0.79]) relative to TAU participants (p = .009). However, MCAT participants with a BHU contact had a higher likelihood of an outpatient behavioral health treatment encounter (OR = 1.63, 95% CI [1.07. 2.49]) relative to TAU participants (p = .023). Figures 8 and 9 show the predicted probabilities of experiencing each event by condition across both follow-up periods.

Overall, results of sensitivity analyses provided inconsistent evidence that more intensive MCAT intervention, via BHU follow-up within 48 hours of an initial response, would be linked to better outcomes relative to TAU. MCAT participants who received BHU follow-up were engaged in more outpatient behavioral health treatment but also had a higher likelihood of ED visits. Conversely, MCAT participants who did not receive BHU follow-up fared better relative to TAU on several outcomes. Together, these findings suggest a potential selection effect when dissecting the overall results into average treatment effects on the treated: it is probable that the BHU conducts timely follow-up services with a subset of MCAT participants in need of more comprehensive care.

Table 5. Sensitivity Analysis by Any Behavioral Health Unit (BHU) Contact within 48 Hours: Logistic and Negative Binomial Regression Results for Outcomes at 6- and 12-Month Follow-Up

Outcome	Follow-Up					
	6-Month			12-Month		
	exp (*B*)	95% CI	*p*	exp (*B*)	95% CI	*p*
Count of Events						
EMS events*						
MCAT no BHU – 48 Hour	0.33	0.12, 0.94	**.039**	0.27	0.10, 0.71	**.008**
MCAT BHU – 48 Hour	0.82	0.47, 1.40	.466	0.97	0.59, 1.59	.896
ED visits						
MCAT no BHU – 48 Hour	0.31	0.18, 0.55	**< .001**	0.34	0.19, 0.59	**< .001**
MCAT BHU – 48 Hour	1.12	0.82, 1.53	.466	1.35	1.00, 1.84	.053
Outpatient BH treatment encounters						
MCAT no BHU – 48 Hour	0.30	0.14, 0.64	**.002**	0.31	0.15, 0.63	**.001**
MCAT BHU – 48 Hour	1.26	0.83, 1.90	.280	1.49	1.02, 2.20	**.041**
Jail bookings						
MCAT no BHU – 48 Hour	0.90	0.27, 2.98	.870	0.75	0.26, 2.17	.599
MCAT BHU – 48 Hour	0.61	0.30, 1.22	.161	0.91	0.51, 1.63	.761
Any Event						
Any EMS event						
MCAT no BHU – 48 Hour	1.00	0.44, 2.25	> .999	0.93	0.43, 1.99	.850
MCAT BHU – 48 Hour	1.30	0.84, 2.03	.240	1.34	0.89, 2.03	.164
Any ED visit						
MCAT no BHU – 48 Hour	0.37	0.18, 0.77	**.007**	0.34	0.16, 0.72	**.005**
MCAT BHU – 48 Hour	1.96	1.19, 3.23	**.008**	1.79	1.02, 3.15	**.042**
Any outpatient BH treatment encounter						
MCAT no BHU – 48 Hour	0.53	0.25, 1.11	.091	0.38	0.18, 0.79	**.009**
MCAT BHU – 48 Hour	1.44	0.97, 2.14	.073	1.63	1.07, 2.49	**.023**
Any jail booking						
MCAT no BHU – 48 Hour	0.75	0.25, 2.26	.610	0.67	0.25, 1.85	.448
MCAT BHU – 48 Hour	0.56	0.29, 1.08	.082	0.91	0.54, 1.51	.706

Notes. *Primary outcome at 12-month follow-up. Exp (*B*) represents incidence rate ratio for count outcomes and odds ratio for binary outcomes. TAU represents reference condition.

Figure 6. Sensitivity Analysis of Any Behavioral Health Unit (BHU) Follow-Up within 48 Hours on Predicted Number of Events at 6 Months
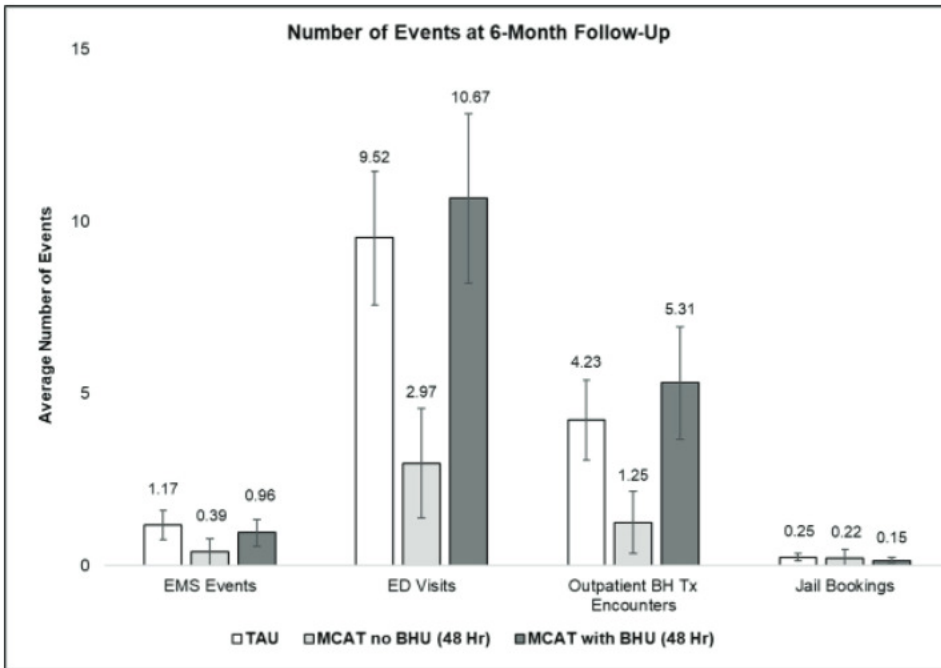

Figure 7. Sensitivity Analysis of Any Behavioral Health Unit (BHU) Follow-Up within 48 Hours on Predicted Number of Events at 12 Months
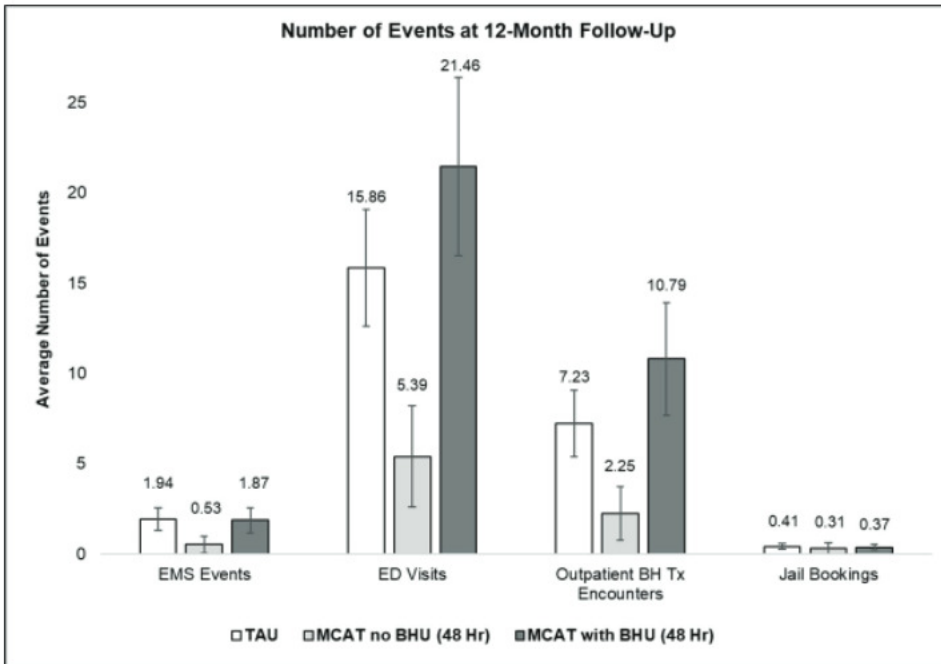
Figure 8. Sensitivity Analysis of Any Behavioral Health Unit (BHU) Follow-Up within 48 on Predicted Probability of Any Event at 6 Months
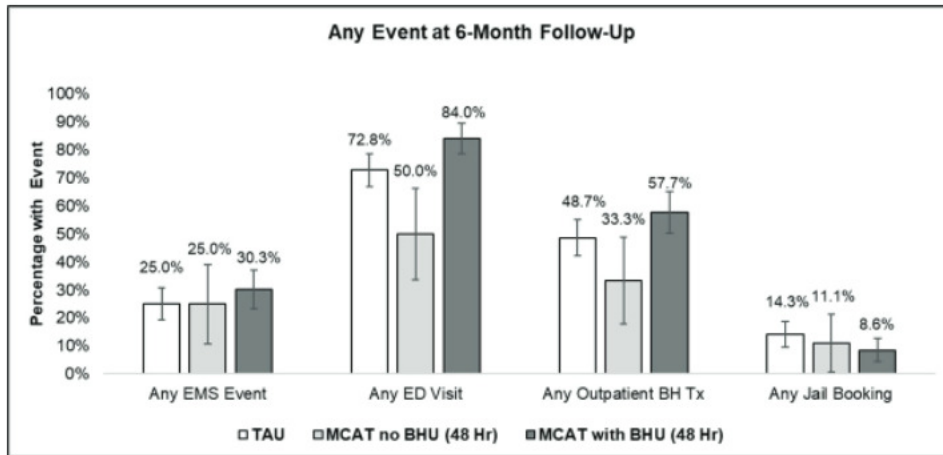
Figure 9. Sensitivity Analysis of Any Behavioral Health Unit (BHU) Follow-Up within 48 Hours on Probability of Any Event at 12 Months
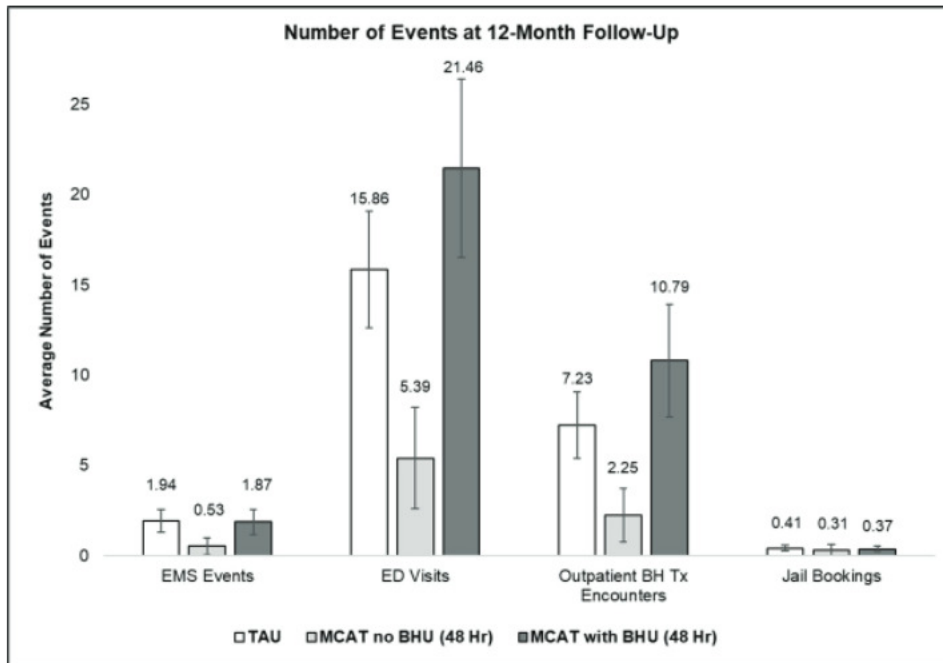
4.4 Methodological Limitations and Considerations

The study design, primary outcome, and analytic strategy were included as part of the OSF pre-registration and included an a priori power analysis based on a much larger anticipated effect size than observed in findings conveyed in the present report. Our research team had many aligning factors that facilitated the original study design: we co-developed policies and procedures with the MCAT team, we had strong buy-in and commitment from all involved agencies and city officials, and the MCAT program itself served a large jurisdiction. Despite these supporting dynamics, we were unable to achieve our targeted sample size (N = 1,440), calculated with consideration for how the MCAT operated during its pilot period, due to subsequent changes in the MCAT program

(from 24/7 operation to 10:00 a.m.–6:00 p.m. Monday through Friday working hours, which reduced call volume). As such, we modified our analysis, determining 615 responses would achieve 80% power for small (OR = 1.5), medium (OR = 2.5), and large (4.3) effects. Our challenges in recruitment were then further hampered by the COVID-19 pandemic, with stay-at-home orders coming into effect less than 2 months into randomization. To account for these challenges, we extended the randomization period from 12 to 15 months, but we were still unable to achieve our target, resulting in an underpowered study. Ultimately, to achieve the required sample size, we would have needed nearly 50 months of recruitment, or a 4-year period.

As shown in our results section above, effect sizes observed in this study were much smaller than anticipated. Small effect sizes combined with the smaller-than-intended sample size contributed to null effects across primary and secondary 12-month outcomes. Below we present the results of a post-hoc power analysis by 12-month outcome, which indicate low levels of statistical power across all outcomes.

To explore the potential effect of various sources of attrition on randomized calls and those retained in the final analysis, we conducted bivariable comparisons between study conditions on several baseline covariates. Despite attrition, our randomization protocol produced equitable groups (see Appendix A: Baseline and Pre-Randomization Checks) as there were no statistically dependable differences between the two conditions on participant age (p = .793). Further, participants had approximately the same rate of EMS events (p = .992), ED visits (p = .771), and jail bookings (p = 0.862) in the year prior to the call for service randomly assigned to the experimental conditions. Unfortunately, we were unable to gather pre-registration baseline measures of participant gender and race or ethnicity with available administrative records.

Finally, our selection of primary and secondary outcomes illustrates the limitations of using administrative data to study a multi-agency initiative. The SEMHC provided the clinicians as part of the co-response efforts and, because it was generally accepted among leadership from all stakeholder groups that there were people with multiple costly EMS mental health crisis responses, this was selected as the primary outcome. Future efforts to rigorously evaluate co-response teams should carefully consider the program goals and capabilities in both the programmatic development and evaluation and choose outcomes accordingly. Our criminal justice outcomes were also limited by using administrative data sources to determine systems involvement. For example, in Indianapolis during the time of this study, an MCAT or TAU encounter might have resulted in an immediate detention, an arrest without a jail booking, or an arrest followed by incarceration through booking in the county jail facility.

As a partial check of measurement validity, we compared MCAT internal administrative records on crisis incident dispositions to the MCAT group same-day any jail booking outcome measure. MCAT internal records contain fields that allow team members to record how incidents were resolved (i.e., crisis incident disposition), including whether there was an immediate detention or an arrest made. Table 7 summarizes the results of this comparison. Immediate detentions are 24–48-hour holds and do not equate to a jail booking. Further, immediate detentions are not synonymous with a custodial arrest. From the comparison between internal administrative records on crisis incident dispositions and the same-day jail booking outcome measure, it appears jail bookings primarily align with administrative record indications of custodial arrests.

Table 6. Post-Hoc Power Estimates by 12-Month Outcome

12-Month Outcome	Achieved Power (1–ß)
Count	
EMS events	.10
Jail bookings	.06
ED events	.19
Outpatient BH treatment encounters	.27
Binary	
Any EMS event	.21
Any jail booking	.09
Any ED event	.11
Any outpatient BH treatment encounter	.19

Notes. α = .05.

Table 7. Comparison of MCAT Internal Records to Jail Booking Outcome Measure

Internal Administrative Record Measure	MCAT Group RCT Outcome Measure					
	Any Same-Day Jail Booking (n = 7)		No Same-Day Jail Booking (n = 204)			
	n	%	*n*	%	χ2	V
Immediate Detention						
Yes	1	1.4	69	98.6	1.16	.074
No	6	4.3	135	95.7		
Arrest Made						
Yes	5	62.5	3	37.5	90.80***	.656
No	2	1.0	201	99.0		

*Notes. *p < 0.05, p < 0.01, ***p < 0.001*

Section 5. MCAT Cost Analysis

The direct intervention cost of MCAT was estimated using documented expenditures maintained by the study. A resource costing method was used to assign monetary values to study outcomes. This method consisted of multiplying the number of units of each resource utilized by the respective unit cost. See Appendix C for details associated with the cost analysis as well as unit cost estimates and sources. All costs were estimated using U.S. prices, adjusted to 2022 dollars.

The total estimated direct intervention cost of receiving an MCAT response was $2,687. This intervention cost included personnel costs (mental health clinicians and police officers) and the purchase and operation of specialized MCAT vehicles.

Table 8 presents the model-adjusted predicted mean costs for each of the study outcomes. We found no cost differences for the EMS and jail bookings outcomes for MCAT relative to TAU

for either the 6- or 12-month follow-up period (p ≥ .757). The incremental ED costs associated with MCAT were $4,450 at 6 months (p =. 002) and $5,377 at 12 months (p = .005). Although we detected no outpatient behavioral health encounter cost differences for MCAT relative to TAU at 6 months (p = .509), by the 12-month follow-up period the incremental costs associated with MCAT were significantly greater, with a difference of $8,813 (p < .001). The total costs across all participant outcomes were higher but not statistically significant for MCAT relative to TAU for the 6-month follow-up period. For the 12-month period, MCAT costs were $14,604 (29.0%) higher and statistically significant. Because there was no benefit in terms of avoided costs associated with the MCAT program, we did not calculate a cost-benefit ratio point estimate.

Table 8. Predicted Mean Costs From Societal Perspective

Outcome	Follow-Up							
	6-Month				12-Month			
	TAU	MCAT	Diff	*p*	TAU	MCAT	Diff	*p*
Count of Events								
EMS events	4,676	3,919	756	.757	6,001	6,411	409	.884
ED visits	9,203	13,653	4,450	.002	17,081	22,458	5,377	.005
Outpatient BH treatment encounters	10,792	9,667	1,126	.509	12,693	21,506	8,813	< .001
Jail bookings	22	18	5	.998	39	44	5	.998
Total	24,693	27,257	2,564	.486	35,815	50,418	14,604	.001

*Notes. *p < 0.05, p < 0.01, ***p < 0.001*

Section 6. Stakeholder Perceptions of the Randomized Trial

Given the practical considerations and potential barriers to randomizing calls for service as a method of evaluating alternative police responses like co-response teams, we also examined qualitative data collected from a series of semi-structured focus groups with MCAT team members and leadership who were part of the RCT study. Three focus groups were conducted in a private conference room in the district police office: one with police and mental health leadership (n = 2), one with MCAT police officers (n = 3), and one with MCAT mental health clinicians (n = 3). Everyone who had served as a member of the MCAT in the police district where the study occurred participated in focus groups, each of which lasted approximately 45 minutes. After receiving verbal consent from participants, each focus group was audio recorded.

Audio files were professionally transcribed. Three researchers independently coded transcripts using the qualitative analysis software NVivo (QSR International Pty Ltd., 2020).

MCAT stakeholders were asked to reflect on their experiences participating in the study procedures. The analytic goal was to identify salient themes from team member reflections on study participation that could benefit future efforts to evaluate similar alternative police response programs. Following independent coding, researchers met to compare and synthesize findings, resulting in three key themes for consideration: the importance of partnerships, site selection and staffing, and ethical concerns.

Table 9. Focus Group Participant Co-Response Team

Focus Group Participants	Co-Response Team Role
Leadership Focus Group	
Participant 1	Supervising mental health clinician
Participant 2	Supervising district police sergeant
Clinician Focus Group	
Participant 1	Primary team clinician
Participant 2	Backup clinician
Participant 3	Backup clinician
Police Focus Group	
Participant 1	First primary officer
Participant 2	Second primary officer
Participant 3	Backup officer

6.1   The Importance of Partnerships

Respondents acknowledged key characteristics of the working partnership with researchers in successfully conducting the study. Regular communication between researchers and team members was identified as a factor that facilitated the study:

> "I thought that, from my perspective, the communication between us [MCAT] and researchers was good and that everybody kind of looked at everybody's perspective and you guys seem to value our opinions and our input and kind of took them at face value. So that was nice. When we said something wasn't working, you guys kind of understood that and respected that and tried to accommodate us as much as possible." (Officer FG, Speaker 2)

One example of incorporating co-response team feedback into the study design was the process of outlining program parameters, which included identification of eligibility criteria for calls for service that are appropriate for MCAT. Prior to the randomized study, MCAT units in Indianapolis used discretion to self-dispatch to calls for service. However, to consistently randomize calls for service that would be considered relevant for MCAT, researchers worked with leadership to identify key terms, phrases, and codes commonly communicated over police dispatch radio that would constitute a behavioral or mental health call warranting MCAT. Not only did this process serve to refine the study design, respondents also reported an increased understanding of the role of the co-response for themselves and other emergency responders:

> "What runs do we go out on? I think if you ask a hundred officers, you would probably get a hundred different answers on what would be a mental health run versus not…So, I think that was a huge challenge, just trying to figure out what runs we need to go on or not go on." (Leadership FG, Speaker 2)

> "There was a lot of uncertainty about what exactly constitutes an MCAT run at the beginning…[First] they said just go on every [call]. And then we did that for a while. And then that didn't really work. And then 'we'll go on this or go on that' or, 'just go on everyone's runs and see if you can help people at the scene that are in a crisis.' So, it was a totally moving target initially all around. And then when the research project was announced… [we] did a really good job of laying out whether something is an MCAT run or not that helped bring clarity… the study brought clarity and kind of more focus to [this issue]." (Clinician FG, Speaker 3)

Partnership with other district police officers was key both successful integration of the MCAT into the district's emergency response procedures as well as successful data collection on TAU calls for study purposes. Given the MCAT was new to the district, focus group respondents mentioned that to garner district police officer buy-in to support the study it was pertinent to acknowledge officers' historical role and prior experiences responding to behavioral health emergencies. As one respondent noted, some officers may have felt disrespected with the introduction of an alternative response unit, which may have hindered their enthusiasm for the study:

> "[Officers may be thinking], 'We've been doing this for years. We know how to handle people, we know how to de-escalate. Don't we know how to recognize mental illness when we see it?'" (Clinician FG, Speaker 3)

> "So maybe that's part of the barriers. Like MCAT comes down as the shiny new object. You know… we've got the clinician with the license, but these officers have been charged with the responsibility of de-escalating and deciding whether to arrest, [place people in immediate detention], or just leave in place. And they've been doing that for 12, 15, 20, 30 years or whatever, were being asked to do a difficult job without the clinical training. So, the cultural disconnects or the challenges there are pretty profound." (Clinician FG, Speaker 3)

Prior to study initiation, researchers held informational meetings with district police officers at roll call to explain the purpose of the study, the randomization procedures, and their role in data collection for calls for service randomized to the TAU arm. One focus group respondent emphasized the importance of giving these officers a sense of "a role within the study" and clearly explaining why MCAT does not respond to calls when randomization results in a "no-go" (Officer FG, Speaker 1) with allocation to the TAU arm. However, preliminary meetings with district officers may not have been sufficient for optimal buy-in from district police officers, which was key to ensuring accurate identification of control cases. Additionally, it was noted that some district officers who were hired after study commencement may have missed these informational sessions:

> "[Other officers] don't really care whether they're giving a name and date of birth or not, because they don't really have a lot of buy-in and they're not really getting anything out of [helping with the study]. So, I don't know if there's any way to improve upon that… incentivizing somehow?" (Police FG, Speaker 3)

> "While we're talking about [coordinating with] officers, I did notice that… within that course of a year, we had a couple of recruit classes come out. So, there were some brand-new officers who came into this with the research study already going. So, I don't think we did a great job… of communicating then what the research study was and what the expectations were versus how MCAT normally operates too, so I think we kind of forgot about them." (Police FG, Speaker 2)

One factor that helped garner police officer buy-in was support from the district commander, who was present at initial roll-call meetings and shared communications with district officers outlining the study procedures. Focus group respondents mentioned the need to continuously engage police leadership to foment patrol officer buy-in:

> "I know when …we were first doing this study, we met with… the commander. And then as the study went along, I'm not

> sure how much we looped him in or if COVID hit and we just went to this virtual format… So, I don't know if we lost sight a little bit with that… I think [it is important] having that buy-in from the higher-ups, because I know that we had it. But for them to visually be at the meetings and to show that, yes, this is important…" (Leadership FG, Speaker 2)

> "However, once the study was underway, officers on MCAT became the main liaison for other district officers who were providing a TAU response. Fortunately, the MCAT officer had a positive relationship with other district officers. As one respondent from MCAT leadership indicated, "Having an officer that's well respected and well-liked be that point [of contact] is important," and added, "I think we were lucky to have [name of MCAT officer] at the beginning because he did have a good rapport [with other district police officers]." (Leadership FG, Speaker 2)

6.2   Site Selection and Staffing

Respondents offered considerations regarding the maturity of the program under study as well as the complications of maintaining a consistently staffed co-response team for study purposes. Although the MCAT had been initially piloted in one police district in Indianapolis, program leaders determined that the randomized study would occur in a district that did not have a fully incorporated MCAT unit. However, in hindsight, respondents indicated that conducting the study with an established co-response team might have yielded fewer barriers and different results:

> "[It would be interesting] to see what the results are where you've already established MCAT as an entity in the district, where there is a level of trust and a greater awareness of the role of MCAT. And so [other police officers in the district] would have had some exposure and some education." (Clinician FG, Speaker 3)

Relatedly, MCAT clinicians described the importance of building rapport with other district police officers to effectively integrate into the emergency response system and suggested that introducing the study at the same time as the program might have stunted that process:

> "We're already, as a social worker, kind of an outsider, right, coming into the district… and this culture of law enforcement, in my opinion, is one of trust. And trust isn't just given. It's built over time. And I think that the study sometimes hindered that relationship between clinicians and officers, because when they were [needing] us, we have a [no-go]. And so, then it was hard to say, well, [we can't

> respond] because the study was a [no-go]. So, then I don't know how they felt out there on the street, but I would assume at some point there might be some frustration with that." (Clinician FG, Speaker 2)

Leadership emphasized the difficulties they faced maintaining a consistently fully staffed MCAT to ensure the study continued smoothly:

> "Logistically, it was stressful. Because we had to fill that spot no matter what. And we had some staffing issues that were going on and then… our days off, and your [clinician] days off, and holidays and so forth. So logistically, I think that was probably the hardest part for me as one of the supervisors was just how stressful [it was] to make sure [the MCAT] was getting manned and so forth." (Leadership FG, Speaker 2)

Focus group respondents noted that sometimes staffing struggles persisted even with backup MCAT staff in place, emphasizing the importance of a working relationship between the officer and the clinician that operate together as a team:

> "There really is something between that clinician and officer rapport that goes on because, you know, there [needs to be] a true partnership out there and sometimes you don't have that. First day when I'm filling in and… I don't know [the other team member] that well and we go out, it's not the same deal as when he and the [the original team member] went out." (Leadership FG, Speaker 1)

6.3   Ethical Concerns

One of the most significant challenges raised by MCAT was concern around those events where they knowingly avoided responding due to a TAU randomization result. Respondents reported feeling frustrated and concerned about the real-world implications of their inability to provide crisis support. This was exacerbated when the person in crisis was someone with whom they had a clinical relationship and prior experience supporting:

> "We kind of like being able to determine which [calls] we go on sometimes because sometimes [for some crises]… we know there's not a lot we can do. And then you get [a call] that comes out and it's one we know we should go on, like a suicidal one. And we know… maybe we can really help on that one, and then we get a [no-go result] on it. So, it was frustrating at times." (Clinician FG, Speaker 1)

> "I might hear a run come out and I know this client really well. I know his needs. I know what he needs, I know he's linked [to care] or he's not linked. But because [the randomization resulted in TAU] I couldn't intervene, whereas ethically as a social worker, what's best for the client is what's best. And I struggled a lot with, like, how can I not intervene?" (Clinician FG, Speaker 2)

These ethical concerns around feeling compelled to provide an MCAT response also impacted the study on some occasions. Although most emergency calls for service came through police dispatch radio, there were also instances in which requests for MCAT came directly from other officers in the district or from police leadership. In some instances, MCAT followed up on these requests, which placed them out of service for study purposes. One respondent described such an incident:

> "[We] were asked to interview a potentially suicidal police officer. …I conducted kind of an informal assessment in a parking lot of an officer's mental state and, thankfully it all worked out… but these are [examples of how] the police use [the co-response team] as another way of dealing with an emergency." (Clinician FG, Speaker 3)

Because these requests for MCAT support were not initiated through a 911 call, they were not included as part of the randomized study, which raised concerns about the ability of the study design to capture all aspects of MCAT impact in the district. As one respondent noted:

> "All you knew is that we were going out of service and going on a run that you're never going to find out about. But that happened during the study. So, all of our activity and all of the good results that happened from it were not randomizable or in the purview of the study." (Clinician FG, Speaker 3)

Section 7. Discussion

Although co-response police–mental health partnerships are not a new approach to addressing the disproportionate representation of persons with mental illness in U.S. criminal-legal systems, the body of research determining the effectiveness of these programs has not kept pace with their implementation. Most studies have been descriptive and have reported details on program implementation, staff perceptions, participant satisfaction, time on scene, and emergency hospital utilization (5,7–17). Only a few studies compare an assortment of outcomes between a co-response team and police response-as-usual (14,18–21). Moreover, there is notable variety and sometimes ambiguity regarding the co-response models being studied, with many identified as crisis follow-up, others identified as immediate crisis response, and some not clearly specified. No studies thus far have reported on long-term outcomes of co-response team programs, and systematic reviews consistently highlight the need for more rigor in evaluating police-based responses to mental health emergencies (22–25). This is especially important as communities begin implementing 988 and other national mental health crisis response initiatives.

This report represents a major advance in our understanding of co-response police–mental health teams by presenting outcomes from the first RCT of this emerging alternative response to behavioral health calls for service. Furthermore, this study demonstrates the feasibility of conducting an RCT of a co-response program in a real-world setting provided collaborative partnerships and sufficient funding are available. Simply establishing and adhering to protocols for call-level randomization in real time was a considerable accomplishment from this study that would not have been possible without funding for dedicated research staff (Emily Sightes); an ongoing successful partnership between multiple public health and safety stakeholder groups; and a committed research team, all of whom were dedicated to rigorously assessing whether co-response programs result in measurable positive change.

As noted, co-response teams vary significantly in terms of roles, responsibilities, purview, and participating organizations, among other factors. Future studies should provide such details about co-response teams when reporting outcomes. For example, the nuance and importance of 911 dispatch in how

co-response teams operate cannot be overstated. The process by which calls for service come to the team is one of the most important distinguishing factors that should be clearly outlined in all research on this topic. With the Indianapolis MCAT model, teams self-dispatch. That is, they listen to 911 dispatch radio and respond when they deem appropriate through communication with dispatchers and discretionary guidelines about crisis circumstances that constitute a relevant call for service. As such, there was no specialized or dedicated dispatch for this co-response team model, which may impact the types of calls to which co-response teams ultimately respond. Other U.S. cities have implemented diversion programs that start with specialized training for dispatchers to recognize behavioral health calls and dispatch responders accordingly (26).

Although we cannot completely rule out the possibility of failing to identify small differences between MCAT and TAU conditions given a priori and post-hoc power analyses, we did not find effectiveness of the MCAT in either the primary outcome—count of EMS events after 12 months—or in a variety of secondary outcomes at 6-month and 12-month follow-up periods. Our findings from the BHU 48-hour follow-up sensitivity analysis suggest that individuals who receive MCAT and BHU services represent a high-risk group for future systems involvement with potentially heightened behavioral health needs. Thus, these persons may not be best described as high utilizers but rather those with severe and chronic health conditions. Moreover, it has been suggested that an unintended consequence of co-response teams could be reinforcing that people can wait to call for help once a crisis has become dire in lieu of seeking services to mitigate the crisis (27); thus, it is possible that continued contact with co-response programming could generate unintended consequences that increase systems utilization. In our study, this was reflected by more than 1 in 10 encounters being with a repeat participant. As such, it will be important for communities to identify goals in terms of systems involvement for persons with behavioral health needs and develop interventions accordingly. Given our findings, it may not be reasonable to anticipate that a co-response team that provides behavioral health emergency response will reduce utilization of emergency services or incarceration or increase treatment encounters. Relatedly, in future studies of alternative response programs, stakeholders and researchers should carefully select outcomes that could logically be impacted by the intervention and consider potential unintended consequences. Thus, it may not be realistic for a one-time emergency response to change the trajectory of chronic illness that results in emergency medical calls for services.

There are also police-related factors that could account for null outcomes. For example, while the IMPD does not follow the evidence-based CIT approach to complete fidelity, all IMPD officers receive a form of CIT training and may have participated in other programming aimed to improve police-as-usual responses to behavioral health calls for service during the study that we are unable to account for. Moreover, our randomization began at the onset of the COVID-19 pandemic

(January 2020) and proceeded during the first 18 months, which included the initial stay-at-home order period. The pandemic led to overall reduced calls for service and jail bookings and increases in naloxone administration and deaths from drug overdoses in Indianapolis (28–30). Given random assignment, the pandemic and its consequences does not threaten the internal validity of the study design but could have shaped event rates overall, reducing our ability to detect statistically significant effects between MCAT and TAU outcomes.

The themes gleaned from stakeholder perceptions of study involvement also revealed several lessons learned for researchers developing experimental study designs to examine the effectiveness of alternative police responses. It is necessary for researchers to develop a working partnership with program practitioners and for their concerns and insights be considered in the study design and throughout the course of the study. Regular collaborative communication between researchers and program stakeholders is key for garnering stakeholder buy-in and identifying potential study pitfalls in advance. This study also emphasized the significance of communicating the importance of the study and garnering buy-in from other police officers in the district under study. This can be facilitated by continuously attending and presenting at roll calls and meetings with district officers, informing officers hired throughout the course of the study about study procedures, ensuring law enforcement leadership communicate support for the study, and developing a positive working relationship between the alternative response team members and district officers.

Aligning the schedules of multiple agencies is likely to be a barrier for any co-response team or alternative police response program. This was exacerbated for this study because it required that a full team be consistently available for randomization. In other police districts not involved in the study, an understaffed co-response team could simply remain out of service until staff could return to work. Future studies that randomize at the call-for-service level should carefully consider staffing needs, including the identification of qualified and sufficiently integrated backup personnel who can fill in such that program fidelity is maintained and interference with randomization procedures is avoided. Additionally, our study scope did not allow us to examine MCAT prevalence among all behavioral health emergency calls for service, and while our cost analysis reflected the null effects from the RCT, we were unable to discern all potential cost benefits; for example, MCAT allows other emergency response units (police, EMS, fire) to leave the scene and attend to other calls for service.

Finally, stakeholders expressed ethical challenges associated with call-for-service randomization. While experiencing this challenge will be inevitable, we recommend that, when planning a study with practitioners, researchers make efforts to emphasize the importance of rigorous evaluation methods in determining program effectiveness and the broader societal implications of such studies. To reinforce study procedures

and resolve issues associated with responding units who are managing calls or are out of service, it is also critical to maintain constant communication between practitioner and researcher teams as calls-for-service are randomized to experimental conditions. Despite the ethical challenges of call-for-service randomization, stakeholders in the present study still felt the study was an important undertaking with one respondent saying, "I think it's still important and worthwhile…if we don't do a study, if we don't do research, we don't gather the data— we don't know, right?" (Leadership focus group [FG], Participant 1). Another participant shared, "I think this study is going to be monumental as far as the information that it produces." (Clinician FG, Participant 2).

Section 8. Conclusion

During the course of this study, the behavioral health crisis response efforts in Indianapolis have continued to evolve. Initially, IMPD had only a behavioral health follow-up unit, then a separate co-response unit with three agencies, then two agencies, and then teams were integrated to have immediate co-response and follow-up. Now, Indianapolis is piloting a clinician-only response program with additional training underway for dispatch to facilitate the identification of non-violent behavioral health crises (31). While some states are using 988 to dispatch mental health crisis teams, Indiana currently does not; however, in Indianapolis, they have also achieved the ability to dispatch MCAT directly from 911 but still operate as self-dispatch units overall. As Certified Community Behavioral Health Clinics, 988, and other national efforts to support mental health systems are developed, they should consider the evolution in Indianapolis around the scope of the co-response team and consider the kinds of community-level effects and long-term outcomes that can be realistically expected from these efforts, but also other immediate outcomes that might capture effectiveness. If we were to design this study today, the procedures and outcomes may be different, but the importance of careful and rigorous evaluation of behavioral health crisis response would remain. Without a functioning national mental health system, communities will continue to struggle to identify solutions to meet the needs of community members with challenging behavioral health issues. However, instead of viewing criminal-legal systems as exculpation for this needs gap, communities should determine whether interventions to address behavioral health crises are calibrated to use community and healthcare resources effectively and reduce unnecessary criminal-legal systems involvement.

Appendix A: Baseline and Pre-Randomization Checks

Table A1. Pre-Assignment Participant Characteristics

Measure	TAU (N = 224)		MCAT (N = 211)			
	n	%	n	%	χ2	V
Gender						
Male	0	0.0	114	53.6	---	---
Female	0	0.0	97	46.4	---	---
Unknown	224	100.0	0	0.0	---	---
Race or Ethnicity						
Black	0	0.0	101	48.3	---	---
White	0	0.0	94	44.5	---	---
Asian	0	0.0	4	1.9	---	---
Hispanic/Latino	0	0.0	8	3.8	---	---
Other	0	0.0	2	0.9	---	---
Unknown	224	100.0	2	0.9	---	---
	M	SD	M	SD	$F_{(1, 434)}$	$\eta2$
Age	36.23	16.46	36.64	16.65	0.07	.000

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table A2. Pre-Assignment Participant Characteristics: System Resources 12m Before Call

Measure	TAU (N = 224)		MCAT (N = 211)			
	M	SD	M	SD	$F_{(1, 434)}$	η^2
EMS events	1.47	5.02	1.47	3.31	0.00	.000
ED visits	13.25	28.74	12.53	22.15	0.08	.000
Jail bookings	0.35	1.05	0.34	0.88	0.03	.000

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Appendix B: BHU Follow-Up Sensitivity Analyses

Table B1. Sensitivity Analysis by Any BHU Contact within 12 Months: Logistic and Negative Binomial Regression Results for Outcomes at 6- and 12-Month Follow-Up

	Follow-Up					
	6-Month			*12-Month*		
Outcome	Exp (*B*)	95% CI	*p*	Exp (*B*)	95% CI	*p*
Count of Events						
EMS events*						
MCAT no BHU – any	0.36	0.11, 1.16	.089	0.29	0.10, 0.86	**.026**
MCAT BHU – any	0.79	0.46, 1.35	.392	0.93	0.57, 1.53	.785
ED visits						
MCAT no BHU – any	0.13	0.07, 0.27	**< .001**	0.14	0.07, 0.27	**< .001**
MCAT BHU – any	1.11	0.82, 1.50	.484	1.34	0.99, 1.81	.055
Outpatient BH treatment encounters						
MCAT no BHU – any	0.11	0.04, 0.29	**< .001**	0.08	0.03, 0.20	**< .001**
MCAT BHU – any	1.24	0.83, 1.86	.293	1.48	1.01, 2.15	.042
Jail bookings						
MCAT no BHU – any	0.73	0.18, 2.92	.654	0.70	0.21, 2.33	.565
MCAT BHU – any	0.64	0.32, 1.28	.212	0.91	0.52, 1.62	.759
Any Event						
Any EMS event						
MCAT no BHU – any	1.20	0.50, 2.88	.683	1.00	0.43, 2.32	1.000
MCAT BHU – any	1.26	0.81, 1.95	.309	1.31	0.87, 1.97	.199
Any ED visit						
MCAT no BHU – any	0.21	0.09, 0.47	**< .001**	0.21	0.09, 0.48	**< .001**
MCAT BHU – any	2.07	1.26, 3.41	**.004**	1.89	1.08, 3.31	**.027**
Any outpatient BH treatment encounter						
MCAT no BHU – any	0.29	0.11, 074	**.009**	0.22	0.09, 0.55	**.001**
MCAT BHU – any	1.48	1.00, 2.20	**.049**	1.65	1.08, 2.50	**.019**
Any jail booking						
MCAT no BHU – any	0.72	0.20, 2.52	.608	0.70	0.23, 2.13	.531
MCAT BHU –any	0.57	0.30, 1.08	.087	0.89	0.54, 1.48	.658

Table B2. Sensitivity Analysis by 2 or More BHU Contacts within 12 Months: Logistic and Negative Binomial Regression Results for Outcomes at 6- and 12-Month Follow-Up

	Follow-Up					
	6-Month			12-Month		
Outcome	Exp (*B*)	95% CI	*p*	Exp (*B*)	95% CI	*p*
Count of Events						
EMS events*						
MCAT no BHU – 2+ contacts	0.40	0.21, 0.79	**.008**	0.38	0.21, 0.70	**.002**
MCAT BHU – 2+ contacts	1.05	0.57, 1.94	.879	1.29	0.73, 2.28	.371
ED visits						
MCAT no BHU – 2+ contacts	0.59	0.41, 0.85	**.004**	0.73	0.51, 1.06	.095
MCAT BHU – 2+ contacts	1.36	0.95, 1.95	.090	1.61	1.12, 2.30	**.009**
Outpatient BH treatment encounters						
MCAT no BHU – 2+ contacts	0.62	0.38, 1.02	.058	0.77	0.49, 1.22	.271
MCAT BHU – 2+ contacts	1.54	0.96, 2.49	.076	1.79	1.14, 2.80	**.011**
Jail bookings						
MCAT no BHU – 2+ contacts	0.55	0.23, 1.30	.175	0.50	0.24, 1.04	.064
MCAT BHU – 2+ contacts	0.75	0.34, 1.67	.487	1.25	0.66, 2.37	.488
Any Event						
Any EMS event						
MCAT no BHU – 2+ contacts	0.91	0.53, 1.58	.740	0.91	0.55, 1.51	.711
MCAT BHU – 2+ contacts	1.63	0.99, 2.68	.055	1.69	1.05, 2.71	**.030**
Any ED visit						
MCAT no BHU – 2+ contacts	0.70	0.42, 1.15	.157	0.62	0.36, 1.07	.087
MCAT BHU – 2+ contacts	3.67	1.80, 7.49	**< .001**	3.53	1.53, 8.12	**.003**
Any outpatient BH treatment encounter						
MCAT no BHU – 2+ contacts	0.79	0.49, 1.26	.318	0.74	0.46, 1.18	.210
MCAT BHU – 2+ contacts	1.87	1.16, 2.99	**.010**	2.23	1.32, 3.75	**.003**
Any jail booking						
MCAT no BHU – 2+ contacts	0.50	0.22, 1.14	.100	0.50	0.25, 1.02	.057
MCAT BHU – 2+ contacts	0.68	0.33, 1.41	.299	1.27	0.73, 2.21	.404

Appendix C: Cost Analysis

Cost Analysis Methods

Our economic evaluation was conducted from the perspective of a (limited) societal perspective. Analyses were conducted for the 6-month period following baseline and a cumulative 12-month follow-up. The predicted mean costs of each resource category (i.e., EMS, ED, outpatient behavioral health treatment, jail booking) were estimated with multivariable generalized linear model (GLM) regressions with clustered standard errors at the participant level. The distribution family and link function were chosen according to the fit of the data, and the method of recycled predictions was used to estimate all predicted means (32). The method of recycled predictions was used to estimate all predicted means. To estimate the standard error around the predicted means, we performed a nonparametric bootstrap procedure with 1,000 repetitions. In each regression, we controlled for non–mutually exclusive emergency response types (i.e., self-harm, mental health, substance use, other), day of the week, and baseline measure of the respective cost outcome. Lastly, the predicted means costs for each resource category for the 12-month follow-up period were calculated by summing each of the 6-months predictions.

Table C1. MCAT Input and Outcomes Cost Estimates

	Unit cost per year ($USD)	Source
Input		
MCAT response	2,687	Information provided by IMPD & SEMHC
Outcome		
EMS event	452	Centers for Medicare & Medicaid Services, Ambulance Fee Schedule Public Use Files (33)
ED visit	1,052	Information provided by SEMHC
Outpatient BH treatment encounter	346	Information provided by SEMHC
Jail booking	106	Research article (34)

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