

Improving Police Response to Mental Health Crisis in a Rural Area

[Final Report]

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Abstract

Due to a lack of community mental health services, police departments in rural communities are often the first and only resource available for individuals experiencing mental health issues. However, police serving as the primary means for individuals with mental illness to access care can lead to increased risk of police use of force, officer safety concerns, and disproportionate involvement of persons with mental illness in the criminal justice system. This report outlines the findings from various investigations conducted over a three-year Bureau of Justice Assistance Smart Policing Initiative-sponsored grant in which three agencies – the Roanoke County (Virginia) Police Department, Roanoke-based mental health provider Intercept Youth Services, and the Center for Evidence-Based Crime Policy at George Mason University – collaborated to better understand and address the dilemma of policing individuals with mental health issues in rural communities. These investigations included: analysis of police calls for service data, officer perception surveys, and mental health “hot spots” (street segments at which mental health-related calls to the police were highly concentrated); an experimental intervention testing the efficacy of a police-mental health provider co-responder model for addressing mental health-related calls for service; and several focus groups with officers and mental health providers. The overarching goal of the project was to improve emergency response by diverting persons with mental illness away from the criminal justice system and connecting them with services in an effort to prevent future harm and recidivism.

Executive Summary

Project description

This final report outlines the various investigations and findings resulting from a Bureau of Justice Assistance (BJA) Smart Policing Initiative (SPI) collaborative research partnership between the Roanoke County Police Department (RCPD), Roanoke-based mental health practitioners (MHP) Intercept Youth Services, and the Center for Evidence-Based Crime Policy at George Mason University (CEBCP-GMU). Since 2016, these three organizations have collaborated on a dynamic research project seeking to understand and improve RCPD's response to calls for service (CFS) involving individuals experiencing mental health (MH) crises in Virginia's primarily rural Roanoke Valley.

Study site

Roanoke County is a rural county located in southwest Virginia. The County is home to approximately 93,400 residents and covers an area of 250 square miles. The County boasts a relatively low crime rate, with the 2018 Virginia Uniform Crime Report Program reporting an overall violent crime rate of only 235.2 incidents per 100,000 residents. RCPD has 142 sworn staff, as well as 16 civilian employees. Although mental health-related (MH-related) calls account for only about 2% of total calls, they disproportionately consume police resources. The average police time spent on MH-related calls is about 2 hours and 28 minutes, compared to 39 minutes for all other calls.

Investigations and interventions

This programmatic collaboration designed and implemented a number of investigations and interventions. **Chapter 2** of this report describes various means – including CFS analysis and an RCPD officer-completed survey – by which the CEBCP-GMU research team sought to understand the scope and quality of mental health issues (MHI) in the study area, as well as RCPD officers' perceptions of and responses to these issues. **Chapter 3** describes the process and results of a spatial comorbidity analysis conducted by CEBCP-GMU of MH-related CFS at micro places in Roanoke County. **Chapter 4** describes the design, implementation, and experimental evaluation of an innovative police-MHP co-responder model in which Intercept clinicians responded to MH-related calls with RCPD officers in order to begin immediate introduction to MH treatment for individuals with MHI. **Chapter 5** describes various process evaluations conducted by the CEBCP-GMU team throughout the research collaboration gauging participants' (including RCPD command staff and officers, Intercept clinicians, and control group subjects from the experimental evaluation discussed in Chapter 4) perceptions of the project and identifying problem areas, opportunities for improvement, and recommendations for future research collaborations.

Key Findings

Chapter 2: The research team's analysis of RCPD CFS data found that MH-related calls for service take significantly longer to resolve than other call types. The research team's CFS analysis also found that MH-related calls accounted for a disproportionately higher share of use of force cases than other call types (for 2014-2016, 3.9% of MH-related calls involved the use of force, while only 0.2% of all other calls involved the use of force, and 20.9% of all use of force reports were attached to MH-related calls). Results from the officer-completed survey highlight

the challenges officers face – including long call clearance times and repeat CFS involving certain individuals with MHI – in resolving MH-related calls in a manner that is both timely and satisfactory to all parties. These challenges may be particularly pronounced in predominantly rural areas such as Roanoke County, where psychiatric facilities and resources are often highly selective, and space is scarce.

Chapter 3: Consistent with the literature surrounding crime concentration, the research team found that MH incidents (measured by CFS data) are extremely concentrated in Roanoke County. It is likely that the combination of the rural environment and the rarity of MH incidents led to a higher concentration of incidents at specific hot spots than prior studies have found. Specifically, the research team found that 100% of MH-related calls clustered in less than 2% of the street segments in Roanoke County annually. The concentration patterns remain when looking at the MH hot spots in a longitudinal fashion, with a very small number of segments (n=63, 0.4% of the total streets) responsible for 44.6% of MH calls.

Chapter 4: The research team designed, implemented, and experimentally evaluated (using a randomized controlled trial) an innovative police-MHP co-responder model in which Intercept clinicians responded to MH-related calls with RCPD officers in order to begin immediate introduction to MH treatment for individuals with MHI. Using an intention-to-treat model (which assumes that individuals inducted into the experimental condition receive the proposed intervention of at least 40 hours of MH treatment), our study found a relative lack of significant findings concerning many of the policing CFS-relevant measures. There were no significant differences in the number of calls and the call length between the control and experimental groups. This relative lack of significant findings may be due to the fact that many individuals inducted into the experimental group did not receive the intervention as intended, with only 33 of the 93 treatment group subjects (35.5%) consenting to and receiving the planned treatment. Comparing the pre- and post-treatment differences in number of calls among experimental group subjects who consented to the treatment and experimental group subjects who declined the treatment is illuminating: those who consented to receive treatment saw a reduction in the number of CFS and MH calls in the post-treatment period, while those who declined treatment saw an increase in CFS and MH calls during the post-treatment period. Such findings highlight the extent to which motivating subjects to accept and continue treatment is essential in increasing the efficacy of the police-MHP co-responder model.

Chapter 5: The relative lack of significant findings of the experimental evaluation of the police-MHP co-responder model (discussed in Chapter 4) contrasts somewhat with many of the overall impressions given by the RCPD command staff and shift officers involved in the experimental intervention. Indeed, regarding the efficacy of the intervention, RCPD command staff and officers, were extremely positive, noting that the project “met its goals even more so than [they] thought it would,” and furthermore reduced the amount of time officers spent responding to MH-related CFS, reduced repeat CFS, and reduced officer stress. In contrast to the positive impressions of RCPD officers and command staff, Intercept clinicians espoused more negative views of the efficacy of the project. These views are somewhat more in line with the findings of the study, with clinicians noting that low client motivation to consent to and fully participate in the treatment, as well as high client attrition over the course of the study, harmed the efficacy of the intervention. Additionally, of the 66 control group subjects enrolled in the study, seven consented to and completed a survey (administered by the CEBCP-GMU research team) gauging their experiences with RCPD officers. Respondents viewed their interactions with officers, for the most part, very positively, with all respondents reporting they were satisfied with

how they were treated by officers during the encounter, and a majority of respondents reporting that they felt officers listened to what they had to say, were polite, treated them objectively (with regards to the individuals' race, gender, age, religion, and sexual orientation), and satisfactorily answered all questions. These responses indicate general citizen satisfaction with RCPD's standard CIT-informed approach to MH CFS. However, given the extremely low response rate (10.6%), these results should be viewed with caution and may not be typical.

Recommendations for practice

From these investigations, we can identify several recommendations for police departments in rural/non-urban areas hoping to improve their response to CFS involving individuals with MHI, including:

- Building relationships with local MHPs and other community institutions (including drug rehabilitation centers and addiction services) to develop best practices for mutual support and effective response (such as a police-MHP co-responder model)
- CIT training that specifically includes scenario-based training for responding to various types of MH-related CFS
- Officer training on best ways to inform individuals with MHI encountered during MH-related CFS of the treatment options available to them in their geographic area
- Identifying MH hot spots and concentrating interventions and resources at these places
- Working with MHPs to identify best practices for motivating individuals with MHI to adopt and continue MH treatment
- Including care-coordination as part of the treatment procedure to ensure that participants continue receiving treatment services
- For agencies implementing randomized controlled trials (RCTs), rigorous and repeated training on the necessity of following RCT procedures

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Chapter 1: Introduction

This final report outlines the various investigations and findings resulting from a Bureau of Justice Assistance (BJA) Smart Policing Initiative (SPI) collaborative research partnership between the Roanoke County Police Department (RCPD), Roanoke-based mental health practitioners (MHP) Intercept Youth Services, and the Center for Evidence-Based Crime Policy at George Mason University (CEBCP-GMU). Since 2016, these three organizations have collaborated on a dynamic research project seeking to understand and improve RCPD’s response to calls for service (CFS) involving individuals experiencing mental health (MH) crises in Virginia’s primarily rural Roanoke Valley. This **introductory chapter** provides background information about the SPI partners and participants, the study setting, and the targeted problem. **Chapter 2** describes various means – including CFS analysis and an RCPD officer-completed survey – by which the CEBCP-GMU research team sought to understand the scope and quality of mental health issues (MHI) in the study area, as well as RCPD officers’ perceptions of and responses to these issues. **Chapter 3** describes the process and results of a spatial comorbidity analysis conducted by CEBCP-GMU of MH-related CFS at micro places in Roanoke County. **Chapter 4** describes the design, implementation, and experimental evaluation of an innovative police-MHP co-responder model in which Intercept clinicians responded to MH-related calls with RCPD officers in order to begin immediate introduction to MH treatment for individuals with MHI. **Chapter 5** describes various process evaluations conducted by the CEBCP-GMU team throughout the research collaboration gauging participants’ (including RCPD command staff and officers, Intercept clinicians, and control group subjects from the experimental evaluation discussed in Chapter 4) perceptions of the project and identifying problem areas, opportunities for improvement, and recommendations for future research collaborations. The **concluding chapter** summarizes the various overall outcomes and findings of the research collaboration.

The SPI Team

The SPI team was led by RCPD Chief Howard Hall with assistance from Assistant Chief James “Jimmy” Chapman and crime analyst Brittini Vineyard. The Intercept Youth Services team was led by clinicians Jennifer Sherman, Natalie Elliott, and Dale Hamman. The CEBCP-GMU team was led by Dr. Sue-Ming Yang and Dr. Charlotte Gill with assistance from graduate research assistants L. Cait Kanewske, Yi-Fang Lu, Muneeba Mazam, and Paige S. Thompson.

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Project Setting and Background

Project setting

Roanoke County is a rural county located in southwest Virginia. The County is home to approximately 93,400 residents and covers an area of 250 square miles. A large part of the population, about 21%, is over the age of 65 and females make up about 51% of the population. Roanoke County's poverty rate rests at about 7% for the area and almost 8% of the population under the age of 65 is without health insurance. The county is rather homogenous: about 88% of residents are White, 6% are Black or African American, 3% are Asian, 3% are of Hispanic or Latino origin, about 2% are of two or more races, and about 1% of the population is American Indian and Alaska Native. Approximately 5% of the population is foreign-born.¹

¹ For context, the Census Bureau reports that for the state of Virginia as a whole: 16% of residents are over the age of 65, females account for 51% of the population, 11% of residents live under the poverty line, and 10% of persons under the age of 65 do not have health insurance. Furthermore, 70% of Virginia residents are White, 20% are Black or African American, 7% are Asian, 10% are Hispanic or Latino, 3% are of two or more races, and less than 1% are American Indian and/or Alaska Native. About 12% of Virginia residents are foreign-born.

RCPD has 142 sworn staff, as well as 16 civilian employees. The County boasts a relatively low crime rate, with the 2018 Virginia Uniform Crime Report Program reporting an overall violent crime rate of only 235.2 incidents per 100,000 residents.² For comparison, the 2018 Uniform Crime Report showed an overall US violent crime rate of 368.9 incidents per 100,000 residents,³ a rate that is 54% higher than the Roanoke County violent crime rate. According to CFS data provided by the RCPD, from 2010 to 2015, the department responded to approximately 550 MH-related CFS per year. Although MH-related calls account for only about 2% of total calls, they have disproportionately consumed police resources. The average police time spent on MH-related calls is about 2 hours and 28 minutes, compared to 39 minutes for all other calls. This number is even higher for MH-related CFS which involve an Emergency Custody Order (ECO) or a Temporary Detention Order (TDO) in which individuals are deemed to be a danger to themselves or others and must be taken into emergency custody or temporary detention in order to connect them with MH services. For such calls, the average response time ranges between three-and-a-half to six hours.

Further, of particular interest is the marked increase between 2013 and 2015 in the amount of time spent by officers responding to ECO/TDO calls. During this period, officer time spent on ECO/TDO calls increased by 45% (from 3 hours, 13 minutes to 4 hours, 40 minutes). This increase can be attributed to a change in Virginia state law requiring officers to remain at the hospital with ECO/TDO individuals for longer periods of time. Additionally, while the number of RCPD CFS pertaining to ECO/TDO, suicide threats, and suicide attempts remained relatively stable between 2010 and 2015, the number of CFS classified as 1096 (i.e. calls in which officers interact with persons in mental crisis who do not pose an immediate threat to themselves or others) increased at an alarming rate from 28 in 2010 to 191 in 2015 (a 582% increase). The following chapters describe the various investigations undertaken by the SPI collaborative team in order to better understand and improve the ways in which RCPD officers respond to MH-related CFS across their jurisdiction.

² Violent crimes include murder, non-negligent manslaughter, rape, and robbery.

³ According to the national Uniform Crime Report, violent crimes include murder, non-negligent manslaughter, rape, robbery, and aggravated assault.

Individuals with mental illness in the criminal justice system

In the last few years, law enforcement agencies across the nation have faced a growing number of calls for service (CFS) involving individuals with mental health issues (MHI). Roanoke County, Virginia is no exception. Although the county is known to have a relatively low rate of crime, as with other small, rural, and mixed-used communities, mental health-related (MH-related) CFS are a primary concern for the Roanoke County Police Department (RCPD), and county jails are often used as temporary holding facilities for persons with MHI.⁴

Previous research shows that MH-related calls account for anywhere between 7 and 31% of all calls to the police nationwide (Abbott, 2011; Baess, 2005; Wilson-Bates, 2008; Deane et al., 1999; Reuland, 2004), but consume a disproportionate amount of police time and resources relative to other calls (Charette, Crocker, & Billette, 2014; Gill, Jensen, & Cave, 2018; Yang et al., 2018). Police officers encounter individuals experiencing MH crisis in various capacities, including as criminal offenders, victims of crime, missing persons, and disorderly persons. Police officers often find themselves playing dual roles as law enforcers and psychiatric social workers with Thompson (2010) describing the police's role nowadays as "society's de facto 24/7 mental health workers" (p.3). When it comes to assisting individuals with MHI, the police serve as gatekeepers to both the criminal justice and MH systems. Increasingly, the police have come to represent the last (and oftentimes only) resort for individuals and families experiencing MHI who have been unable to find help elsewhere (Russell, 2016). As such, the RCPD, like many other agencies across the country, face a real challenge dealing with the rising number of cases related to the mentally ill.

According to a report created by the Substance Abuse and Mental Health Services Administration in 2017, more than 46 million U.S. adults (19%) had a mental illness, while approximately 11 million U.S. adults (4.5%) had a serious mental illness that greatly affected day-to-day living, or caused serious functional impairment. Though most persons with severe MHI do not necessarily pose a threat to others and, when interacting with the police, are often involved only in minor offenses such as disorderly conduct, the extent of their behavioral problems are complex and can often escalate quickly without appropriate treatment. Additionally, the likelihood of violent behavior among individuals with MHI increases

⁴ See Sullivan and Spitzer (1997) for a discussion on the systematic use of jails and prisons as temporary holding facilities for individuals with MHI in rural areas.

dramatically when they also use substances (Clark et al, 1999; Steadman et al, 1998). Such tendencies to violence increase the chances that police will need to use force in an effort to control situations. Nationally, about a quarter of fatal police shootings are related to individuals with MHI (Kindy and Elliot, 2015). This figure is even higher in the Commonwealth of Virginia where about 40 percent of the fatal police shootings since 2010 have involved individuals with MHI (Harki, 2016).

Currently, the American criminal justice system is grappling with a high number of individuals with MHI and the best way to respond to individuals experiencing MH crisis. The deinstitutionalization of the mentally ill beginning in the 1960s, along with a pervasive "tough on crime" mentality, indirectly re-institutionalized a significant proportion of the mentally ill inside the criminal justice system (Manderscheid, Atay, & Crider, 2009). According to a 2006 Bureau of Justice Statistics (BJS) analysis, 24% of state prisoners report a recent history of mental illness, as do 21% of jail inmates and 14% of federal prisoners.

Rural communities' lack of mental health resources

Contrary to some misconceptions, the influx of individuals with MHI in correctional facilities is not only an urban phenomenon. As Mohatt et al (2006) note, the shortage of mental health professionals (MHP) in rural areas makes it harder for people in need to access comprehensive services, further stigmatizing individuals with MHI. Compounding the problem, individuals with MHI in rural areas may not have access to public or private health insurance, or their capacity to obtain such assistance may be limited. As such, with few other options, individuals with MHI in rural areas disproportionately rely on emergency responders (including the police) to access MH care.

The lack of readily available MH services and resources within communities has pushed the police to the forefront of the battle against mental illness. In this battle, the police utilize three primary approaches: Police-based specialized police response (Crisis Intervention Programs, CIT); Police-based specialized mental health response; and mental health-based mental health response (Deane et al., 1999). The RCPD follows the first approach and has incorporated CIT programs into their training curriculum. CITs consist of specially trained officers who create collaborative relationships with MHP, both in their departments and in the community. This program shifts from the traditional law enforcement model to a more service-oriented policing approach (Watson et al, 2008). The RCPD has invested heavily in training its

personnel and currently has CIT-trained all 140 officers on the force. Starting in 2014, CIT was added to the entrance-level training curriculum to ensure that all new officers receive this training. However, MH-related calls continue to consume a disproportionate amount of police time and resources that could otherwise be allocated towards additional crime prevention/intervention efforts.

Chapter 2: Exploring police response to mental health calls in a nonurban area: a case study of Roanoke County, Virginia

Introduction

Among the first tasks undertaken by the Center for Evidence-Based Crime Policy (CEBCP-GMU) research team were to understand the scope and quality of mental health-related (MH-related) issues in the study area and Roanoke County Police Department (RCPD) officers' perceptions of and responses to these issues. Using calls for service (CFS) data and an officer-completed survey,⁵ the research team examined the challenges that RCPD officers face when responding to MH-related CFS. The research team subsequently published the results of this initial investigation in a 2018 issue of the academic journal *Victims and Offenders* (full citation included below); the following information provided in this chapter is adapted from this publication. As previously discussed, most prior studies examining the policing of individuals with mental health issues (MHI) use data from large urban cities. However, questions remain as to whether these results can be generalized to non-urban or rural police departments. This article attempted to fill this void by assessing CFS data to provide a comprehensive picture of MHI and policing in this setting. In addition to illustrating the extent of MHI in this jurisdiction, the research team also examined officers' perceptions of the options available to them when responding to MH-related calls, and how job satisfaction is impacted by the perceived ability to help the community solve MH-related problems in the more service-oriented context of a non-urban agency.

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⁵ This survey was adapted from a survey used for other police/researcher collaborative projects carried out by CEBCP-GMU.

⁶ Because this chapter is adapted from a previously-published article, we did not incorporate some of the substantive edits suggested by reviewers. However, we appreciate these suggestions and will take them into account for future publications.

Methodology

Data Description

Police Data. The CEBCP-GMU research team obtained calls for service (CFS) data from RCPD to better understand the types of problems RCPD faces. RCPD has five call types that are classified as MH-related: ECO/TDO (Emergency Custody Order/Temporary Detention Order), Mental Health (“1096”),⁷ Mental Health with Weapon, Suicide Threat, and Suicide Attempt. We refer hereafter to all of these call types collectively as “MH-related calls.” Our analysis is based on CFS data from the years 2014–2016. The research team primarily used SPSS statistical software to quantitatively analyze the CFS data.

RCPD also compiles a separate use of force database including incidents reported by individual officers. Since the use of force report is only available to us after 2014, our use of force analysis contains information from 2014 to 2016. RCPD defines use of force as physical effort on the part of a police employee that is designed to assist the employee in gaining control of the actions or behaviors of a person or persons.⁸ According to RCPD command staff, the range of responses may include advice, warning, persuasion, verbal encounters, physical contact, use of less-lethal weapons, and deadly force. Together, the CFS and the use of force data provide a picture of the challenges RCPD officers face in encounters involving individuals with MHI.

Officer Survey. The CEBCP-GMU team developed a survey to assess RCPD officers’ experiences responding to MH-related calls and their satisfaction with the current options available for handling these calls. The survey was administered in July 2016 to all patrol and command staff in the agency. Officers completed the survey on paper during daily roll call. Survey questions were quantitative and organized around themes such as officers’ available options for responding to MH-related calls, the time and location from which MH-related calls most-often originated, and officers’ attitudes towards citizens experiencing MH crises. Demographic information included division assignment, tenure with the police department, and departmental rank. However, for confidentiality reasons the research team did not collect data on

⁷ The code 1096 was developed by RCPD to differentiate general MH-related calls from ECO/TDO, Suicide Threat, or Suicide Attempt calls.

⁸ Complaint of pain resulting from handcuff application has been excluded from the use of force analysis. While officers are required to file a Use of Force Report for these incidents, they are not included in the department’s Use of Force database.

respondents' age, race, or gender. RCPD officers are relatively homogeneous, so specific demographic questions may potentially identify individual officers.

Sample Description. In total, the research team collected 73 completed surveys. However, data from only 71 of these surveys are included in the present analysis; two responses were removed due to those officers being assigned to special operations positions within the department. These responses were excluded because special operations officers are unlikely to have had much recent or consistent contact with individuals experiencing MH crises. The remaining 71 responses are from officers in the uniform division.⁹ The findings from the survey provide information on officers' perceptions responding to individuals with MHI in their community, as well as the departmental context in which decisions are made regarding MH-related calls. As noted above, the survey collected demographic information pertaining to officers' rank and tenure. There are six different ranks for RCPD uniformed officers: Police Officer, Police Officer II, Police Officer III, Police Officer IV, Sergeant, and Commander. The differences between each of the ranks include a combination of law enforcement experience and education. In order to advance to positions higher than Police Officer (an entry-level rank), officers must go through promotional procedures where eligibility is determined according to years of experience, education level, and having been rated as at least "competent" in annual performance evaluations. In addition, to demonstrate the skills required for the higher-ranking positions of Police Officer II-IV and Sergeant, officers must take a written exam. Among officers who responded to our survey, 38.6% held a rank of Police Officer, 35.7% held a rank of Officer II, 10% held a rank of Officer III, 1.4% held a rank of Officer IV, 10% held a rank of Sergeant, and 4.3% held a rank of Commander.¹⁰ The officer survey included four categories for officer tenure with the following distributions: less than one year (11.3%), more than one year but less than five years (40.8%), more than five years but less than ten years (19.7%), and more than ten years (28.2%). The majority of the officers who responded to our survey had worked in the

⁹ According to the sample schedules given to us by RCPD, we estimate there were 80 separate uniform officers on shift (including supervisors) across three platoons at the time the survey was distributed and completed (Platoon A = 26, Platoon B = 31, Platoon C = 23). Thus, based on this parameter, the response rate is approximately 89%. While the sample schedules used to approximate this rate showed the number of officers on duty during March-April 2016 (several months before officers completed the survey), our understanding is that officer schedules do not change significantly over time. Thus, we believe the estimated response rate – 89% – closely approximates the actual response rate.

¹⁰ Though 71 total officers responded to the survey, one individual did not answer the question "What is your rank?" As such, the rank of one responding officer is not known.

department for more than one year, but less than ten years. RCPD officers participate in Crisis Intervention Team (CIT) training, which uses a scenario-based curriculum that teaches officers to recognize the signs of MH crisis in individuals, and to use appropriate techniques to deescalate the situation and assess the needs of the individual. Among our respondents, 83.1% had received any CIT training, and among that group 76.1% received the full 40-hour training.

Results

Analysis of MH-Related Calls for Service

The RCPD received a total of 39,549 calls for service in 2014. 546 were MH-related, accounting for 1.4% of all calls for service. The total number of MH-related calls increased from 546 to 558 incidents between 2014 and 2016, primarily driven by an increase in ECO/TDO calls. These calls increased from 286 in 2014 to 300 in 2016 (see Table 1).

While MH-related calls account for just a fraction of total calls, Table 1 shows the extent to which they disproportionately consume police resources. The time spent on MH-related calls increased substantially, from about 3 hours in 2014 to almost 4 hours in 2016. This increase was particularly pronounced in cases that required police to seek an ECO or TDO, which occurs when officers deem the individual unable to care for themselves or to be a possible danger to themselves or others. The time spent on these calls increased by 38.2% between 2014 and 2016. It is also noteworthy that ECO/TDO calls were the most common type of MH-related calls, accounting for 53.5% of these calls between 2014 and 2016.

To gain a better understanding of how MH-related calls compare to other calls for service, the research team compared five main categories of non-MH-related call types to MH-related calls in Table 1. During 2016, domestic-related calls (1 hour, 29 minutes, and 21 seconds, 1,278 incidents), property crime (36 minutes and 18 seconds, 7,243 incidents), violent crime (2 hours, 7 minutes, and 3 seconds, 682 incidents), calls pertaining to disorder (31 minutes and 55 seconds, 7,597 incidents) and drug and alcohol-related incidents (58 minutes and 22 seconds, 732 incidents) all took less average total time per incident than MH-related calls (3 hours, 52 minutes, and 45 seconds, 558 incidents). This, once again, highlights the disproportionate amount of RCPD time and resources consumed by MH-related calls for service.

Table 1. Average total time spent on call type category by year

	Time, hh:mm:ss (Number of calls)			
	2013	2014	2015	2016
Mental health-related	2:32:49 (490)	2:50:54 (546)	3:25:30 (553)	3:52:45 (558)
<i>ECO/TDO</i>	3:33:05 (285)	4:26:58 (286)	5:17:22 (301)	6:09:01 (300)
<i>Mental Health Call (1096)</i>	0:32:20 (136)	0:25:07 (182)	0:29:30 (190)	0:37:45 (188)
<i>Suicide Threat</i>	1:15:43 (32)	1:14:18 (33)	1:51:08 (34)	2:29:33 (30)
<i>Suicide Attempt</i>	3:21:22 (37)	3:30:02 (45)	4:29:26 (28)	2:37:37 (40)
Domestic-related	1:15:04 (1,533)	1:28:18 (1,310)	1:22:24 (1,459)	1:29:21 (1,278)
Property Crime	0:35:54 (6,900)	0:36:13 (7,232)	0:39:13 (7,223)	0:36:18 (7,243)
Violent Crime	1:24:24 (615)	1:34:26 (558)	2:27:50 (593)	2:07:03 (682)
Disorder	0:36:09 (6,352)	0:31:00 (6,684)	0:32:01 (7,372)	0:31:55 (7,597)
Drug and alcohol-related	0:39:04 (982)	0:54:53 (912)	0:55:56 (773)	0:58:22 (732)

Officers' Encounters with Individuals with MHI

Turning to the data from the officer survey, the research team first examined officers' perceptions of how frequently they encountered individuals with MHI. More than 80% of officers reported that they encounter individuals with MHI at least once a week (Table 2). This frequency seems high when compared with numbers reported in objective calls for service data (see Table 1 above). Though we cannot directly compare CFS data to officer survey results, perhaps the high rate reported by officers indicates the extent to which resource-draining and

potentially-traumatic MH-related calls for service cause officers to overestimate their prevalence. The research team also explored the relationship between officer rank and frequency of encounter with individuals with MHI (Table 2).¹¹ The majority of the respondents who reported daily encounters with individuals with MHI have a rank of Officer I or Officer II. Supervisors (Sergeants and Commanders) reported less frequent (though still substantial) encounters than officers of lower rank.¹² These results suggest that officer perceptions are highly related to their daily patrol assignments (supervisors generally respond to fewer CFS than patrol officers), and that junior officers tend to be more overwhelmed in interactions with individuals with MHI than more senior officers. Conversely, this mis-match between our survey data and the calls for service data may indicate that officers often encounter individuals with MHI during non-MH-coded calls, thus highlighting the degree to which officers must be prepared to interact with those with MHI even when responding to other types of calls (such as domestic disturbance, public intoxication, or traffic calls).¹³

Table 2. Frequency of encounters with individuals with mental health issues

	Frequency (%)
Every day	11 (16.2)
Several times a week	32 (45.1)
Once a week	15 (22.1)
Several times a month	7 (11.3)
Once a month	2 (2.8)
Once every few months	2 (2.8)
Rarely/never	1 (1.4)
Total	71 (100.0)

¹² 9 of the 10 supervisors surveyed reported that they encountered individuals with MHI at least once a week, while one responded that they encountered individuals with MHI once every few months.

¹³ Calls involving individuals with MHI may be coded by officers using non-MH-related call types for a number of reasons. For instance, though a domestic disturbance call may involve individuals with MHI, the incident which officers are responding to is best categorized as a domestic disturbance. However, because poor MH is often a contributing factor to a number of crimes, officers often encounter individuals with MHI even when responding to non-MH-related calls.

Use of Force in MH-Related Calls

Another important concern in police responses to individuals with MHI is the risk that force may be used. Table 3 shows that the number of calls for service involving force increased between 2014 and 2016, although there was a slight decline in the number of MH-related calls involving force during this time period.¹⁴ Nonetheless, Table 3 indicates that, although the overall risk of use of force is relatively low, it is disproportionately higher in MH-related calls compared to calls overall. Across 2014 – 2016, 64 of 305 total use of force incidents (20.9%) involved a MH-related call, even though MH-related calls comprised just 1.3% of all CFS. Furthermore, from 2014 – 2016, 3.9% of all MH-related calls involved police use of force, compared to 0.2% of calls overall.

Table 3. Use of force analysis for general police calls for service and mental health-related calls

	2014	2015	2016
Total calls for service	39,549	44,243	44,742
Total mental health-related calls per year (% of total calls)	546 (1.4)	553 (1.3)	558 (1.2)
Total calls involving UOF (% of total calls)	87 (0.2)	103 (0.2)	115 (0.3)
Total mental health-related calls involving UOF (% of mental health calls)	21 (3.9)	25 (4.5)	18 (3.3)

Note: Complaint of pain resulting from handcuff application has been excluded from the use of force analysis; UOF: Use of force.

The findings from the use of force data analysis are corroborated by officers' responses to the survey. The research team asked the officers whether they had been afraid or felt unsafe when responding to MH-related calls. The findings show that 55 out of the 71 officers surveyed (77.5%) reported ever being in fear for their own or their partner's safety during an encounter with someone with MHI. To some extent, the feeling appears to be mutual given that 85.9% of officers reported responding to calls in which the individual with MHI appeared to be afraid of

¹⁴ We have confirmed with the RCPD's crime analyst that complaint of pain resulting from handcuff application has been excluded from the use of force analysis.

officers. Furthermore, 87.3% of officers said they had ever used force during an encounter with an individual with MHI.¹⁵ While we do not know whether the use of force is the consequence or cause of officer fear, the high likelihood of officers using force while responding to MH-related calls concurs with the aforementioned finding that officers frequently respond to calls that require an ECO or TDO (situations which commonly require officers to forcibly restrain individuals) when dealing with individuals in MH crisis.

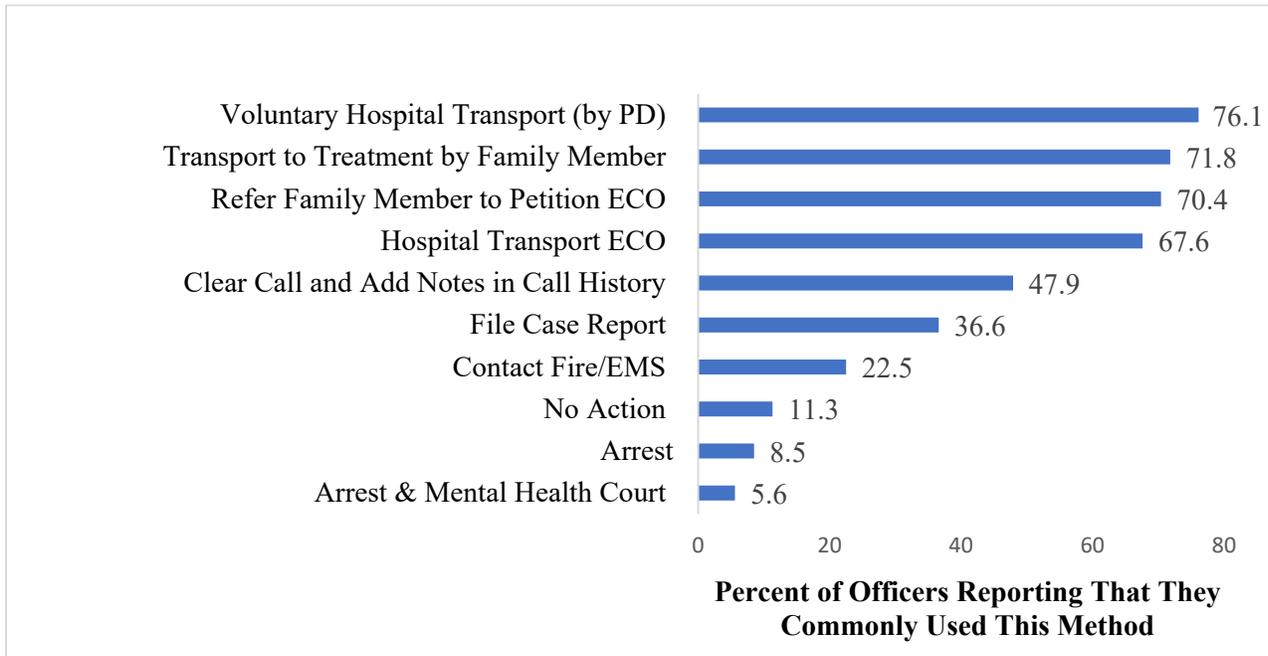
Options Available for Responding to MH-Related Calls

Given the finding that MH-related calls consume much more police time than other types of calls, the research team was interested to learn how officers typically responded to and resolved these resource-intensive calls. The survey asked officers to identify the most common ways in which they resolve calls involving individuals with MHI. The top four most common responses involved voluntary transport to a treatment facility (either by the officer or by a family member) or involuntary treatment via ECO (secured by the officer or a family member; see Figure 1). For instance, 76.1% of officers reported that they often resolved encounters by accompanying individuals to the hospital for voluntary committal. About 70% of officers reported using ECO directly (officer requested ECO), or indirectly (officer recommended that family request ECO) when responding to MH-related calls. Interestingly, fewer than 10% of officers reported that arrest was a common means of responding to such calls.¹⁶

¹⁵ As discussed earlier in this chapter, the RCPD includes a wide range of actions under “use of force,” including advice, warnings, persuasion, verbal encounters, physical contact, use of less-lethal weapons, and deadly force.

¹⁶ The original question asks: “When you encounter individuals with mental health issues, what is the most common way you resolve the call?” If officers originally ranked an option as 1-4, their answer was recoded as COMMON. If officers originally ranked an option as 5-11, their answer was recoded as UNCOMMON.

Figure 1. Common responses to mental health-related calls for service



Note: Common responses were defined by the top four methods that are frequently used by officers when responding to mental health related calls.

Officers' Perceptions of CIT Training

Outside the more restrictive options of ECO, TDO, and arrest, the Crisis Intervention Team (CIT) is one option officers may utilize when responding to MH-related calls. When asked about their opinions of the CIT training they received, 76.6% of the participants who had received the training agreed that it increases the likelihood that officers will refer individuals in crisis to MH services. The majority (66.7%) of the trained officers also believed that CIT-trained officers are better able to identify individuals with MHI. A little over half (58.3%) of the CIT-trained officers agreed that CIT-trained officers are more effective at de-escalating events involving individuals with MHI than non-CIT-trained officers, and exactly half (50%) of the CIT-trained officers reported that CIT-trained officers are less likely to arrest people with MHI if they commit minor offenses.¹⁷

The research team also asked the officers what type of information is useful to them when responding to MH-related calls. Almost all (90.1%) of the officers believed that their own prior experience with the individual is the most helpful type of information, while 78.9% of

¹⁷ This observation is supported by several additional studies finding that training officers in CIT strategies can translate to reduced arrests involving individuals with MHI (see Franz & Borum, 2011; Watson et al., 2008).

officers stated that other officers' experience with the individual is very helpful. Only about half of the officers responded that case reports or information from other units is very helpful in aiding their response to MH-related calls.

Officers' Satisfaction with Available Options

Another focus of the study was to examine the impact of calls involving individuals with MHI on officers' perceptions and job satisfaction. Despite the fact that police responses to MH-related calls are time-consuming and involve a higher risk of use of force, a large majority of officers still hold very positive attitudes towards those with MHI and believe both that appropriate treatment can help individuals with MHI (87.1%), and that first responders have a duty to help individuals dealing with MHI access information and resources (88.4%). However, only 50.7% of officers indicated that they were satisfied with the options available to them (at the time of the survey) for resolving calls that involved individuals experiencing MHI.¹⁸ Officers cited a number of reasons for being dissatisfied with the options available to them, including the disproportionate amount of time spent on ECO/TDO calls and the fact that the current system did little to actually treat or ameliorate individuals' MHI.

Discussion

The present study contributes to the understanding of the challenges police face in responding to individuals with MHI, particularly in non-urban areas. Due in part to both the deinstitutionalization of individuals with MHI beginning in the 1960s and "tough on crime" policies that direct this population away from community services and into contact with the criminal justice system, recent decades have seen an increase in the number of individuals with MHI who have repeated contact with police officers (Manderscheid et al., 2009). This issue is especially pronounced in rural police departments where police officers are often the first (and sometimes only) resource for individuals with MHI (and their families) who are experiencing a MH crisis (Russell, 2016). Previous research shows that because MH-related calls are often time-intensive (Reuland, 2004) and more likely to result in police use of force (Rossler & Terrill, 2017), they disproportionately consume police resources and place great strain on police officers and departments. The research team's analysis of CFS data from the primarily suburban-rural Roanoke County Police Department concurs with this previous research, finding that MH-related

¹⁸ Officer satisfaction was measured using the question "Are you satisfied with the current options available to you for resolving calls that involve an individual with mental health issues (Yes or No)?"

calls for service take significantly longer to resolve than other call types (in 2016 MH-related calls took an average of 233 minutes, while other calls types¹⁹ averaged between 36 and 127 minutes). The research team's CFS analysis also found that MH-related calls accounted for a disproportionately higher share of use of force cases than other call types (for 2014-2016, 3.9% of MH-related calls involved the use of force, while only 0.2% of all other calls involved the use of force, and 20.9% of all use of force reports were attached to MH-related calls).

Results from the police survey highlight the challenges officers face in resolving MH-related calls in a manner that is both timely and satisfactory to all parties. These challenges may be particularly pronounced in predominantly rural areas such as Roanoke County, where psychiatric facilities and resources are often highly selective, and space is scarce. Furthermore, changes to state laws in Virginia that govern procedures for dealing with people subject to Emergency Custody or Temporary Detention Orders (ECO/TDO) have added another layer of complexity to the police's already difficult task, especially given that ECO/TDO calls comprise the majority of all MH-related calls for service. While the specifics of the law may be unique to Virginia, the substantial amount of time police spend resolving MH-related calls or supervising temporary custody of people who pose an immediate danger to themselves or others reflect challenges that police face around the country. These difficulties are exacerbated by inadequate resources "upstream" in the MH system, which can lead to a "revolving door" situation in which people with MHI are released from hospital with little to no treatment and police are repeatedly called to assist them. The police are typically the first responders in these situations but are rarely equipped to deal with the complex needs of the population they serve.

Although MH-related calls to RCPD accounted for a substantial amount of police time relative to other calls, the actual frequency of these calls was low, accounting for only 1.3% of all calls to the police during the time period of our study. However, the officer survey revealed that a very high proportion of entry-level officers believed that they encountered individuals with MHI frequently. As discussed previously, it is possible that the complexity of these calls coupled with the frustration and stress experienced by the responding officers may make these calls more "memorable" and lead officers to believe that they occur more frequently than they actually do.

¹⁹ Including domestic, property, violent, disorder, and drug- and alcohol-related crimes

The disproportionately large amount of time officers spend on MH-related calls may also factor into this perception. However, the research team was not able to code for other types of incidents in which the police encounter individuals experiencing MHI; for example, cases in which people with MHI are the perpetrators or the victims of a crime. As such, it is also possible that officers are frequently encountering individuals with MHI during calls not included in our analysis. This speaks to the breadth of encounters in which the police interact with this population and highlights the need for better tracking of MH-related calls in police departments, such as a MH “flag” that can be attached to calls in the computer-aided dispatch (CAD) system regardless of how the call is classified. This type of data tracking requires substantial thought and planning to avoid labeling or stigmatizing any individuals with MHI. For instance, should the flag be based on the officer’s perception of an individual with MHI, or actual information about a diagnosis? How should this information be recorded and accessible to officers? This decision could lead to over- or under-counting of the range of circumstances in which someone might be experiencing a MH crisis. We discuss this issue further in relation to RCPD’s data systems in the Limitations section below.

While the actual number of use of force incidents resulting from MH-related calls was low, MH-related incidents comprise a disproportionately high number of all use of force reports. For 2014-2016 MH-related calls made up 1.3% of all calls for service but accounted for 20.9% of use of force reports. The survey results indicate that officers have used force disproportionately in an encounter involving a person with MHI, and also reveal high levels of fear on both the part of officers and individuals with MHI (as perceived by officers who interacted with these individuals). It could be that when officers are more fearful during encounters with individuals with MHI, they are more likely to use force. Furthermore, individuals with MHI may be more fearful of police, which may result in more resistance to officers’ actions, thus leading officers to use more extreme measures to resolve the situation (Johnson, 2011). While the survey does not allow us to assess the possible causal relationships between fear (of both officers and individuals with MHI) and use of force, we can speculate that the responses are related in a way that is meaningful to police encounters with individuals with MHI.

As we have discussed, the limited options available to officers when responding to calls, as well as the high degree of fear and risk of force inherent in some encounters with individuals

with MHI, may result in officers' dissatisfaction. The "revolving-door" phenomenon creates a further heavy burden on officers. Although CIT-trained officers felt that the CIT training was helpful, a substantial minority of the survey respondents (49.3%) remained dissatisfied with the options available to them for resolving MH-related calls. As mentioned earlier, officers who serve rural communities are more likely to experience stress and job dissatisfaction when they cannot provide appropriate assistance (Lord, 1996; Lurigio & Skogan, 1994). Given that a very high percentage of officers who completed the survey (87%) felt a strong duty to help individuals with MHI and their families (see also Engel & Silver, 2001; Kisely et al., 2010), it must be extremely frustrating for officers to be unable to resolve situations in effective ways.

Given prior research on the role of fear and the potential for misunderstanding in MH-related calls, there may be further opportunities within the context of CIT training or the development of co-responder models to enhance police understanding of the complex range of behavior exhibited by individuals with MHI and the circumstances under which MH-related calls can escalate. Future research should address how innovative methods such as mobile crisis teams and other co-responder models impact police officer satisfaction, as well as effective resolution for the individual in crisis, and attempt to evaluate these models in rural communities where possible. Based both on prior research (Krameddine et al., 2013; Krameddine and Silverstone, 2015) and officer feedback gleaned through our survey, successful CIT training should also incorporate role-playing scenarios that specifically address situations where officers need to make difficult decisions regarding use of force when responding to MH-related calls.

As discussed above, the challenges of policing individuals with MHI may be detrimental to officer stress and job satisfaction. However, the more community- and service-oriented nature of non-urban police departments presents an opportunity for officers to be creative and use discretion in their responses to individuals with MHI, especially in lower-level cases that take up police resources but do not escalate into use of force or ECO/TDO situations. This in turn may improve officers' satisfaction with available options and reduce feelings of "helplessness." Again, exactly what this looks like in rural or non-urban communities with more limited resources is difficult to predict, but it could include proactive visits to individuals with MHI (especially frequent callers) and their families outside of contact during a crisis call, perhaps in collaboration with an MHP, to understand their needs and explore options for assistance. It may also involve building relationships with local service providers and other community institutions

that may support people with MHI (such as schools, community centers, and places of worship) to develop best practices for mutual support and effective response.

Limitations

This study has several limitations. As noted above, police departments face substantial challenges in classifying and reporting on the full range of MH-related incidents. In the past few years, RCPD began requiring officers to add a MH flag to the disposition code when closing calls in which they suspect the individual is dealing with MHI, and to change the call type to 1096 if the officer determines that MH is the source of the problem, but the call is not initially reported as such. However, this rule has not been systematically enforced, and it may also be challenging for officers to consistently change the call type when a variety of other factors are at play (for example, if a crime was committed by the person with the MHI that needs to be documented). As a result, our CFS analysis may underestimate the number of calls with a MH component. As we have discussed, this may account for the higher perception of incidents involving individuals with MHI reported by officers who responded to the survey, relative to the recorded number of MH-related calls. While RCPD have been collecting use of force data for a long period of time, they have only started recording MH related information in the use of force incidents since 2014 (based on officers' self-report). Thus, it is possible that the use of force data are not as comprehensive as they could be, though we are unable to cross-validate with other external data.

Another limitation of our analysis is the small number of surveys. Despite its non-urban setting, RCPD is a large department in both its geographic size and number of sworn officers (approximately 140), so our survey only reached about half of the department. However, our target participants for the survey were those officers who respond to calls for service and have direct experience interacting with individuals with MHI during patrol. By that standard, RCPD's Assistant Chief estimates that our survey was completed by more than 80% of relevant personnel. We are therefore confident that the survey results are representative of RCPD officers' overall experiences responding to MH-related calls and their satisfaction with available options for resolution. On the other hand, while our results provide valuable insights into the challenges police face in non-urban areas when encountering individuals with MHI, the results may not be generalizable to other agencies with different demographic compositions, or to the

large number of law enforcement agencies in the United States with fewer than ten officers and even more limited resources (Reaves, 2015), many of which are concentrated in rural areas.

Conclusion

Despite its limitations, this study provides insight into the nature of MH-related calls and the challenges police face in dealing with these calls in the unique context of a police agency serving a large, predominantly rural community. In many ways, the experiences of officers in this agency are comparable to those of officers in urban departments, but the ability to provide adequate resources to individuals with MHI in a timely manner can be especially challenging. We hope that these findings inspire further research into the development of effective co-responder models and enhancements to CIT training that can be adapted for implementation in a diverse range of agencies across the United States, as well as more studies of the effects (both positive and negative) of this difficult but important work on police officers themselves.

Chapter 3: Comorbidity analysis of mental health calls at micro places

Introduction

This chapter describes the process and results of a spatial comorbidity analysis conducted by Center for Evidence-Based Crime Policy (CEBCP-GMU) research team of mental health (MH) and mental health relevant (MHR) calls for service (CFS) at micro places in the jurisdiction covered by the Roanoke County Police Department (RCPD). MH calls are those calls classified by the RCPD as explicitly involving persons experiencing mental health issues (MHI). MHR calls are those calls not classified by the RCPD as explicitly MH-related, but found (by examining narrative CFS data) to contain MH components (such as a victim or perpetrator displaying MH symptoms). In short, this analysis sought to determine the extent to which MH and MHR calls were clustered within small, concentrated areas across Roanoke County, as well as the extent to which both call types co-occurred at such micro places.

The information in this chapter is adapted from a manuscript in progress authored by Sue-Ming Yang, Sangjun Park, Yi-Fang Lu, and Charlotte Gill (all affiliated with CEBCP-GMU).

Literature Review

The recent developments in research on crime patterns and concentration at micro places provides a helpful direction with respect to pinpointing the areas where MHI tend to occur (Gill, Wooditch, & Weisburd, 2017; Sherman, Gartin, & Buerger, 1989; Vaughan, Hewitt, Andresen, & Brantingham, 2016; Weisburd, Bushway, Lum, & Yang, 2004; Weisburd, Groff, & Yang, 2012; Wheeler, Worden, & McLean 2016; White & Goldberg, 2018). Particularly, studies done by White and Goldberg (2018) and Vaughan et al. (2016) both show that MH-related calls for service are extremely concentrated. Though both studies were based on data collected from major cities, the findings indicate that a place-based approach could be fruitful in understanding the distribution of MHI and offering avenues for effective interventions by police and service providers.

Another important direction of studies focusing on geographic distributions of mental health incidents is the attempt to identify other co-existing patterns of MH with other problems. For instance, Vaughan et al. (2016) examined calls that involved “emotionally-disturbed persons” (EDP) and their association with non-EDP related calls in Vancouver, Canada and

concluded that there were very low spatial associations between the two types of calls. Specifically, they concluded that while calls involving EDP are highly concentrated, places that are high in these calls do not necessarily have other types of problems. Similarly, White and Goldberg (2018) examined MH calls in Baltimore and the results show that the spatial association between MH calls and other types of calls (i.e., drug calls and violent calls) is relatively modest.

Though neither Vaughan et al. (2016) nor White and Goldberg found a salient spatial association between MH-related calls and other types of problems, we believe this direction warrants more examination for several reasons. First, prior research that examined MH distributions tends to use recorded information of the calls for service (CFS) data as the main data source. Unlike incident and arrest reports, CFS have not been verified by any sources, may be unfounded, and the call type may be changed before the final disposition, especially if the MH component is unclear. As such, it is very likely that many more CFS contain MH elements than a few MH related call types represent (Gill, Jensen, & Cave, 2018). Second, police may not update the call types after arriving at the scene and discovering that the call was actually related to MHI, or MHI may be related to another recorded issue such as assault. Therefore, relying on what have been recorded in the CFS data alone is likely to underestimate the true extent of MH-related incidents. However, the wealth of information in CFS data, while often unverified, could also provide a shorthand to signal places that are in need of MH resources when other frequently comorbid issues are identified. The current study expands prior research by identifying a set of mental health-relevant (MHR) calls based on the detailed descriptions recorded in police CFS dispatch narrative data. The research team then cross-check the associations between MH calls and specific types of MHR calls by using two separate methods, Spatial Point Pattern Test (SPPT) developed by Martin Andresen (2009) and Group-Based Trajectory Analysis developed by Daniel Nagin (1999; 2005), to help identify specific call types that could help signal the existence of MH problems at the micro-geographic level.

Methods and Data

Data

Police data. The research team obtained calls for service (CFS) data from RCPD to help us understand the types of problems RCPD faces. RCPD has five call types that are classified as MH-related: ECO/TDO (Emergency Custody Order/Temporary Detention Order), Mental Health

(“1096”),²⁰ Mental Health with Weapon, Suicide Threat, and Suicide Attempt. We refer hereafter to all of these call types collectively as “MH calls.” Our analysis is based on CFS data from the years 2013–2017. The total number of calls per year ranges from 65,003 to 69,846. In total, there were 399,108 calls during the study period. The research team geocoded the CFS data and aggregated them to the street segment level by year. Calls from intersections accounted for 19% to 25% of all CFS over five years. More than 80% of these calls were traffic-related each year. Only 23% of calls at intersections over the entire 5-year period were MH-related. Thus, we decided to follow the prior research (Weisburd et al., 2004; Weisburd et al., 2012; Gill et al., 2017) and only analyzed calls that originated from street segments. The research team also excluded administrative calls, such as deliver message, paper pickup, or paper service.

Removing intersections and administrative calls left 261,972 calls over a 5-year period from 15,356 street segments for analysis. The CFS data also include the call time, the address, latitude, longitude, source, the incident number, the call type, and the dispatch time of each call. RCPD uses more than 120 call classification codes, which we classified into 16 broader categories such as violent, property, disorder, domestic, juvenile, mental health, animal, fire and rescue, traffic, and other. Table 4 shows the total numbers of MH calls, MHR calls and all CFS from 2013 to 2017. About 1% of all CFS were identified as MH calls by police in each year.

Table 4. Descriptive Analysis of Mental Health and Mental Health Relevant CFS

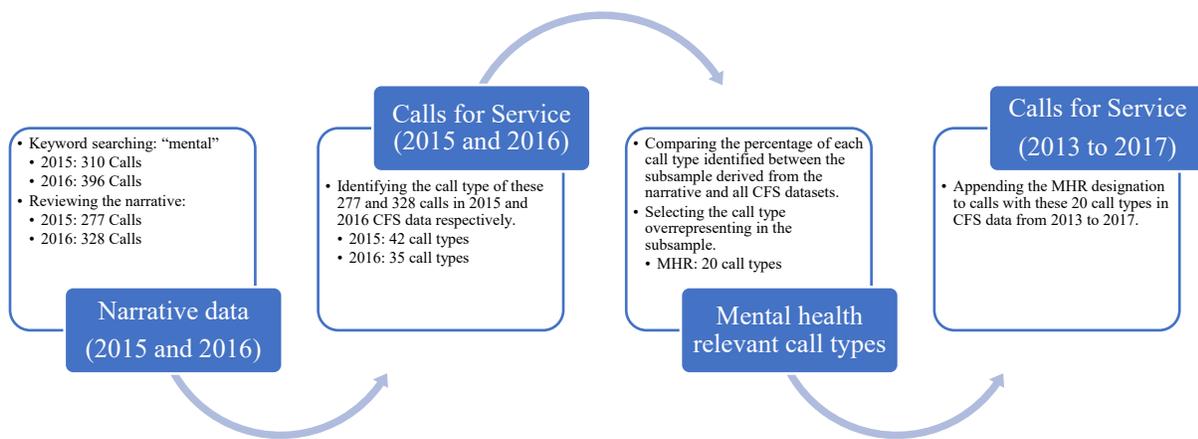
	2013	2014	2015	2016	2017
Mental Health	474 (.87%)	540 (1.03%)	539 (1.00%)	539 (1.02%)	409 (.84%)
Mental Health Relevant	8,448 (15.66%)	8,639 (16.48%)	10,380 (19.27%)	10,426 (19.72%)	10,770 (22.03%)
Total CFS	53,944 (100.0%)	52,428 (100.0%)	53,862 (100.0%)	52,859 (100.0%)	48,879 (100.0%)

Mental health relevant (MHR) calls were specified by the researchers. The research team relied on CFS narrative data for identifying MHR calls. The CFS narrative data include the actual conversations between dispatch and callers or officers and time stamp of the initiation of each call. While it provides comprehensive information about each call, the content included in the narrative data could be overwhelming. Thus, it is important to employ a feasible strategy to

²⁰ The code 1096 was developed by RCPD to differentiate general MH-related calls from ECO/TDO, Suicide Threat, or Suicide Attempt calls.

help identify potentially useful information from a haystack. In order to do so, we searched for the word “mental” in the dispatch CFS narratives from 2015 and 2016 and examined the most common call types in which the term appeared, reading the narrative of these selected calls to identify whether they possibly contain a MH component, and determining which call type should be included in MHR pool at last. After keyword searching, there were 310 and 396 calls in 2015 and 2016 respectively. We located potential MHR calls if the information indicated the possibility of any MH components.²¹ This process yielded two subsamples with 277 and 328 calls in two different years. We then identified all call types of these calls in two subsamples in CFS data. The process used to identify MHR calls is illustrated in Figure 2. It is important to note that while those calls indicate a very high likelihood of MH components, none of them would have been considered in the analysis if we solely followed the classification of CFS data.

Figure 2. The process of identifying MHR call types



In total, we identified 42 call types in 2015 and 35 call types in 2016 that include calls with MH components. Following a standard procedure, 20 call types were specified as MHR, including civil advice, disturbance, domestic, drug overdose, threat, suspicious, wellbeing check,

²¹ Some frequently appeared words in narrative are anxiety, mental problems, depression, thought of suicide, mental breakdown, change in mental status, alcoholism, overdose, mentally disability, mental trauma, schizophrenia, and paranoid, etc..

some rescue call types and so forth.²² MHR calls account for 16% to 22% of all CFS. Table 5 demonstrates the distribution of MHR calls among broader categories. Among MHR calls, more than 50% were related to disorder across five years and 15% were classified as “Wellbeing check and others,” among which 10% of them were missing persons, screaming for help, and emergency officer assistance while the rest of them were wellbeing checks. Domestic-related calls vary across years from 8.7% to 17.3% of MHR calls. About 7% of MHR calls were related to fraud/forgery. Violent calls only account for 3 to 4% of MHR calls. Finally, there were less than 5% of MHR calls classified under the juvenile, drug/alcohol, and fire and rescue call types.

Table 5. Descriptive Analysis of Mental Health Relevant Calls from 2013 to 2017

	2013	2014	2015	2016	2017
Domestic	1,462 (17.31%)	1,254 (14.52%)	1,383 (13.32%)	1,207 (11.58%)	940 (8.73%)
Domestic with weapons	50 (.59%)	31 (.36%)	45 (.43%)	41 (.39%)	24 (.22%)
Disorder	4,597 (54.42%)	4,753 (55.02%)	5,483 (52.82%)	5,730 (54.96%)	6,325 (58.73%)
Violent	303 (3.59%)	252 (2.92%)	273 (2.63%)	327 (3.14%)	310 (2.88%)
Juvenile	85 (1.01%)	183 (2.12%)	445 (4.29%)	442 (4.24%)	494 (4.59%)
Drug/Alcohol	92 (1.09%)	74 (.86%)	44 (.42%)	35 (.34%)	81 (.75%)
Fire and rescue	20 (.24%)	63 (.73%)	350 (3.37%)	349 (3.35%)	369 (3.43%)
Wellbeing check and others	1,228 (14.54%)	1,412 (16.34%)	1,553 (14.96%)	1,606 (15.40%)	1,564 (14.52%)
Fraud/forgery	611 (7.23%)	617 (7.14%)	804 (7.75%)	689 (6.61%)	663 (6.16%)
Total	8,448 (100.0%)	8,639 (100.0%)	10,380 (100.0%)	10,426 (100.0%)	10,770 (100.0%)

²²Any call types that were overrepresented in the subsamples compared to all CFS were identified as MHR calls. If a call type demonstrated similar percentages between the subsamples and all CFS data or the overrepresentation of that call type is due to few calls, we checked the narrative data of all calls within this call type to determine whether the call type should be included as MHR calls or not. Although the percentages of suspicious calls among the subsamples were lower than among all CFS across two years, we believe that this call type might be more likely to have MH components based on working with officers. This call type accounts for more than 6% (8.08% in 2015 and 6.04% in 2016) of the 40-call-type subsamples. Thus, we considered suspicious calls MHR as well. Mental health calls were excluded from MHR calls to avoid contamination.

Analytical Methods

Spatial Point Pattern Test. The first analytical approach we use is the Spatial Point Pattern Test (SPPT) developed by Andresen (2009). Martin Andresen (2009, 2017) introduced the nonparametric SPPT to measure the similarity of two different datasets in terms of their spatial distributions. In this study, we used SPPT to examine how geographically similar MH calls are to other specific types of MHR calls (e.g., violent, disorder, drug/alcohol, juvenile, domestic, domestic with weapon, fraud/forgery, wellbeing check and others, as well as fire and rescue calls) from 2013 to 2017.

The nonparametric spatial point pattern test is appropriate to measure the spatial similarities between call types for service location without making any distribution assumption (see Andresen, 2017; Hibdon et al., 2017; Vaughan et al., 2016; Wu & Lum, 2016; White & Goldberg, 2018; for application of this approach). We created a 7-meter buffer around each street segment to make sure all CFS occurring at or near the segment were captured.²³ S-index was used to evaluate the spatial similarities between data. S-index ranges from 0 (no similarity) to 1 (perfect similarity), and 0.80 has been proposed as a threshold for substantial similarity (Andresen, 2017; see also Vaughan et al., 2016; White & Goldberg, 2018).

Since more than 64% of the street segments did not have any call each year, we conducted two different sets of analysis to examine the spatial and temporal similarity of MH and MHR within segments: one including segments with zero calls, and one excluding them to obtain more robust results. The robust S-index measures the degree of similarity of the spatial patterns based on only the streets with at least one event, whereas the standard S-index uses all the street segments. We set MHR calls as the test data set and compared whether MH calls is within the 95% confidence interval of MHR calls for all spatial units of analysis (see Andresen 2009, 2017; Andresen & Malleson, 2011).²⁴ If the value of MH calls within street segments for the MHR calls is within the 95% confidence interval, there is a similarity of spatial pattern between MH calls and MHR calls.²⁵

²³ ArcGIS© 10.2 was used to spatially relocate the MH and MHR calls on top of the closest street segment using the NEAR tool. As a result, the 7-meter buffer could capture all CFS occurred at or near the segment.

²⁴ The confidence interval was computed by randomly sampling 85% of the streets with replacement for 200 times. Based on the range of the samples, we then removed the top and bottom 2.5% to create boundaries for the 95% confidence interval.

²⁵ We conducted these analyses using R 3.4.1 and the SPPT package (Steenbeek, Vanderviver, Andresen, Malleson, & Wheeler, 2018).

Group-based Trajectory Analysis. While SPPT helps us understand the spatial similarities between MH calls and categories of MHR calls, it only analyzes the patterns cross-sectionally. Since MH calls are rare events, analyzing spatial concentrations based on one year of data could lead to a biased conclusion. Thus, we supplemented the SPPT results with group-based trajectory analysis (GBTA) to examine the MH concentration patterns from a longitudinal perspective. While GBTA was initially developed by Nagin (1999) to capture the developmental patterns of individual criminal offending (see also Nagin & Land, 1993), it has been applied to the study of crime distributions across geographic locations (Nagin & Land, 1993) and trends in terrorist activities and crime across countries and groups (Dugan, LaFree, & Miller, 2007; LaFree, Morris, & Dugan, 2009; LaFree, Yang & Crenshaw; 2009; Piquero & Piquero, 2006). The primary assumption of GBTA is that patterns of observations of interest over time can be approximated with a set number of groups characterized by polynomial growth curves (Nagin et al., 2003; Nagin & Tremblay, 1999).²⁶ In the current study, we use GBTA to help identify MH hot spots, street segments that have had relatively high volume of MH calls during the study period, and the characteristics of those streets.

Results

Spatial Similarity of MH and MHR CFS

We examined the spatial similarity of RCPD's MH and MHR calls for service from 2013 to 2017. We first measured spatial stability of MH calls over time to see if MH problems are similar to crime problems that remain stable over time (Weisburd et al., 2004; Weisburd, 2015). To explore whether the spatial concentrations of MH calls carry over time, we ran SPPT using data from every two consecutive years of our study period.

The spatial stability of MH calls is shown in Table 6. The upper-right triangle of the table represents the results of the test with using all street segments (standard *S*-Index), whereas the lower-left triangle shows the robust *S*-Index using only street segments that have at least one MH call (in italics). Conducting both sets of analysis is important since 94% of the street segments in Roanoke County had no MH calls over the study period. If we look at the data cross-sectionally, between 1.35% to 1.86% of street segments were responsible for 100% of MH calls each year. The results of the standard *S*-Index show high spatial stabilities of MH calls across years (*S*-

²⁶ The number of groups is determined by the prior theories, empirical criteria (Bayesian Information Criteria--BIC) and posterior probability (for more detailed information, please see Nagin, 2005).

Index are all $> .980$). However, when we measure the spatial stability excluding street segments with no calls, the robust *S*-Index values declined substantially, which shows that while the majority of street segments have no MH calls over time, the concentration patterns of those that had MH calls do vary to some extent if we only follow the official CFS designation.²⁷

Table 6. *The Spatial Stability of Mental Health Patterns from 2013 to 2017*

Mental Health	2013	2014	2015	2016	2017
2013	-----	0.984	0.983	0.983	0.983
2014	<i>0.430</i>	----	0.982	0.982	0.982
2015	<i>0.447</i>	<i>0.425</i>	----	0.982	0.981
2016	<i>0.425</i>	<i>0.411</i>	<i>0.432</i>	----	0.982
2017	<i>0.332</i>	<i>0.333</i>	<i>0.333</i>	<i>0.343</i>	----

Note: the standard *S*-Index values are on the upper-right triangle and the robust *S*-Index values are shown in italics on the lower-left triangle.

Next, we conducted comorbidity tests by examining the spatial associations between MH and MHR calls. The standard *S*-Index (including segments with zero calls)—shows a very high spatial similarity between these two types of calls ($S > 0.939$ for overall MHR-MH comparisons and for specific types of MHR and MH calls comparisons, see Table 7). The average *S*-index value of the geographic similarity between MH and MHR calls exceeded .9 across individual MHR call types when we include the segments with no incidents.

Table 7. *The Spatial Similarity of Mental Health Patterns and Mental Health Relevant from 2013 to 2017*

	Mental Health (standard <i>S</i> -Index)					Average
	2013	2014	2015	2016	2017	
Mental Health Relevant	0.923	0.921	0.907	0.909	0.909	0.914
Domestic	0.975	0.975	0.973	0.976	0.981	0.976
Domestic with weapons	0.985	0.984	0.983	0.983	0.987	0.984
Disorder	0.953	0.949	0.941	0.941	0.939	0.945
Violent	0.984	0.984	0.983	0.983	0.986	0.984
Juvenile	0.985	0.983	0.982	0.981	0.984	0.983
Drug/Alcohol	0.986	0.985	0.983	0.983	0.987	0.985
Fire and Rescue	0.985	0.984	0.984	0.983	0.987	0.985
Wellbeing check and others	0.979	0.977	0.975	0.975	0.977	0.976
Fraud/Forgery	0.983	0.982	0.978	0.978	0.984	0.981

²⁷ We also ran the same analyses for sub-categories of MHR calls. The results are very similar to the SPPT of MH calls. For the sake of parsimony, we do not include the results in this paper but they are available upon request.

Again, the values of MHR-MH similarity from robust *S*-index went down substantially. In Table 8, the robust *S*-Index values of MH and MHR calls are all less than .62, and the variations range widely by call types (from .072 to .616). Specifically, we found moderate degrees of spatial similarity between MH and wellbeing check and others (.604), fraud/forgery (.597), disorder (.577), and domestic dispute (.541); low spatial similarities between MH and juvenile (.321), violent (.436), and fire and rescue (.335); and negligible spatial similarity between MH and drug/alcohol (.183) and domestic with weapon (.143).

Table 8. The Spatial Similarity of Mental Health Patterns and Mental Health Relevant from 2013 to 2017

	MH (robust S-Index)					Average
	2013	2014	2015	2016	2017	
Mental Health Relevant	0.544	0.537	0.513	0.520	0.532	0.529
Domestic	0.576	0.535	0.508	0.538	0.561	0.544
Domestic with weapons	0.163	0.109	0.126	0.108	0.090	0.119
Disorder	0.590	0.585	0.555	0.578	0.578	0.577
Violent	0.421	0.405	0.425	0.450	0.481	0.436
Juvenile	0.161	0.238	0.393	0.393	0.417	0.321
Drug/Alcohol	0.264	0.205	0.119	0.099	0.230	0.183
Fire and Rescue	0.072	0.175	0.450	0.445	0.533	0.335
Wellbeing check and others	0.585	0.600	0.614	0.604	0.616	0.604
Fraud/Forgery	0.613	0.612	0.612	0.545	0.602	0.597

Results from GBTA

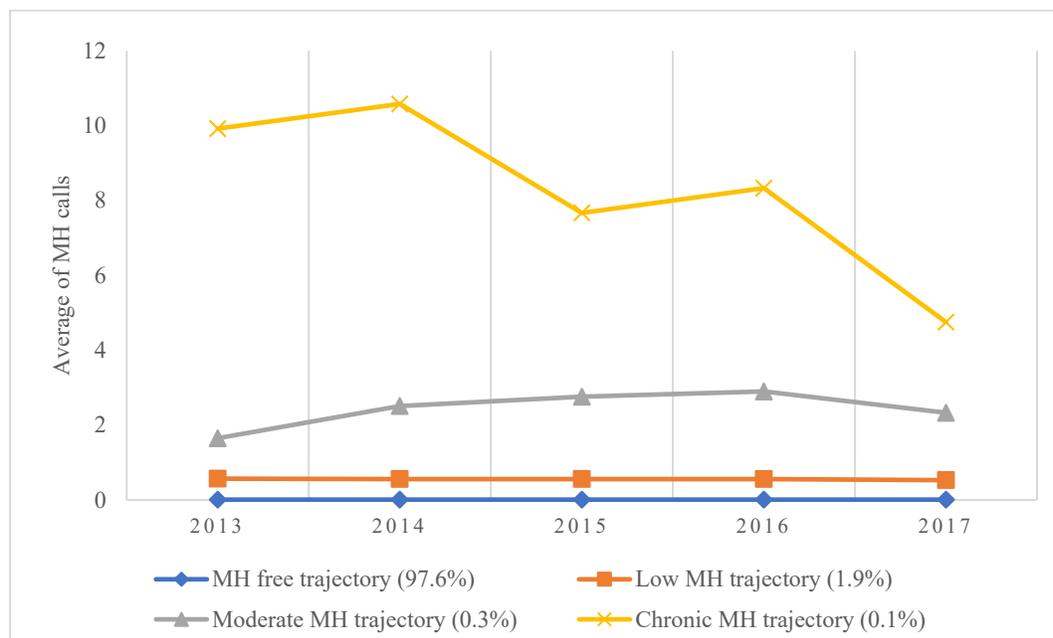
We conducted the GBTA using the MH calls over the study period. Based on prior literature (Nagin, 2005; Weisburd et al., 2012), we followed the exhaustive approach to identify the most optimal trajectory model for the data. Other than the Bayesian Information Criteria (BIC), we also considered the average posterior probability, odds of correction classification (OCC) and whether meaningful groups were revealed for the selection of final model. We decided on a four-group quadratic zero-inflated Poisson model based on the aforementioned criteria (BIC= -7331.49). As shown in Table 9, the average posterior probability values range from .88 to .98 across four groups. The OCC values are all greater than 700. In order to achieve a high level of accuracy, Nagin (2005) recommends identifying models with average posterior probabilities greater than .7 with OCC values greater than 5. Based on these standards, the four-group model performs well in classifying the 15,356 street segments into four trajectory groups.

Table 9. The average posterior probability and odds correct classification of 4-group model

Trajectory group	# of street segments	% of total street segments	Average Posterior Probability	Odds of Correct Classification
1	14995	0.976	0.975	1730.403
2	298	0.019	0.932	719.087
3	51	0.003	0.882	2253.964
4	12	0.001	0.973	46508.998

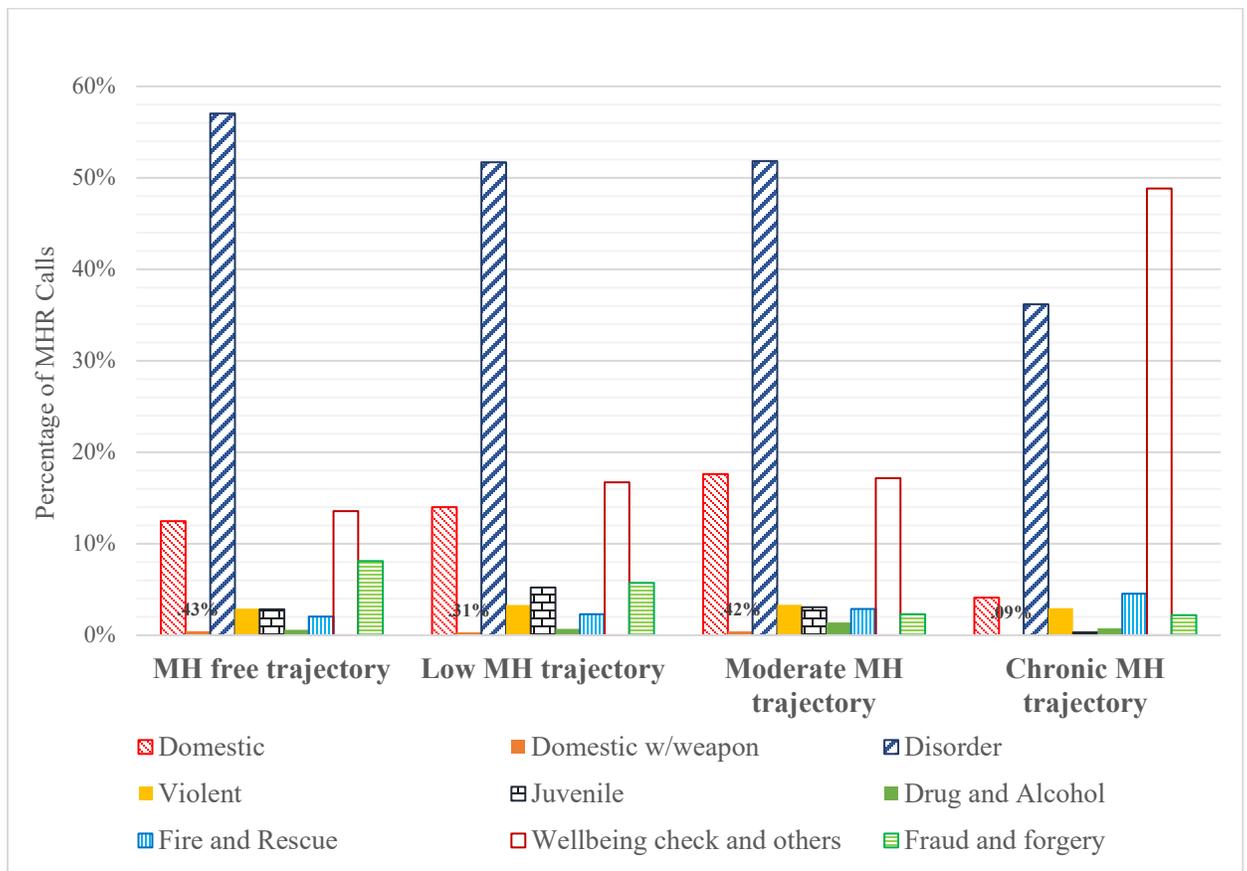
Figure 3 illustrates the 4 trajectories of MH calls. The most notable feature is the extreme level of concentration of MHI over time. That is, more than 97.6% of street segments were free from MHI across five years (MH Free Trajectory). About 2% of places experienced low levels of MH problems (Low MH Trajectory). The average number of MH calls for the Low MH segments ranges from .53 to .57 per year. The moderate MH trajectory includes about 0.3% of places (51 streets) and experienced between 1.65 and 2.90 MH calls per year. Despite the differences in the levels of MH activities, the patterns of these three trajectories appear to be quite stable over time. Particularly noteworthy is the last trajectory group (Chronic MH Trajectory). While it includes only a very small number of street segments (0.1% of the total streets, n=12), these streets experienced a high level of MH related activities over time. This Chronic MH group experienced a fluctuating and declining pattern, starting with around 10 calls in 2013 but gradually reduced to 5 calls in 2017.

Figure 3. MH call trajectories



We also conducted the co-morbidity analysis by examining the MHR call compositions for each MH trajectory to see if places with different levels of MH problem also exhibit different call make-up. Figure 4 shows the proportions of each type of MHR call within each trajectory. Overall, the percentages of “domestic with weapon”, “drug and alcohol”, and “violent” calls were uniformly low across all trajectories. While “juvenile” calls represented less than 5% of the calls across the board, they were almost non-existent in the streets with Chronic MH problems. Similar patterns were found for “domestic-dispute” calls, in that streets classified as having chronic MH problems had less than half of percentages of domestic disputes compared to streets in all other trajectories. There is a gradient descent pattern in fraud and forgery calls moving from MH free trajectory to chronic MH trajectory, whereas fire and rescue calls increased slightly from MH free trajectory at about 2% to chronic MH trajectory at about 5%.

Figure 4. Proportions of types of MHR calls within four trajectories



Disorder-related calls accounted for more than half of the MHR calls in the MH free, low MH, and moderate MH trajectories, but they accounted for a far lower percentage of calls in the chronic MH group. Interestingly, while the patterns of “wellbeing checks and other” calls were very similar in the first three trajectories, the proportion of such is way higher in the chronic MH group—more than double of the percentage they accounted for in the other trajectory groups.

To summarize, the comorbidity patterns that we identified through the GBTA vary by levels of MH problems. While well-being checks and missing persons are common problems in the streets with high MH problems, family related calls, such as domestic disputes, domestic with weapon, and juvenile problems, are not as frequent in those places. On the contrary, streets with no or low levels of MH problems tend to report high levels of disorder and some family related problems, but not as many issues related to well-being checks or missing persons.

Discussion and Conclusions

Consistent with the literature surrounding crime concentration, we found that MH incidents (measured by CFS data) are extremely concentrated in Roanoke County. The combination of the rural environment and the rarity of MH incidents possibly led to a concentration rate that is higher than what the prior studies have found (Weisburd et al., 2004; Weisburd et al., 2012; Weisburd, 2015; Kim & Hipps, 2017 White & Goldberg, 2018; Gill et al., 2017). Specifically, we found that 100% of MH-related calls clustered in less than 2% of the street segments in Roanoke County annually. The concentration patterns remain when we look at the MH hot spots in a longitudinal fashion and see that a very small number of segments (n=63, 0.4% of the total streets) were responsible for 44.6% of MH calls.

As we measure the spatial-temporal similarity of MH and MHR calls, the values of standard *S*-Index show that there are spatio-temporal similarities between different calls across years. However, when we measure robust *S*-Index, most values dropped to below .50 except for juvenile-related calls and fire and rescue calls. Clearly, the differences are due to the fact that the majority of places did not experience any MH-related calls and the absence of such events remained over time. In this study, using the values of robust *S*-Index is more useful to measure spatio-temporal similarity because our site is rural area which has high levels of crime concentration. In fact, crime concentration studies show that smaller cities have higher crime concentration than larger cities (see Gill et al., 2017; Weisburd, 2015) because crime

concentrates at micro-places. In other words, there are large numbers of micro-places that have no crime, and it would be irrational to measure spatio-temporal similarity with majority places with no crime in rural settings. Thus, we gain a better understanding of spatio-temporal similarity from the results of robust *S*-Index.

While the cross-sectional SPPT analysis shows that MH calls are extremely concentrated in the cross-sectional analysis, the findings from our trajectory models show both that these concentration patterns hold up longitudinally and are stable over time. More than 94% of street segments in Roanoke County did not have a single MH call and about 64% of streets did not experience a single MHR call during the 5-year study period. Even among streets that did experience MH calls, most remain at low levels over time. The low MH trajectory represents 2% of street segments, but which average a very small number of calls ($n=829$). Furthermore, this average number of calls stays in a very narrow bandwidth, ranging from .53 to .57 per year. There were only 51 street segments in the moderate MH trajectory with a total of 620 calls across five years. The average of MH calls ranges from 1.65 to 2.90. With the overwhelming amount of stability, we also observed a chronic MH trajectory that experienced fluctuations in the MH call volume. The chronic MH trajectory representing just 12 street segments, shows a decreasing trend over time, which accounts for 495 MH calls over the study period.

In sum, this analysis found that MH incidents (measured by CFS) are extremely concentrated in Roanoke County, with 100% of annual MH-related calls clustered in less than 2% of county street segments. Furthermore, 44.6% of calls were ultra-concentrated in only 0.4% of street segments. Simply put, this means that MH incidents occurring during the study period clustered at only a handful of hotspot addresses. Additionally, co-morbidity patterns (i.e. multiple problems occurring at the same time and place) in identified hotspots appear to vary by levels of MH problems. While well-being checks and missing persons are common problems in streets with a high number of MH incidents, family related calls – such as domestic disputes, domestic with weapon, and juvenile problems – are not as frequent in those places. On the contrary, streets with no or low levels of MH problems tend to report high levels of disorder and some family related problems, but not as many issues related to well-being checks or missing persons. This indicates that MH incidents tend to co-occur with certain additional problems (such as missing persons or individuals who may be experiencing a crisis), but not with others (such as domestic violence and juvenile delinquency). Taken together, these findings suggest that

police departments (especially those in rural areas) can possibly benefit from identifying underlying MH problems through examining other types of problems that are more explicit and concentrating interventions and resources at these places.

Chapter 4: Experimental evaluation of a police-mental health practitioner co-responder model

Introduction

In an effort to improve the ways in which the Roanoke County Police Department (RCPD) responds to mental health-related (MH-related) calls for service (CFS), the collaboration between the RCPD, Intercept Youth Services, and the Center for Evidence-Based Crime Policy at George Mason University (CEBCP-GMU) sought to design, implement, and experimentally evaluate an innovative model for responding to such calls. Implementing a police-mental health practitioner (MHP) co-responder model, clinicians from Intercept responded to MH-related calls with RCPD officers in order to begin immediate introduction to treatment for individuals with MHI. This chapter describes the intervention, evaluation, and results of this research collaboration.

Description of the intervention

The intervention involved a collaboration between CEBCP-GMU, RCPD, and Intercept Youth Services to assess the effects of a police-MHP co-responder model in which police have 24-hour access to trained MHP who provide stabilization services and guide individuals into further treatment services if needed. Treatment services provided by Intercept include crisis stabilization, crisis intervention, and therapeutic interventions tailored to meet the individual needs of clients. Treatment may include aspects such as conflict resolution, individual, group, and family counseling, behavioral interventions, relaxation and anger management techniques, medication evaluation and management, and psychiatric assessment. Intercept staff may use cognitive behavioral therapy (CBT), trauma-focused CBT, and solution-focused, person-centered, or other evidence-based clinical models in order to support clients towards a successful discharge. These services are provided by Licensed and Licensed-eligible mental health professionals (LMHP-S, LMHP-R, LMHP-RP). Participants in the experimental condition were connected with an MHP from Intercept's 24-hour Crisis One response team at the time of police response and were offered the opportunity to engage with Intercept's longer-term services. The specific services and treatment programs offered were tailored to participants' individual needs as assessed by Intercept staff.

Study design

In order to evaluate the efficacy of the police-MHP co-responder model, we implemented a randomized controlled trial (RCT) to assess the relative impacts of the RCPD's existing standard CIT procedures (control condition) against the innovative police-MHP co-responder model (experimental condition). We achieved randomization by pre-designating individual RCPD work shifts as **experimental shifts or control shifts**. All officers responding to calls on a specific shift were advised whether it was a control shift where standard operating procedures were to be used, or an experimental shift where an Intercept representative would be on call. This process of pre-designating experimental and control shifts allowed the research team to achieve appropriate randomization of cases while also attenuating the demand placed on our partners at the Intercept organization (i.e. they were able to plan for experimental shifts ahead of time, instead of being on-call 24-hours). The researchers worked with the RCPD to ensure that the shifts assigned as experimental or control were equal and comparable in all aspects, thus mitigating possible confounding influences. The RCT experimental period ran from September 1, 2016 to March 22, 2019 (approximately 31 months). For the analytical purposes, CFS data involving experimental and control subjects was also collected from a pre-treatment period (June 1, 2016 to August 31, 2016) and a post-treatment period (March 23, 2019 to June 30, 2019) in order to compare participants' pre-treatment and post-treatment outcomes.

Randomization

We developed and implemented a block-randomized design to reduce variability and confounding influence and to ensure reliability of experimental effects. This approach is intended to maximize statistical power to detect effects and reduce heterogeneity within the experimental and control conditions (Gill & Weisburd, 2013; Weisburd & Gill, 2014). Random assignment was achieved through pre-designating experimental and control shifts. Within each 24-hour day, there were three 8-hour RCPD shifts covered respectively by officers assigned to Platoons A, B, and C. The RCPD pre-schedules officers according to 28-day schedule periods (for instance, June 18-July 15; July 16-August 12). To achieve appropriate randomization, the research team used a random number generator to assign each of the 28 shifts (for Platoons A, B, and C separately) to the experimental or control conditions of our study (see Figure 5 for an example of the monthly randomization schedule provided to RCPD and Intercept). From

September 1, 2016 to March 22, 2019, there were a total of 2,795 predesignated shifts in which 1,416 (50.66%) were experimental shifts and 1,379 (49.34%) were control shifts.

Figure 5. Example of Shift Randomization Schedule

SHIFT RANDOMIZATION BEGINNING JUNE 18, 2016 ENDING JULY 15, 2016

	S	S	M	T	W	T	F	S	S	M	T	W	T	F
	18-Jun	19-Jun	20-Jun	21-Jun	22-Jun	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul
PLATOON A	T	C	C	C	T	T	C	T	C	C	T	C	C	T
PLATOON B	T	T	T	C	C	T	T	C	C	T	T	T	C	T
PLATOON C	C	T	T	C	T	C	C	T	C	C	C	C	T	T

	S	S	M	T	W	T	F	S	S	M	T	W	T	F
	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	9-Jul	10-Jul	11-Jul	12-Jul	13-Jul	14-Jul	15-Jul
PLATOON A	T	T	C	T	T	T	C	C	T	T	C	T	T	C
PLATOON B	T	T	T	T	T	C	T	T	T	C	C	C	T	T
PLATOON C	C	T	T	T	C	T	C	C	C	C	C	T	C	C

The experimental condition

During the experimental shift, officers responded to MH-related calls and first assisted individuals according to existing standard operating procedures. Once officers determined that the individuals were eligible to participate in the study (i.e. they did not require ECO/TDO²⁸ or arrest), they would then contact Intercept clinicians to begin introduction to treatment. Representatives from Intercept were on-call and available to respond within one hour to the scene of the call when contacted by officers. While a representative from Intercept was required to be available in-person to conduct the consent process for interested individuals, they had the option to begin initial crisis stabilization with individuals over the phone prior to arriving on scene if necessary. Once the Intercept representative arrived on scene and the RCPD officers felt that the situation was under control, the officers referred the individual to the Intercept representative. The Intercept representative then introduced him/herself and gave an explanation

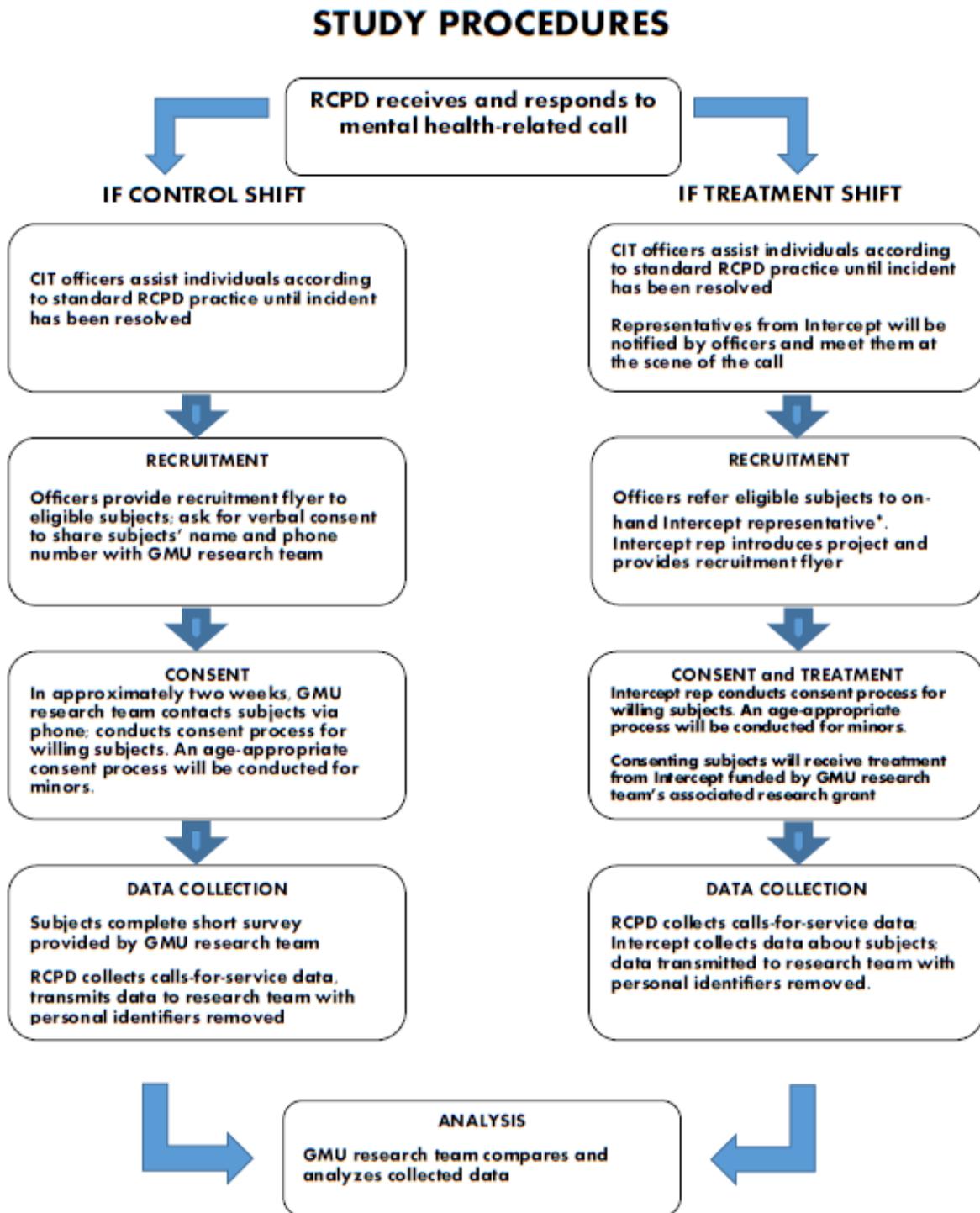
²⁸ See Chapter 2 for definitions and descriptions of ECO/TDO

of the treatment services provided by the organization. The Intercept representative also introduced the research project and conducted the consent process for interested individuals. Consenting individuals were offered the opportunity to receive further screening and treatment from Intercept that was funded by the associated BJA research grant (subject to the usual consent to treatment processes used by Intercept). Data about the incident and involved individuals was collected by the RCPD through normal agency record keeping procedures. Data about the treatment services offered to, and progress of, individuals was collected by Intercept as part of their standard data collection procedures. If participants consented to participate in the research project, RCPD and Intercept shared that data with the GMU research team after personally identifying information (including name, social security number, birth date, and phone number) had been removed. RCPD's Emergency Communications Center and Intercept collaborated to develop case numbers for study participants that allowed the research team to receive relevant data without breaching the privacy or confidentiality of participants.

The control condition

During control shifts, officers responding to MH-related calls assisted individuals according to the existing standard CIT operating procedure. Once the officers felt that the situation was under control (i.e. the officers feel they have successfully employed de-escalation techniques and that the individuals responded to require no further police assistance), officers shared the research study recruitment flyer and asked the interested individuals for permission to share their name and phone number with the CEBCP-GMU research team. The CEBCP-GMU research team then contacted the individual and finished the consent process via the phone. Data about the incident and involved individuals was collected by the RCPD through normal agency record keeping procedures. If participants consented to the RCPD sharing data about the call they were involved in, the RCPD shared this data with the GMU research team (including name and phone number for contact purposes). See Figure 6 for a visual representation of the study procedures.

Figure 6. Study Procedures Flowchart



Data and analysis

The researchers used comprehensive CFS data provided by RCPD to assess both short- and long-term changes in MH-related calls for service using service data provided by the RCPD. Particularly, the researchers wanted to examine the frequency of MH-related calls to the police (with special attention paid towards repeat calls for service), the amount of time consumed by response to calls, and frequency of diversion (based on the number of calls made by participants who contacted Crisis One for additional support and services). In order to evaluate the intervention, the researchers analyzed the program's impact on MH-related calls for service outcomes using statistical techniques appropriate for the block-randomized controlled study design, such as a generalized linear modeling approach that takes into account treatment assignment, statistical block, and interaction between the treatment and block assignments (e.g. Braga et al, 1999). Various other statistical tools were used to determine the extent of impact. Survival analysis was applied to quantify whether receiving service helps stabilize cases with MHI and maintain levels of functioning for an extended period of time. Performance between the experimental and control groups was compared to see if intervention led to more positive outcomes.

Results

Description of sample

During the treatment period (from September 1st 2016 to March 22nd 2019), there were a total of 2,795 predesignated shifts in which 1,416 (50.66%) were experimental shifts and 1,379 (49.34%) were control shifts. Throughout this period, 119 experimental group subjects were initially recruited. Of these 119 subjects, 93 of them agreed to participate in our study, 20 individuals refused to participate, and six individuals were subsequently deemed ineligible. Additionally, 66 control group subjects were initially recruited. Of these 66 subjects, 47 were willing to participate in our study, while 17 refused to participate, and two were deemed ineligible. These two groups yielded a total of 140 study subjects. About 54% of experimental group subjects are females; the group's average age is 39.6 years. On the other hand, 44.7% of control group subjects are females; the group's average age is 41.1 years. There are no significant differences between these two groups regarding the demographic variables of gender and age.

Description of call data

The calls related to each of 140 subjects during the entire study period were extracted.²⁹ Within the study period from June 2016 to June 2019, there was a total of 1,419 CFS in which 957 calls related to the experimental group subjects (n=93) and the remaining 462 calls related to the control group subjects (n=47). Among all CFS, 106 calls were from the pre-treatment period (June 1, 2016 to August 31, 2016), 1,195 calls were from the treatment period (September 1, 2016 to March 22, 2019), and 118 calls were from the post-treatment period (March 23, 2019 to June 30, 2019). Of all CFS, 248 (17.5%) were mental health (MH) calls. The MH designation is used by RCPD for call types identified as specifically involving individuals with MHI; these call types include 1096 (calls in which officers interact with individuals with MHI who do not pose an immediate threat to themselves or others), 1096 with weapon, ECO/TDO, suicide threats, and suicide attempts. However, some calls responded to by RCPD were initially classified by the department as non-MH-related but nonetheless involved MH components. Because of this, we identified a separate category of calls – mental health relevant (MHR) calls – in order to capture more potential MH-related calls (that are not flagged as such in RCPD’s call data). Following the process outlined in Chapter 3, we identified 20 separate and additional MHR call types, including (but not limited to) well-being check, domestic dispute, drug overdose, and suspicious activity (see Chapter 3 for the full list of MHR calls). In addition to the 248 MH calls related to subjects during the study period, there were an additional 863 MHR calls related to subjects during the study period (accounting for 60.8% of all CFS related to subjects during the study period).

As shown in Table 10, among the 248 MH calls, 73.4% were identified as calls involving mental health subjects (1096). 19.8% of MH calls were ECO/TDO, while suicide attempt and suicide threats calls accounted for only 5.2% of MH calls. Additionally, 60.8% (N=863) of CFS were MHR calls. Table 11 presents the distribution of call types of these 863 calls. About 40% of MHR calls were wellbeing checks. Civil advice, disturbance, domestic, and suspicious calls together contribute to approximately 42% of MHR calls. The remaining 308 CFS involving study participants (accounting for 21.7% of participants’ calls to police during the study period)

²⁹ The extracted calls include all calls in which a study subject was the primary individual attended to by officers during the call. That is, these calls include calls made both by the study subject themselves (in which they are asking for police assistance) and by others (including family, friends, neighbors, and other acquaintances) who are seeking police assistance because of an interaction with or on the behalf of the individual with MHI.

were not flagged as either MH or MHR, but included calls pertaining to issues such as break-ins, property crime, traffic offenses, and various administrative calls.

Table 10. Distribution of call types of MH calls (N=248)

Call types	Frequency (%)
1096	182 (73.4)
1096 with weapon	4 (1.6)
ECO/TDO	49 (19.8)
Suicide attempt	5 (2.0)
Suicide threats	8 (3.2)
Total	248 (100.0)

Table 11. Distribution of call types of MHR calls (N=863)

Call types	Frequency (%)
ALS (Fire and rescue)	34 (3.9)
BLS (Fire and rescue)	30 (3.5)
Civil advice	71 (8.2)
Disturbance	85 (9.8)
Domestic	103 (11.9)
Drug Overdose	12 (1.4)
Fraud/forgery	13 (1.5)
FSERVICE (Fire and rescue)	3 (.3)
Juvenile problems	20 (2.3)
Missing person	6 (.7)
Personal assault	5 (.6)
Runaway	12 (1.4)
Screams for help	4 (.5)
Stalking	2 (.2)
Suspicious	106 (12.3)
Threat	9 (1.0)
Wellbeing check	348 (40.3)
Total	863 (100.0)

Distributions of CFS, MH and MHR calls across the experimental and control groups

Table 12 shows the distributions of all CFS, MH, and MHR calls involving experimental and control group subjects across the pre-treatment, treatment, and post-treatment periods.³⁰ During the three-month pre-treatment period, there were 67 CFS involving the experimental

³⁰ CFS calls include all MH, MHR, and non-MH-related calls. MH and MHR calls are measured separately (i.e. MHR calls do not include MH calls).

group subjects. Of these 67 calls, 13 of them were MH calls (19.4%) and 42 of them were MHR calls (62.7%). On the other hand, a total of 39 calls involved the control group in the pre-treatment period. Of these 39 calls, 12 were MH calls (30.8%) and 17 were MHR calls (43.6%). During the treatment period, the experimental group subjects accounted for 824 CFS in which 129 were MH calls (15.7%) and 504 were MHR calls (61.2%). Among 371 CFS involving the control group in the treatment period, 84 were MH calls (22.6%) and 224 were MHR calls (60.4%). During the post-treatment period, there were 66 CFS involving the experimental group and 52 CFS involving the control group. Of the 66 CFS involving the experimental group subjects, six of them were MH calls (9.1%) and 44 of them were MHR calls (66.7%). For the control group, four of 52 CFS were MH calls (7.7%) and 32 of CFS were MHR calls (61.5%). These numbers show the extent to which the majority of calls involving both the experimental and control groups were MHR calls, thus highlighting how individuals with MHI consume more police resources than is apparent when only considering MH calls.

Table 12. Total number of calls among experimental and control groups across the study period

Study group	All CFS		MH		MHR	
	Experimental (n=93)	Control (n=47)	Experimental (n=93)	Control (n=47)	Experimental (n=93)	Control (n=47)
Pre-treatment	67	39	13	12	42	17
Treatment	824	371	129	84	504	224
Post-treatment	66	52	6	4	44	32
Total	957	462	148	100	590	273

Table 13 shows the call types of 248 MH calls for the experimental and control groups. 1096 calls (calls involving individuals with MHI) accounted for the majority of MH calls for both groups across the pre-treatment, treatment, and post-treatment periods (76.4% of experimental group calls and 69% of control group calls). ECO/TDO calls accounted for 20.1% of experimental group MH calls and 19% of control group calls across the pre-treatment, treatment, and post-treatment periods. The remaining MH call types – 1096 with weapon, suicide threats and suicide attempt – only account for a small proportion of MH calls for both groups across the three study periods.

Table 13. Distribution of MH calls across three study periods among the experimental and control groups (%)

	Study group	1096	1096 w/ weapon	ECO/TDO	Suicide threats	Suicide attempt	Total
Pre-treatment	Exp. (n=93)	9 (69.2)	0 (.0)	4 (30.8)	0 (.0)	0 (.0)	13
	Con. (n=47)	5 (41.7)	0 (.0)	4 (33.3)	2 (16.7)	1 (8.3)	12
Treatment	Exp. (n=93)	98 (75.9)	1 (.8)	26 (20.2)	0 (.0)	4 (3.1)	129
	Con. (n=47)	61 (72.6)	3 (3.6)	14 (16.7)	6 (7.1)	0 (.0)	84
Post-treatment	Exp. (n=93)	6 (100.0)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	6
	Con. (n=47)	3 (75.0)	0 (.0)	1 (25.0)	0 (.0)	0 (.0)	4

Evaluation of the intervention

Total numbers of CFS, MH, and MHR calls. Turning to the treatment effects, there were no significant differences in all CFS, MH and MHR calls during the pre-treatment, treatment, and post-treatment periods between the experimental and control groups. As can be seen in Table 14, during the treatment period, the average CFS per experimental group subject is 8.86 calls while the average CFS per control group subject is 7.89 calls. Though the experimental group had slightly fewer post-treatment CFS per subject (.71) than the control group (1.11), the difference is not significant ($p=.40$). Table 15 shows that the average number of MH calls per subject for both groups. During the treatment period, the experimental group had a lower number of average MH calls per subject (1.39) than the control group (1.79). Similarly, during the post-treatment period, the experimental group had a lower number of average MH calls per subject (.06) than the control group (.09), though this difference is not significant ($p=.79$). Table 16 shows the average number of MHR calls per subject for both groups. During the treatment period, the average number of MHR calls per subject for this experimental group was 5.42, while the average for the control group was 4.77. Despite the fact that the average of post-treatment MHR calls is fewer in the experimental group (.47) than in the control group (.68), the difference is not significant ($p=.52$).

Table 14. Average number of CFS (standard deviation) by two groups

All CFS	Experimental	Control	t-test	p value
Pre-treatment	.72 (2.16)	.83 (1.92)	-.29	.77
Treatment	8.86 (16.27)	7.89 (10.32)	.37	.71
Post-treatment	.71 (2.43)	1.11 (3.09)	-.83	.40

Table 15. Average number of MH calls (standard deviation) by two groups

MH calls	Experimental	Control	t-test	p value
Pre-treatment	.14 (.76)	.26 (.77)	-.85	.41
Treatment	1.39 (4.45)	1.79 (4.00)	-.52	.61
Post-treatment	.06 (.46)	.09 (.35)	-.27	.79

Table 16. Average number of MHR calls (standard deviation) by two groups

MHR calls	Experimental	Control	t-test	p value
Pre-treatment	.45 (1.37)	.36 (.97)	.40	.69
Treatment	5.42 (9.14)	4.77 (6.00)	.44	.66
Post-treatment	.47 (1.65)	.68 (2.06)	-.65	.52

Repeat CFS, MH, and MHR calls. We also examined the experimental vs. control group differences in repeat CFS. Table 17 shows the average number of repeat CFS per subject for the experimental and control groups (calculated as the total number of CFS involving each study subject, including the initial call for which the subject was entered into the study). As can be seen, there is no significant difference in repeat CFS with an average of 8.31 for experimental group subjects and an average of 7.32 for control group subjects ($p=.72$). For repeated MH calls, the experimental group had a slightly lower average of MH repeated calls compared to the control group (1.33 vs. 1.68), though this difference is not statistically significant ($p=.40$). Though the experimental group has slightly more repeat MHR calls for service than the control group (5.06 vs. 4.23), this difference is not statistically significant ($p=.50$).

Table 17. Average number of repeat calls per subject (standard deviation)

Repeated Calls	Experimental	Control	t-test	p value
CFS	8.31 (17.34)	7.32 (10.59)	.36	.72
MH calls	1.33 (4.69)	1.68 (3.94)	-.44	.40
MHR calls	5.06 (9.44)	4.23 (6.52)	.54	.50

Police time consumed responding to CFS. Of the 1,419 CFS involving experimental and control subjects during the study period, we were able to access the unit history of 1,320 (93.2%) in order to determine the total call time and the time spent per officer on each CFS. Table 18 shows the average CFS call-length time for the experimental and control groups across the pre-treatment, treatment, and post-treatment periods. During the treatment period, the average call time was slightly longer for the experimental group as opposed to the control group

(65.92 minutes vs. 57.87 minutes). The average call time during the post-treatment period is nearly the same for the experimental and control groups (46.04 minutes vs. 45.89 minutes); the difference between the two groups is not statistically significant ($p=.99$).

Table 18. Average call length (in minutes) per CFS (standard deviation in parentheses)

All CFS	Experimental group	Control group	t-test	p value
Pre-treatment	88.76 (141.47)	86.82 (157.64)	.06	.95
Treatment	65.92 (103.38)	57.87 (87.51)	1.35	.18
Post-treatment	46.04 (56.46)	45.89 (42.51)	.01	.99

Table 19 shows the average MH call-length time for the experimental and control groups across the pre-treatment, treatment, and post-treatment periods. During the treatment period, the average call time was longer for the experimental group as opposed to the control group (93.46 minutes vs. 70.06 minutes).³¹ Though the average call time during the post-treatment period was much shorter for the experimental group as opposed to the control group (11.08 minutes vs. 48.42 minutes), this difference is not statistically significant ($p=.24$). Furthermore, it is important to note that the longer time spent by officers in the pre-treatment and treatment periods (for both groups) was likely due to a number of suicide attempt and suicide threat calls (known to be time-intensive calls) occurring specifically during these periods.

Table 19. Average call length (in minutes) per MH call (standard deviation in parentheses)

MH calls	Experimental group	Control group	t-test	p value
Pre-treatment	74.89 (131.47)	170.79 (247.47)	-1.22	.23
Treatment	93.46 (162.95)	70.06 (105.23)	1.24	.22
Post-treatment	11.08 (7.90)	48.42 (38.67)	-1.66	.24

Table 20 shows the average MHR call length time for the experimental and control groups across the pre-treatment, treatment, and post-treatment periods. During the treatment period, the average call time was longer for the experimental group as opposed to the control group (60.97 minutes vs. 51.55 minutes). Though the average call time during the post-treatment period was longer for the experimental group as opposed to the control group (59.20 minutes vs. 45.59 minutes), this difference is not statistically significant ($p=.37$).

³¹ This is likely due to the fact that, in some cases, officers had to wait with subjects for up to an hour while the MHP responded to the scene.

Table 20. Average call length (in minutes) per MHR call (standard deviation in parentheses)

MHR calls	Experimental group	Control group	t-test	p value
Pre-treatment	108.32 (157.88)	61.94 (82.81)	1.14	.26
Treatment	60.97 (78.05)	51.55 (60.34)	1.74	.08
Post-treatment	59.20 (63.39)	45.59 (40.07)	.91	.37

Table 21 shows the average time spent per officer per CFS for the experimental and control groups across the pre-treatment, treatment, and post-treatment periods. During the treatment period, the average time spent per officer per call was nearly the same for the experimental group as opposed to the control group (30.97 minutes vs. 29.98 minutes). Though the time spent per officer during the post-treatment period was slightly higher for the experimental group as opposed to the control group (24.11 minutes vs. 22.32 minutes), this difference is not statistically significant ($p=.69$).

Table 21. Average time spent per officer per CFS (standard deviation in parentheses)

All CFS	Experimental group	Control group	t-test	p value
Pre-treatment	35.02 (39.96)	42.85 (70.37)	-.72	.48
Treatment	30.97 (44.72)	29.98 (47.03)	.34	.73
Post-treatment	24.11 (23.12)	22.32 (18.12)	.40	.69

Table 22 shows the average time spent per officer per MH call for the experimental and control groups across the pre-treatment, treatment, and post-treatment periods. During the treatment period, the average time spent per officer per call was higher for the experimental group as opposed to the control group (45.81 minutes vs. 38.52 minutes). During the post-treatment period, the average time spent per officer per call was significantly lower for the experimental group as opposed to the control group (8.49 minutes vs. 28.73 minutes), a difference that is significant at the .05 level ($p=.03$).

Table 22. Average time spent per officer per MH call (standard deviation in parentheses)

MH calls	Experimental group	Control group	t-test	p value
Pre-treatment	43.69 (66.64)	81.07 (115.47)	-1.00	.33
Treatment	45.81 (87.23)	38.52 (66.39)	.63	.53
Post-treatment	8.49 (6.24)	28.73 (16.90)	-2.74	.03*

Table 23 shows the average time spent per officer per MHR call for the experimental and control groups across the pre-treatment, treatment, and post-treatment periods. During the treatment period, the average time spent per officer per call was slightly higher for the experimental group as opposed to the control group (29.16 minutes vs. 27.48 minutes). Though the average time spent per officer per call during the post-treatment period was higher for the experimental group as opposed to the control group (30.56 minutes vs. 22.55 minutes), this difference is not statistically significant ($p=.21$).

Table 23. Average time spent per officer per MHR call (standard deviation in parentheses)

MHR calls	Experimental group	Control group	t-test	p value
Pre-treatment	37.08 (31.76)	29.38 (23.64)	.90	.37
Treatment	29.16 (29.72)	27.48 (40.63)	.62	.54
Post-treatment	30.56 (25.70)	22.55 (18.52)	1.28	.21

Frequency of diversion. Of the 93 experimental group subjects, only 33 subjects (35.5%) consented to the treatment and received the service as planned, while 53 (57.0%) subjects declined the service either at the beginning or at certain point during the treatment. The seven remaining subjects were either hospitalized during the treatment or otherwise deemed inappropriate for the treatment. Table 24 shows the distribution in length of treatment received by the experimental group. Concerning the length of service, 69 of the subjects (74.2%) received at least some service (either receiving the full service as planned or declining the service after beginning treatment), while 24 subjects (25.8%) received no service at all. The mean of treatment length among the 93 experimental group subjects was 14.97 hours, with the maximum length being 296 hours. Among the 69 subjects who received at least some service, four subjects received less than two hours of treatment (4.3%), 27 subjects (29.0%) received between two and 10 hours of treatment, 18 subjects (19.4%) received between 10 and 30 hours of treatment, and the remaining 14 subjects (15.1%) received more than 30 hours of treatment.

Table 24. Distribution of length of treatment

Length of treatment	Frequency (%)
0 hours	24 (25.8%)
Less than 2 hours	4 (4.3%)
2-10 hours	27 (29.0%)
10-30 hours	18 (19.4%)
More than 30 hours	14 (15.1%)
Total	93

Since less than 40% of subjects consented to the entire treatment program, we further examined the differences within the experimental group. Those who consented to the treatment had an average of 40 hours of service, while those who declined the treatment or were hospitalized averaged only 1.2 hours of service. Table 25 shows all CFS between those who consented to the treatment and those who declined the treatment. Although those who consented to the treatment (n=33) tended to have more calls during the pre-treatment and treatment periods, there is a reduction in CFS during the post-treatment period with an average of .61 for those who consented to the treatment and .77 for those who declined the treatment. However, only the difference in the average pre-treatment CFS is significant (p=.05). As shown in Table 26, similar patterns were found for MH calls, but all differences between these two subgroups are not significant. In terms of MHR calls, those who consented to the treatment tended to have more calls before the intervention period as indicated in Table 27 (though this difference is not significant at the p=.05 threshold). During the post-treatment period, however, their average of MHR is .42, while the average of those who declined the treatment is .50. Overall, despite those who consented to the treatment tending to have more calls before the treatment period, the numbers of calls during post-treatment period are similar or even lower compared to those who declined the treatment.

Table 25. Average CFS (standard deviation in parentheses) by admission status

All CFS	Consent (n=33)	Decline (n=60)	t-test	p value
Pre-treatment	1.48 (3.34)	.30 (.85)	2.01	.05
Treatment	11.33 (20.84)	7.5 (13.12)	1.09	.28
Post-treatment	.61 (1.99)	.77 (2.65)	-.30	.76

Table 26. Average of MH (standard deviation in parentheses) by admission status

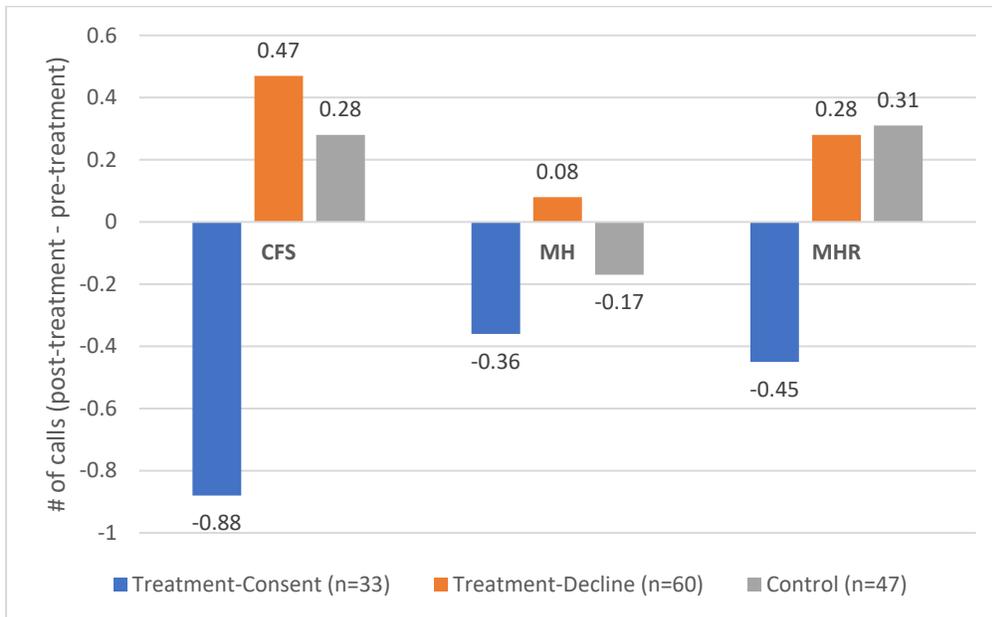
MH calls	Consent (n=33)	Decline (n=60)	t-test	p value
Pre-treatment	.36 (1.25)	.02 (.13)	1.60	.12
Treatment	1.94 (5.64)	1.08 (3.66)	.89	.38
Post-treatment	.00 (-)	.10 (.57)	-1.35	.18

Table 27. Average of MHR (standard deviation in parentheses) by admission status

MHR calls	Consent (n=33)	Decline (n=60)	t-test	p value
Pre-treatment	.88 (2.12)	.22 (.59)	1.76	.09
Treatment	6.67 (11.85)	4.73 (7.25)	.98	.33
Post-treatment	.42 (1.58)	.50 (1.69)	-.22	.83

We then calculated the post- and pre-treatment differences in the numbers of calls to compare the reduction between those who consented to the treatment and those who did not. As shown in Figure 7, CFS, MH and MHR calls all showed a decreased pattern for those who consented to the treatment, whereas all three categories of calls showed an increased pattern for those who declined the treatment. In addition to the within-group differences, the control group subjects also had more CFS and MHR calls during the post-treatment period relative to the pre-treatment period, though they had fewer MH calls. To conclude, despite the fact that there might be some self-selection bias (i.e. those who consented to treatment potentially had more-severe MHI, thus making them more inclined to consent to and participate in treatment services), those who consented to treatment tended to consume fewer police resources over time, even though they had more contacts with the police before the intervention compared to those who declined the service. Similar to one core principle of the risk-need-responsivity (RNR) model of offender rehabilitation (Andrews & Bonta, 2010), which emphasizes that the intensity of treatment should match the risk level of recidivism, we found that targeting subjects in the greatest need can yield greater reductions in repeated calls for service.

Figure 7. Reduction in Calls



Discussion and Conclusion

Using an intention-to-treat model (which assumes that individuals inducted into the experimental condition receive the proposed intervention), our study found a relative lack of

significant findings concerning many of the policing CFS-relevant measures. For instance, regarding reducing CFS involving individuals with MHI, there were no significant differences between the control and experimental groups during the post-treatment period for CFS, MH calls, and MHR calls (though the experimental group did have fewer average post-treatment calls for all call types). Similarly, regarding repeat calls for service during the post-treatment period, there were no significant differences between the experimental and control conditions for CFS, MH calls, and MHR calls. In terms of analyzing the reduction in police call time, with regards to average call length, there are no significant differences between the experimental and control groups in the post-treatment for CFS, MH calls, and MHR calls. Regarding the average time spent per officer per call, we did find one significant difference between the experimental and control groups during the post-treatment period for MH calls with experimental group averaging 8.49 minutes and the control group averaging 28.73 minutes ($p=.03$). The differences in average time spent per officer per call on CFS and MHR calls were not significant.

This relative lack of significant findings may be due to the fact that, in addition to the relatively small sample sizes of the experimental and control groups, many individuals inducted into the experimental group did not receive the intervention as intended, with only 33 of the 93 treatment group subjects (35.5%) consenting to and receiving the planned treatment. Indeed, when further breaking down the amount of actual treatment that experimental groups subjects received, we see stark differences: those who consented to the service received an average of 40 hours of treatment, while those who declined the service (or were subsequently hospitalized) received an average of only 1.2 hours of service. Comparing the pre- and post-treatment differences in number of calls among experimental group subjects who consented to the treatment and experimental group subjects who declined the treatment is illuminating: those who consented to receive treatment saw a reduction in the number of CFS, MH calls, and MHR calls in the post-treatment period, while those who declined treatment saw an increase in all three call types during the post-treatment period. Though the intention-to-treat model is the most rigorous way to evaluate the results of this study (in keeping with the requirements of the RCT), these differences in outcomes between the experimental group subjects who consented to the intervention vs. those who declined nonetheless lend strong evidence to the argument that the police-MHP co-responder model works for those individuals who are most in need and motivated to participate. Such findings highlight the extent to which motivating subjects to

accept and continue treatment is essential in increasing the efficacy of the police-MHP co-responder model. This is a task perhaps best addressed by including a care-coordinator in the service plans who can be trained in how to follow up with clients and proactively match cases with needed services that could help improve clients' life circumstances.

Chapter 5: Process Evaluation

Introduction

The Center for Evidence-Based Crime Policy at George Mason University (CEBCP-GMU) research team conducted several process evaluations throughout the course of the collaboration with the Roanoke County Police Department (RCPD) and Intercept Youth Services in order to gauge participants' perceptions of the project and identify problem areas. These process evaluations included three rounds of focus groups with RCPD command staff, RCPD officers, and Intercept clinicians, two waves of RCPD officer surveys, and a survey completed by participants in the control group of the experimental evaluation of the police-mental health provider (MHP) co-responder model (discussed in Chapter 4). This chapter outlines the results of these evaluations and the knowledge gained.

Gauging perceptions of project participants (RCPD and Intercept)

Focus group interviews

The CEBCP-GMU research team conducted three rounds of focus group interviews with RCPD command staff officers, RCPD midnight shift officers, RCPD day shift officers, and Intercept clinicians concerning their participation in the experimental intervention testing the police-mental health practitioner co-responder model described in Chapter 4. The first round of focus group interviews was conducted in early January 2017, about four months following the beginning of the experimental intervention period. The second round of focus group interviews was conducted in April 2018, about 19 months following the beginning of the experimental intervention period. The third and final round of focus group interviews was conducted in May 2019, a little over a month after the end of the experimental intervention period. The purpose of these focus group interviews was to gauge how effective the Intercept-RCPD-CEBCP-GMU partnership had been up until the point of the interview and how it could be improved for the remainder of the collaboration and future research studies. Each interview had 4-6 respondents, except for the Intercept clinicians' interviews, which usually involved two or three individuals. The interviews lasted about an hour and were not recorded. Researchers did, however, take notes throughout each interview. The interviews were semi-structured and included various pre-determined questions, such as "How satisfied are/were you with the partnership between RCPD, Intercept, and GMU?"; "Does/did the experimental intervention reach the intended population?";

and “Does/did your organization meet its intended goals?” There were also various questions pertaining to the challenges participants faced during the experimental study period and recommendations for other organizations looking to implement interventions similar to the studied intervention. The research team encouraged participants to elaborate on their responses and volunteer information outside of that specifically addressed by the pre-determined questions. This qualitative data was subsequently analyzed using Atlas.ti software in order to identify recurring themes and construct a grounded theory of participants’ experiences with the project.

RCPD officer surveys

In addition to these focus group interviews, the CEBCP-GMU research team distributed two separate surveys to RCPD officers over the course of the collaboration. The first survey was distributed in July 2016 (prior to the experimental intervention period) and assessed RCPD officers’ experiences responding to MH-related calls and their satisfaction with the current options available for handling these calls. The results of this survey are discussed at length in Chapter 2 of this report. In short, this survey revealed that while officers felt a duty and desire to respond effectively to call for service (CFS) involving individuals with mental health issues (MHI), they felt their options for doing so were limited and that the standard CIT-informed response was often insufficient to successfully resolve calls.

Additionally, the CEBCP-GMU research team also distributed a second-wave survey to RCPD officers in late December 2016 (about four months into the experimental intervention) in order to gauge officers’ perceptions of their participation in the experimental intervention to that point. This survey was completed by 51 officers and included officers of rank Police Officer (39.1%), Police Officer II (28.3%), Police Officer III (15.2%), Police Officer IV (6.5%), and Sergeant (10.9%). Of these respondents, 86% reported having responded to calls in which they encountered individuals in MH crisis or experiencing MHI in the four months since the experimental evaluation began, highlighting the extent to which officers often came in contact with such individuals while responding to CFS. Results from this survey are mentioned throughout the following discussion in relation to various themes highlighted in the focus groups interviews.

Recurring themes

Perceptions of efficacy. During the *first round* of focus group interviews (in January 2017), RCPD command staff, day shift, and midnight shift officers all expressed tempered

support for the efficacy of the experimental intervention, noting that they felt it contributed to reduced repeat calls for service and somewhat lessened police workload. Officers did not feel, however, that the intervention reduced the time officers spent responding to MH-related CFS (especially since the intervention did little to change the lengthy ECO process), and many officers remained neutral as to whether the intervention would prove effective in the long-run. These sentiments are echoed in the RCPD officer second-wave survey (distributed and completed in the weeks prior to the first round of focus group interviews). When asked, “In your opinion, how likely is it that the police-MHP co-responder model will help reduce police workload?” 79.2% of responding officers answered that it was either very likely or somewhat likely, while 20.8% of officers answered that it was somewhat unlikely or very unlikely. Similarly, when asked, “How likely is it that the police-MHP co-responder model will have a positive effect on individuals with MHI?” 85.2% of officers responded that it was either very likely or somewhat likely, while 14.8% of officers responded that it was somewhat unlikely or very unlikely.

Intercept clinicians expressed similarly positive sentiments during this first round of focus group interviews, noting that they had positive experiences with several study subjects and praising the extent to which the intervention allowed them to reach individuals with MHI in the general population who were uninsured or had private insurance. Intercept clinicians also felt that, to that point, the intervention had reduced repeat MH calls to the police and increased the amount of time between repeat MH calls to the police. However, during this first round of interviews, Intercept clinicians did express concerns that some experimental group subjects were not following-through with the MH treatment and that there could possibly be problems with subject attrition as the project progressed.

During the *second round* of focus group interviews (in April 2018), RCPD day shift and midnight shift officers expressed similar sentiments as during the first round of interviews, noting that they felt the intervention was potentially reducing repeat CFS and contributing to lessened police workload, but had done little to address the problem of lengthy ECO calls. Still, several officers related that they were less skeptical of the intervention at this point than they had been at the beginning of the study period, feeling that their interactions with individuals with MHI were more positive during experimental shifts (during which Intercept clinicians co-responded to calls) than during control shifts. RCPD command staff officers expressed

reservations regarding the efficacy of the intervention at this point, noting that many individuals most in need of the treatment were not receiving care (either because they refused treatment or were inducted into the control group), and that the problem of lengthy ECO calls was still a primary concern in the department. Still, command staff officers remained committed to the project, noting that they felt, on balance, that the intervention was producing positive outcomes regarding repeat MH CFS. During this second round of interviews, Intercept clinicians expressed concern with the high number of experimental group individuals who either refused the treatment or subsequently dropped out of treatment, and also mentioned the growing problem of encountering individuals with MHI during MH calls who had co-occurring substance abuse issues (who they were unequipped to respond to).

During the *third round* of interviews (in May 2019), regarding overall perceptions of the project's efficacy, both the RCPD command staff and midnight shift officers were extremely positive, relating that the project met its goals "even more so than [they] thought it would," and that the "numbers show it works." The RCPD day shift officers were somewhat less enthusiastic than these first two groups, but still largely positive, praising the intervention for giving officers more tools to use when responding to MH CFS. However, day shift officers also noted frustration that the intervention did little to alleviate the time spent responding to ECO or voluntary hospital transfer. Day shift officers also expressed that the intervention likely benefitted the midnight shift more than the day shift given that there were fewer options for people in MH crisis outside of normal business hours (thus increasingly the utility of a MH co-responder model that operates during off-hours). Concerning the project's overall efficacy, RCPD officers (both day shift and midnight shift) and command staff most often cited their perceptions that the intervention was of great benefit to experimental group participants (by connecting at-need individuals with treatment), that the intervention allowed officers more options for responding to MH CFS, that the intervention reduced repeat CFS, and that the intervention reduced the amount of time officers spent responding to MH CFS.

In contrast to RCPD officers and command staff, Intercept clinicians expressed primarily negative views when asked about their overall perception of the project's efficacy, feeling that client receptivity to participating in the program was generally low and faded over the period of the project. Furthermore, Intercept clinicians noted high levels of client attrition across the study period as well as problems encountered when dealing with possible clients who had co-occurring

substance abuse issues (which they considered the intervention ill-suited to address given that Intercept's standard Crisis One treatment program does not specifically address substance abuse issues).

Taken together, perceptions of the intervention's efficacy followed two distinct and opposite trajectories for RCPD officers (command staff, day shift, and midnight shift) and Intercept clinicians. Whereas many RCPD officers began the project with a degree of skepticism (while still voicing largely positive views of the project) and came eventually to believe wholeheartedly (as in the case of command staff and midnight shift officers) or mostly (as in the case of RCPD day shift officers) in the effectiveness of the intervention, Intercept clinicians began the project with more positive views before eventually, by the end of the intervention, espousing mostly negative views about the overall efficacy of the endeavor. These differences in perception may be due to the differences in roles played by the various project participants. More specifically, because officers usually were free to leave experimental shift calls after Intercept clinicians arrived, they perceived the co-responder model as mostly effective because it succeeded in reducing the amount of time they felt they spent responding to calls and (as far as they were aware) introduced at-need individuals to MH treatment. However, due to the low levels of experimental group consent to treatment and high subject attrition over time (as discussed in Chapter 4), from the vantage point of Intercept clinicians, the intervention was largely ineffective.

Impressions of experimental procedure. A major recurring theme when asking respondents about their experiences with the project (across all three rounds of interviews) pertained to several grievances and difficulties faced when complying with the experimental procedure. During the first two rounds of interviews (in January 2017 and April 2018), interviewees across all four groups (RCPD command staff, day shift, and midnight shift officers, and Intercept clinicians) noted the difficulties officers had in determining the eligibility of study subjects encountered during experimental and control shifts when responding to MH CFS (day shift and midnight shift officers noted that they themselves had difficulties determining eligibility; RCPD command staff and Intercept clinicians relayed that they had witnessed officers having problems determining subject eligibility). Specifically, interview participants mentioned that RCPD officers often seemed unsure of the criteria that would disqualify an individual from participation in the study (i.e. the individual experiencing the MH crisis required arrest or

hospitalization). These concerns with eligibility pointed to the need for clearer and more rigorous training on the experimental procedure and the need for refresher trainings throughout the study period.

However, these concerns with determining eligibility expressed during the focus group interviews are somewhat at odds with RCPD officers' responses to the second-wave survey (completed in the weeks prior to the first round of focus group interviews). When asked, "How comfortable did you feel determining the eligibility of possible research study participants during experimental shifts?" 90.7% of responding officers said they felt very comfortable or somewhat comfortable, while only 9.3% said they felt somewhat uncomfortable or very uncomfortable. Similarly, when asked, "How comfortable did you feel determining the eligibility of possible research study participants specifically during control shifts?" 86.4% of responding officers said they felt very comfortable or somewhat comfortable, while only 13.6% said they felt somewhat uncomfortable or very uncomfortable. This may indicate that though few officers felt they had trouble properly determining the eligibility of study participants, the instances in which they did encounter difficulties stood out in their minds (and in the minds of RCPD command staff and Intercept clinicians) in such a way that they felt compelled to discuss them at length during the focus group interviews.

Furthermore (especially during the third round of interviews in May 2019), both RCPD day shift and midnight shift officers expressed frustration with having to comply with control shift procedures because they felt conflicted when interacting with individuals with MHI to whom they could not offer the experimental intervention. On the one hand, this frustration is indicative of officers' belief in the efficacy of the treatment (so much so that they felt regret when not able to offer it to control group participants). On the other hand, however, this frustration may have led to a certain amount of contamination across the experimental and control groups. Several officers reported that they were "unsure how to *not* offer the Intercept service" to control group subjects, and further told individuals they encountered on control shifts things such as, "There's this other program [that might benefit you], but we can't offer it to you right now." Such disclosures ran the risk of affecting the integrity of the RCT design. When the GMU research team noted the risk to experimental integrity of informing control group subjects of the experimental intervention (explaining to officers that the RCT was necessary in order to "see if the intervention works"), several officers expressed confusion, with one officer replying,

“What do you mean, ‘*If it works*’?” To these officers, the benefits they had personally seen among experimental group subjects was sufficient to prove the efficacy of the intervention. Such sentiments highlight the need for future research teams to properly train officers in the utility and necessity of complying with RCT procedures. The Intercept clinicians voiced similar frustrations with complying with the RCT, noting that offering the treatment to some individuals with MHI and not others presented an ethical dilemma even though they understood the necessity of the research design.

Recommendations for improvement and implementation in other agencies. During the third round of focus group interviews (in May 2018), when asked what general improvements they would make to the intervention, as well as what recommendations they would make to other agencies hoping to implement similar MH interventions, respondents most often cited the need for more effective training on the experimental procedures and for recurrent refresher trainings throughout the course of the intervention. These recommendations were especially highlighted in the RCPD command staff, day shift, and midnight shift focus groups, during which officers suggested that training on the intervention and procedures be introduced to new officers during Field Officer Training (to mitigate the effect of high officer turnover on officers’ understanding of and fluency with the procedures), and that the research team set up a “train the trainers” program in which a select group of officers were rigorously trained in the study procedures and could subsequently serve as “procedure experts” for other officers. Additionally, participants across all four focus groups noted the need for subsequent MH co-responder model interventions to include treatment contingencies for individuals with MHI with co-occurring substance abuse disorders, feeling that the current experimental intervention was ill-suited to address the needs of many such individuals they encountered during the study period.

Effective collaboration across agencies. Regarding effective collaboration across agencies, across all three interview rounds, participants noted largely positive interactions between Intercept clinicians and RCPD officers and Command Staff, with only a handful of comments hinting at any minor negative sentiments between the two agencies. For instance, one RCPD Command Staff officer noted minor initial problems with Intercept clinicians that were quickly resolved; one Intercept clinician noted that they felt officer motivation to introduce new subjects to the project may have faded over the period of the project. On the whole, however,

both agencies considered the other to have behaved and performed responsibly and in accordance with the project guidelines

Gauging perceptions of control group subjects with a phone survey

The CEBCP-GMU research team developed and administered a phone questionnaire to subjects from the control group of the experimental intervention testing the police-MHP co-responder model described in Chapter 4 to glean information about subjects' MH history, MH status, legal status, and drug and alcohol profile. Additionally, the control group survey also included several questions about the circumstance surrounding the individual's contact with the police, including questions about the quality of interaction and their satisfaction with the way the police handled the situation. This survey was geared specifically towards gauging individuals' experiences with the existing CIT-informed response used by the RCPD (i.e. not the innovative police-MHP co-responder model) and was not distributed to experimental group subjects. We aimed to conduct and carry out the phone survey shortly after a participant had been enrolled in the study. The research team took deliberate effort to record whether each participant completed the survey, refused it, stopped midway, or requested to speak at a different time. However, due to various difficulties in contacting control group subjects via phone, of the 66 control group subjects, only seven consented to and completed the phone survey.

Description of survey measures

Although the survey included various items relating to the subjects' MH history and status (including date and type of MH-related treatment received by the individual prior to the given incident and information pertaining to individuals' appearance and general behavior, affect, mood, attitude, attention and activity level, and psychiatric diagnoses), drug and alcohol profile (including history of substance abuse and reported use of controlled substances), and their legal status (including past and present criminal charges or convictions, and probation, parole, or bail status), the main goal of the survey was to investigate and understand subjects' interactions with police and satisfaction with how police officers responded to the MH call in which the individual was involved. The survey included six questions related to these main interests.

Using a Likert-scale ranging from "very satisfied" to "very unsatisfied," one question inquired about the subjects' satisfaction with the way they were treated by the officer during the entire encounter. Five additional dichotomous yes-no questions asked for further details about the encounter, including inquiring about whether the officer listened to what the individual had

to say, if the officer was polite, if the officer treated the individual objectively (with regards to the individuals' race, gender, age, religion, and sexual orientation), if the officer satisfactorily answered all of the individuals' questions, and whether the officer provided helpful information about MH treatment or other services the individual might seek out.

Analysis of control group perception data

A preliminary analysis of the survey results indicated some interesting patterns. As shown in Table 28, of the seven subjects who completed the survey, all of them stated that they were either "very satisfied" (57.1%) or "somewhat satisfied" (42.9%) with the way they were treated by the officer throughout the entire encounter. Six of the seven participants (85.7%) answered in the affirmative regarding whether they felt that the officer listened to what they had to say. One participant (14.3%) answered "don't know" to this question; this particular subject related that they were unconscious at the time of their interaction with police and were unsure about the quality of their interaction. Five of the seven subjects (71.4%) reported that the officer or officers they interacted with was/were polite. One respondent (14.3%) indicated a varied experience, relating that one of the officers they interacted with was extremely polite while the other officer was very abrasive. The remaining subject (14.3%) was unconscious at the time of interaction and thus was unsure whether the officer was polite. Five of the seven subjects (71.4%) felt that the officers treated them objectively without considering their race, gender, age, religion, or sexual orientation; one subject felt the officers did not treat them objectively (14.3%). The remaining subject was unconscious at the time of the interaction and was thus unaware of whether the officer treated them objectively. Five of the seven subjects (71.4%) felt that the officer satisfactorily answered all of their questions; two subjects (28.6%) answered "Don't Know" to this question. The final question (asking whether the officer provided helpful information about MH or other services the individual might seek out) exhibited the most variability among the control group subjects who completed the survey. Only two of the seven subjects (28.6%) answered in the affirmative to this question, while three of the seven subjects (42.9%) answered in the negative; the remaining two subjects (28.6%) answered that they did not know if the officer provided them with such information.

Table 29 shows the percentage of subjects answering "yes" to each of the five dichotomous survey questions. Taken together, participants' answers to the six questions concerning their interactions with officers responding to MH calls paint a largely positive

picture, with a majority of participants expressing satisfaction with their experience and positive sentiments regarding their interactions with officers. The sole area in which participants related a largely negative perception of their interaction involved the extent to which officers provided them with helpful information about MH treatment or other services that the subjects might seek out. Though this is likely related to the general lack of MH resources and service programs in the Roanoke Valley, it nonetheless highlights the extent to which the RCPD might improve its ability to inform citizens of the MH treatment options available to them.

Table 28. Frequency of control subject answers to question: “Taking the whole experience into account, how satisfied are you with how you were treated by the officer during this encounter?” (N=7)

Answer	Frequency (%)
Very satisfied	4 (57.1)
Somewhat satisfied	3 (42.9)
Somewhat unsatisfied	0 (0.0)
Very unsatisfied	0 (0.0)
Total	7 (100.0)

Table 29. Frequency of control subjects who answered “yes” to dichotomous questions (N=7)

Question	Frequency (%)
Did the officer listen to what you had to say?	6 (85.7)
Was the officer polite?	5 (71.4)
Do you feel the officer treated you objectively?	5 (71.4)
Did the officer satisfactorily answer all of your questions?	5 (71.4)
Did the officer provide helpful information about treatment or other services you might seek out?	2 (28.6)

Analysis of relevant non-perceptual survey measures

Regarding respondents’ legal status, four of the seven subjects (57.1%) currently or previously had criminal charges or convictions against them. This is perhaps not surprising given that, as noted above, individuals with MHI are overrepresented in the criminal justice system and the lack of MH resources in rural communities likely means that individuals with MHI residing in rural areas are at higher risk of coming into contact with the criminal justice system. Of these four respondents with current or past charges/convictions, three (75%) had charges/convictions

relating specifically to drugs or alcohol, highlighting the extent to which substance abuse often co-occurs with mental illness and increases individuals' with MHI likelihood of coming into contact with the criminal justice system.

Discussion and overall conclusions from process evaluation

The relative lack of significant findings of the experimental evaluation of the police-MHP co-responder model (discussed in Chapter 4) contrasts somewhat with many of the overall impressions given in the focus group interviews and second-wave survey by the RCPD command staff and shift officers involved in the experimental intervention. Indeed, regarding the efficacy of the intervention, RCPD command staff and officers (particularly those on the midnight shift), were extremely positive, noting that the project “met its goals even more so than [they] thought it would,” and furthermore reduced the amount of time officers spent responding to MH-related CFS, reduced repeat CFS, and reduced officer stress. Officers also perceived the project to have been of great benefit to the individuals with MHI they encountered during calls, noting several specific instances of individuals who had been connected with appropriate services. Indeed, officers considered the intervention to have been so helpful that they felt a sense of regret and frustration when encountering individuals with MHI during control shifts who they felt could benefit from, but to whom they were unable to offer, the intervention. This very positive perception of the project may be a further artifact of the differences in treatment effects for those experimental group subjects who consented to the treatment as opposed to those who declined the treatment (as discussed in Chapter 4); officers saw the positive effects for many of the “frequent flyers” who were successfully connected with treatment and felt both that they had fewer subsequent interactions with these individuals, and that when they did interact with these individuals, their mental health seemed to have improved. Such positive effects likely colored officers' perception of the overall efficacy of the program, even if such positive effects were not typical among the experimental population. This points to the extreme importance of rigorously motivating individuals with MHI to consent to and fully participate in treatment in order to increase the efficacy of police-MHP co-responder models.

In contrast to the positive impressions of RCPD officers and command staff, Intercept clinicians espoused more negative views of the efficacy of the project. These views are somewhat more in line with the findings of the study, with clinicians noting that low client

motivation to consent to and fully participate in the treatment, as well as high client attrition over the course of the study, harmed the efficacy of the intervention. Additionally, many focus group participants (across all groups) noted the need for subsequent police-MH co-responder models to include contingencies for individuals with MHI with co-occurring substance abuse issues, relating that many individuals with such issues would have been better served by the intervention were such structures in place.

On the flip side of the intervention, of the 66 control group subjects enrolled in the study, seven consented to and completed a survey (administered by the CEBCP-GMU research team) gauging their experiences with RCPD officers. Respondents viewed their interactions with officers, for the most part, very positively, with all respondents reporting they were satisfied with how they were treated by officers during the encounter, and a majority of respondents reporting that they felt officers listened to what they had to say, were polite, treated them objectively (with regards to the individuals' race, gender, age, religion, and sexual orientation), and satisfactorily answered all questions. These responses indicate general citizen satisfaction with RCPD's standard CIT-informed approach to MH CFS. However, given the extremely low response rate (10.6%), these results should be viewed with caution and may not be typical. Additionally, only two respondents (28.6%) indicated that, during the encounter, RCPD officers provided helpful information about MH treatment and other services the individual might seek out. This is likely related to the lack of MH services available in the primarily-rural Roanoke Valley, but nonetheless points to a potential opportunity for improvement in the RCPD's CIT-informed response to MH calls.

Conclusion

This report outlines the findings from various investigations conducted over the three-year collaboration BJA-SPI collaboration between the Roanoke County Police Department (RCPD), Intercept Youth Services (a Roanoke Valley-based mental health provider), and the Center for Evidence-Based Crime Policy at George Mason University (CEBCP-GMU). The **introductory chapter** provided background information about the SPI partners and participants, the study setting, and the targeted problem.

Chapter 2 described various means – including CFS analysis and an RCPD officer-completed survey – by which the CEBCP-GMU research team sought to understand the scope and quality of mental health issues (MHI) in the study area, as well as RCPD officers’ perceptions of and responses to these issues. The research team’s analysis of CFS data found that MH-related calls for service take significantly longer to resolve than other call types. The research team’s CFS analysis also found that MH-related calls accounted for a disproportionately higher share of use of force cases than other call types (for 2014-2016, 3.9% of MH-related calls involved the use of force, while only 0.2% of all other calls involved the use of force, and 20.9% of all use of force reports were attached to MH-related calls). Results from the officer-completed survey highlight the challenges officers face in resolving MH-related calls in a manner that is both timely and satisfactory to all parties. These challenges may be particularly pronounced in predominantly rural areas such as Roanoke County, where psychiatric facilities and resources are often highly selective, and space is scarce.

Chapter 3 described the process and results of a comorbidity analysis conducted by CEBCP-GMU of MH-related CFS at micro places in Roanoke County. Consistent with the literature surrounding crime concentration, we found that MH incidents (measured by CFS data) are extremely concentrated in Roanoke County. It is likely that the combination of the rural environment and the rarity of MH incidents led to a higher concentration of incidents at specific hot spots than prior studies have found (Weisburd et al., 2004; Weisburd et al., 2012; Weisburd, 2015; Kim & Hipps, 2017 White & Goldberg, 2018; Gill et al., 2017). Specifically, we found that 100% of MH-related calls clustered in less than 2% of the street segments in Roanoke County annually. The concentration patterns remain when we look at the MH hot spots in a longitudinal fashion and see that a very small number of segments (n=63, 0.4% of the total streets) were responsible for 44.6% of MH calls. Furthermore, co-morbidity patterns in identified

hotspots appear to vary by levels of MH problems. While well-being checks and missing persons are common problems in the streets with high MH problems, family related calls, such as domestic disputes, domestic with weapon, and juvenile problems, are not as frequent in those places. On the contrary, streets with no or low levels of MH problems tend to report high levels of disorder and some family related problems, but not as many issues related to well-being checks or missing persons.

Chapter 4 described the design, implementation, and experimental evaluation of an innovative police-MHP co-responder model in which Intercept clinicians responded to MH-related calls with RCPD officers in order to begin immediate introduction to MH treatment for individuals with MHI. Using an intention-to-treat model (which assumes that individuals inducted into the experimental condition receive the proposed intervention), our study found a relative lack of significant findings concerning many of the policing CFS-relevant measures. For instance, regarding reducing CFS involving individuals with MHI, there were no significant differences between the control and experimental groups during the post-treatment period for CFS, MH calls, and MHR calls (though the experimental group did have fewer average post-treatment calls for all call types). Similarly, regarding repeat calls for service during the post-treatment period, there were no significant differences between the experimental and control conditions for CFS, MH calls, and MHR calls. In terms of analyzing the reduction in police call time, with regards to average call length, there are no significant differences between the experimental and control groups in the post-treatment for CFS, MH calls, and MHR calls. Regarding the average time spent per officer per call, we did find one significant difference between the experimental and control groups during the post-treatment period for MH calls with experimental group averaging 8.49 minutes and the control group averaging 28.73 minutes ($p=.03$). The differences in average time spent per officer per call on CFS and MHR calls were not significant.

This relative lack of significant findings may be due to the fact that many individuals inducted into the experimental group did not receive the intervention as intended, with only 33 of the 93 treatment group subjects (35.5%) consenting to and receiving the planned treatment. Indeed, when further breaking down the amount of actual treatment that experimental groups subjects received, we see stark differences: those who consented to the service received an average of 40 hours of treatment, while those who declined the service (or were subsequently

hospitalized) received an average of only 1.2 hours of service. Comparing the pre- and post-treatment differences in number of calls among experimental group subjects who consented to the treatment and experimental group subjects who declined the treatment is illuminating: those who consented to receive treatment saw a reduction in the number of CFS, MH calls, and MHR calls in the post-treatment period, while those who declined treatment saw an increase in all three call types during the post-treatment period. Such findings highlight the extent to which motivating subjects to accept and continue treatment is essential in increasing the efficacy of the police-MHP co-responder model.

Chapter 5 described various process evaluations conducted by the CEBCP-GMU team throughout the research collaboration gauging participants' (including RCPD command staff and officers, Intercept clinicians, and control group subjects from the experimental evaluation discussed in Chapter 4) perceptions of the project and identifying problem areas, opportunities for improvement, and recommendations for future research collaborations. The relative lack of significant findings of the experimental evaluation of the police-MHP co-responder model (discussed in Chapter 4) contrasts somewhat with many of the overall impressions given by the RCPD command staff and shift officers involved in the experimental intervention. Indeed, regarding the efficacy of the intervention, RCPD command staff and officers (particularly those on the midnight shift), were extremely positive, noting that the project "met its goals even more so than [they] thought it would," and furthermore reduced the amount of time officers spent responding to MH-related CFS, reduced repeat CFS, and reduced officer stress. Officers also perceived the project to have been of great benefit to the individuals with MHI they encountered during calls, noting several specific instances of individuals who had been connected with appropriate services. In contrast to the positive impressions of RCPD officers and command staff, Intercept clinicians espoused more negative views of the efficacy of the project. These views are somewhat more in line with the findings of the study, with clinicians noting that low client motivation to consent to and fully participate in the treatment, as well as high client attrition over the course of the study, harmed the efficacy of the intervention.

Of the 66 control group subjects enrolled in the study, seven consented to and completed a survey (administered by the CEBCP-GMU research team) gauging their experiences with RCPD officers. Respondents viewed their interactions with officers, for the most part, very positively, with all respondents reporting they were satisfied with how they were treated by

officers during the encounter, and a majority of respondents reporting that they felt officers listened to what they had to say, were polite, treated them objectively (with regards to the individuals' race, gender, age, religion, and sexual orientation), and satisfactorily answered all questions. These responses indicate general citizen satisfaction with RCPD's standard CIT-informed approach to MH CFS. However, given the extremely low response rate (10.6%), these results should be viewed with caution and may not be typical. Additionally, only two respondents (28.6%) indicated that, during the encounter, RCPD officers provided helpful information about MH treatment and other services the individual might seek out. This is likely related to the lack of MH services available in the primarily-rural Roanoke Valley, but nonetheless points to a potential opportunity for improvement in the RCPD's CIT-informed response to MH calls.

Recommendations for practice

From these investigations, we can identify several recommendations for police departments in rural/non-urban areas hoping to improve their response to CFS involving individuals with MHI, including:

- Building relationships with local MHPs and other community institutions (including drug rehabilitation centers and addiction services) to develop best practices for mutual support and effective response (such as a police-MHP co-responder model)
- CIT training that specifically includes scenario-based training for responding to various types of MH-related CFS
- Officer training on best ways to inform individuals with MHI encountered during MH-related CFS of the treatment options available to them in their geographic area
- Identifying MH hot spots and concentrating interventions and resources at these places
- Working with MHPs to identify best practices for motivating individuals with MHI to adopt and continue MH treatment
- Including care-coordination as part of the treatment procedure to ensure that participants continue receiving treatment services
- For agencies implementing RCTs, rigorous and repeated training on the necessity of following RCT procedures

References

- Abbott, S. E. (2011). Evaluating the impact of a Jail Diversion Program on police officer's attitudes toward the mentally ill. (Doctoral Dissertation). Northeastern University, Boston MA.
- Andrews, D. A., & Bonta, J. (2010). *The psychology of criminal conduct*. Routledge.
- Baess, E. (2005). Integrated Mobile Crisis Response Team (IMCRT): Review of pairing police with mental health outreach services. *Victoria, BC: Vancouver Island Health Authority*.
- Braga, A. A., Weisburd, D., Waring, E. J., Mazerolle, L. G., Spelman, W., & Gajewski, F. (1999). Problem-oriented policing in violent crime places: A randomized controlled experiment. *Criminology*, 37(3), 541–580. doi:10.1111/j.1745-9125.1999.tb00496.x
- Charette, Y., Crocker, A. G., & Billette, I. (2014). Police encounters involving citizens with mental illness: use of resources and outcomes. *Psychiatric Services*, 65(4), 511-516.
- Clark, R.E., Ricketts, S.K., & McHugo, G.J. (1999). Legal System Involvement and Costs for Persons in Treatment for Severe Mental Illness and Substance Use Disorders. *Psychiatric Services*, 50(5):641-648. Retrieved from: <http://dx.doi.org/10.1176/ps.50.5.641>
- Deane, M., Steadman, H., Borum, R., Veysey, B., & Morrissey, J. (1999). Emerging partnerships between mental health and law enforcement. *Psychiatric Services*, 50(1), 99–101. Retrieved from. doi:10.1176/ps.50.1.99
- Dugan, L., LaFree, G., & Miller, E. (2007, November). Organizational trajectories of terrorism activity. In Presentation at the American Society of Criminology Annual Meeting, Atlanta, GA.
- Engel, R. S., & Silver, E. (2001). Policing Mentally Disordered Suspects: A Reexamination Of The Criminalization Hypothesis. *Criminology*, 39(2), 225-252.
- Franz, S., & Borum, R. (2011). Crisis intervention teams may prevent arrests of people with mental illnesses. *Police practice and research: an international journal*, 12(3), 265-272.
- Gill, C. & Weisburd, D. (2013). Increasing equivalence in small-sample place-based experiments: Taking advantage of block randomization methods. In B. C. Welsh, A. A. Braga, & G. J. N. Bruinsma (Eds.), *Experimental criminology: prospects for advancing science and public policy* (pp. 141–162). New York, NY: Cambridge University Press.
- Gill, C., Jensen, R., & Cave, B. (2018). Exploring physical force and subject resistance in police encounters with people with behavioral health issues. *Victims & Offenders*, 13(8), 1106-1131.
- Gill, C., Wooditch, A., & Weisburd, D. (2017). Testing the “law of crime concentration at place” in a suburban setting: Implications for research and practice. *Journal of quantitative criminology*, 33(3), 519-545.
- Harki, G. (2016). Virginia is outpacing the nation in police shootings of the mentally ill. *The Virginia-Pilot*. Retrieved from <http://www.pilotonline.com>.
- Hibdon, J., Telep, C.W. & Groff, E.R. (2017). The Concentration and Stability of Drug Activity in Seattle, Washington Using Police and Emergency Medical Services Data. *Journal of Quantitative Criminology*, 33: 497.
- Hipp, J. R., & Kim, Y. A. (2017). Measuring crime concentration across cities of varying sizes: Complications based on the spatial and temporal scale employed. *Journal of quantitative criminology*, 33(3), 595-632.
- Kindy, K. & Elliott, K. (2015). 990 people were shot and killed by police this year: Here’s what we learned. *The Washington Post*. Retrieved from <http://www.washingtonpost.com>.

- Kisely, S., Campbell, L. A., Peddle, S., Hare, S., Pyche, M., Spicer, D., & Moore, B. (2010). A controlled before-and-after evaluation of a mobile crisis partnership between mental health and police services in Nova Scotia. *The Canadian Journal of Psychiatry, 55*(10), 662–668. doi:10.1177/070674371005501005
- Krameddine, Y., & Silverstone, P. H. (2015). How to improve interactions between police and the mentally ill. *Frontiers in Psychiatry, 5*, 1-5. <http://dx.doi.org/10.3389/fpsy.2014.00>
- Krameddine, Y., DeMarco, D., Hassel, R., & Silverstone, P. H. (2013). A novel training program for police officers that improves interactions with mentally ill individuals and is cost-effective. *Front Psychiatry, 4*, 9.
- LaFree, G., Morris, N. A., & Dugan, L. (2009). Cross-national patterns of terrorism: Comparing trajectories for total, attributed and fatal attacks, 1970–2006. *The British Journal of Criminology, 50*(4), 622-649.
- LaFree, G., Yang, S. M., & Crenshaw, M. (2009). Trajectories of terrorism: Attack patterns of foreign groups that have targeted the United States, 1970–2004. *Criminology & Public Policy, 8*(3), 445-473.
- Lord, V. B. (1996). An impact of community policing: Reported stressors, social support, and strain among police officers in a changing police department. *Journal of Criminal Justice, 24*(6), 503–522.
- Lurigio, A. J., & Skogan, W. G. (1994). Winning the hearts and minds of police officers: An assessment of staff perceptions of community policing in Chicago. *Crime & Delinquency, 40*(3), 315–330.
- Manderscheid, R. W., Atay, J. E., & Crider, R. A. (2009). Psychiatric Services. Changing Trends in State Psychiatric Hospital Use from 2002 to 2005, 60(1), 29–34. Retrieved from <http://ps.psychiatryonline.org/doi/pdf/10.1176/ps.2009.60.1.29>
- Mohatt, D. F., Bradley, M. M., Adams, S. J., & Morris, C. D. (2006). Mental health and rural America: 1994-2005. Washington, DC: United States Department of Health and Human Services, Health Resources and Services Administration, Office of Rural Health Policy. Retrieved from <ftp://ftp.hrsa.gov/ruralhealth/RuralMentalHealth.pdf>
- Morabito, M. S. (2007). Horizons of context: Understanding the police decision to arrest people with mental illness. *Psychiatric services, 58*(12), 1582-1587.
- Nagin, D. S. (1999). Analyzing developmental trajectories: a semiparametric, group-based approach. *Psychological methods, 4*(2), 139.
- Nagin, D. S. (2005). *Group-based modeling of development*. Harvard University Press.
- Nagin, D. S., & Land, K. C. (1993). Age, criminal careers, and population heterogeneity: Specification and estimation of a nonparametric, mixed Poisson model. *Criminology, 31*(3), 327-362.
- Nagin, D. S., Pagan, L., Tremblay, R. E., & Vitaro, F. (2003). Life course turning points: The effect of grade retention on physical aggression. *Development and psychopathology, 15*(2), 343-361.
- Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child development, 70*(5), 1181-1196.
- Piquero, N. L., & Piquero, A. R. (2006). Control balance and exploitative corporate crime. *Criminology, 44*(2), 397-430.

- Reaves, B. A. (2015). *Local police departments, 2013: Personnel, policies, and practices*. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Assistance. Retrieved from <http://www.bjs.gov/content/pub/pdf/lpd13ppp.pdf>
- Reuland, M. M. (2004). A guide to implementing police-based diversion programs for people with mental illness. Delmar, NY: Technical Assistance and Policy Analysis Center for Jail Diversion.
- Rossler, M.T., & Terrill, W. (2017) Mental Illness, Police Use of Force, and Citizen Injury. *Police Quarterly*, 20(2), 189-212.
- Russell, J. (2016, July). Families failed by a broken mental health care system often have no one to call but the police. *The Boston Globe*. Retrieved from https://apps.bostonglobe.com/spotlight/thedesperate-and-the-dead/series/police-confrontations/?p1=BGMenu_Article.
- Sherman, L. W., Gartin, P. R., & Buerger, M. E. (1989). Hot spots of predatory crime: Routine activities and the criminology of place. *Criminology*, 27(1), 27-56.
- Steadman, H. J., Mulvey, E. P., Monahan, J., Robbins, P. C., Appelbaum, P. S., Grisso, T., ... & Silver, E. (1998). Violence by people discharged from acute psychiatric inpatient facilities and by others in the same neighborhoods. *Archives of general psychiatry*, 55(5), 393-401. doi:10.1001/archpsyc.55.5.393
- Steenbeek, W., Vandeviver, C. Andresen, M.A., Malleson, N., Wheeler, A. (2018). *sppt: Spatial Point Pattern Test*. R package version 0.2.1. URL: <https://github.com/wsteenbeek/sppt>.
- Substance Abuse and Mental Health Services Administration, Center for Behavior Health Statistics and Quality (2017). 2017 National Survey on Drug Use and Health. Retrieved from: <http://www.samhsa.gov/data/release/2017-national-survey-drug-use-and-health-nsduh-releases>
- Thompson, S. (2010). Policing Vancouver's mentally ill: The disturbing truth. *For: The Vancouver Police Board*.
- Vaughan, A. D., Hewitt, A. N., Andresen, M. A., & Brantingham, P. L. (2016). Exploring the role of the environmental context in the spatial distribution of calls-for-service associated with emotionally disturbed persons. *Policing: A journal of policy and practice*, 10(2), 121-133.
- Vaughan, A. D., Ly, M., Andresen, M. A., Wuschke, K., Hodgkinson, T., & Campbell, A. (2018). Concentrations and specialization of mental health-Related calls for police service. *Victims & Offenders*, 13(8), 1153-1170.
- Virginia Uniform Crime Reporting Program (2018). *Crime in Virginia*. Virginia State Police. Retrieved from: https://www.vsp.virginia.gov/Crime_in_Virginia.shtm.
- Watson, A. C., Morabito, M. S., Draine, J., & Ottati, V. (2008). Improving police response to persons with mental illness: A multi-level conceptualization of CIT. *International Journal of Law and Psychiatry*, 31(4), 359–368.
- Weisburd, D. & Gill, C. (2014). Block randomized trials at places: Rethinking the limitations of small N experiments. *Journal of Quantitative Criminology*, 30(1), 97–112. doi:10.1007/s10940-013-9196-z
- Weisburd, D. (2015). The law of crime concentration and the criminology of place. *Criminology*, 53(2), 133-157.
- Weisburd, D., & Amram, S. (2014). The law of concentrations of crime at place: the case of Tel Aviv-Jaffa. *Police Practice and Research*, 15(2), 101-114.

- Weisburd, D., Bushway, S., Lum, C., & Yang, S. M. (2004). Trajectories of crime at places: A longitudinal study of street segments in the city of Seattle. *Criminology*, 42(2), 283-322.
- Weisburd, D., Cave, B., Nelson, M., White, C., Haviland, A., Ready, J., Lawton, B., & Sikkema, K. (2018). Mean streets and mental health: Depression and Post-Traumatic stress disorder at crime hot spots. *American journal of community psychology*, 61(3-4), 285-295.
- Weisburd, D., Eck, J. E., Braga, A. A., Telep, C., Cave, B., Bowers, K., ... Yang, S. M. (2016). *Place matters: Criminology for the twenty-first century*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139342087>
- Weisburd, D., Groff, E. R., & Yang, S. M. (2012). *The criminology of place: Street segments and our understanding of the crime problem*. Oxford University Press.
- Weisburd, D., Morris, N. A., & Groff, E. R. (2009). Hot spots of juvenile crime: A longitudinal study of arrest incidents at street segments in Seattle, Washington. *Journal of Quantitative Criminology*, 25(4), 443.
- Wheeler, A. P., Worden, R. E., & McLean, S. J. (2016). Replicating group-based trajectory models of crime at micro-places in Albany, NY. *Journal of quantitative criminology*, 32(4), 589-612.
- White, C., & Goldberg, V. (2018). Hot spots of mental health crises: A look at the concentration of mental health calls and future directions for policing. *Policing: An International Journal*, 41(3), 401-414.
- Wilson-Bates, F. (2008). *Lost in transition: How a lack of capacity in the mental health system is failing Vancouver's mentally ill and draining police resources*. Vancouver, BC, Canada: Vancouver Police Department.
- Wu, X. & Lum, C. (2016). Measuring the Spatial and Temporal Patterns of Police Proactivity. *Journal of Quantitative Criminology*, 33 (4), 915-934.
- Yang, S. M., Gill, C., Kanewske, L. C., & Thompson, P. S. (2018). Exploring police response to mental health calls in a nonurban area: a case study of Roanoke County, Virginia. *Victims & Offenders*, 13(8), 1132-1152.