Mental Health and the Justice System in Durham County

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Introduction

Individuals living with mental illness are overrepresented within the criminal justice system. At the local level, they can be repeatedly booked and detained, resulting in a vicious cycle of regular incarceration. Duke Health, as the major health care provider in the county, has valuable data about patient encounters at over 350 locations, including the Lincoln Community Health Center, which specializes in providing health care services to the medically underserved. Using data from the Durham County Detention Facility (DCDF) and Duke Health System, this Data + project examines patterns of health-service utilization in the incarcerated population, including those with and without mental illness diagnoses. By working alongside county agencies such as the Criminal Justice Resource Center (CJRC), our team's data analysis could potentially impact policy plans and contribute to new ways of thinking about mental health within the Durham County justice system.

Building on research done in prior years, our team acquired new data from 2019-2021 provided by the DCDF and Duke Health centers, which gives us the opportunity to examine trends in more recent years and during the COVID-19 pandemic. This summer, our team's primary objective was to clean and organize the various datasets on demographics, bookings, encounters, and diagnoses, in an effort to prepare them for more detailed analysis during the academic year. Additionally, our team created two new variables to identify individuals with a serious mental illness and those with more general mental health based on their records of diagnoses. With these new variables and properly formatted data, we have begun to analyze trends across these institutions.

Methods

Before beginning this project, each team member was required to complete thorough HIPAA training and receive IRB approval. To maintain the privacy of our data, we worked within Protected Analytics and Computing Environment (PACE), a protected online workspace. Using a matched dataset provided by the Durham County Detention Facility (DCDF) and the Duke Health Analytics Center of Excellence (ACE), we conducted descriptive statistical analysis of the population of interest for this project. To prepare our datasets for analysis, our team had to discuss and address the challenges of dealing with duplicate entries, conflicting race records, conflicting sex records, and conflicting incarceration date records. After cleaning the data, we used R Software — specifically the plyr, dplyr, tidyverse, and xtable packages — to visualize our data and conduct exploratory and descriptive statistical analysis.

This year, our team incorporated new mental health related variables, or tags, with which to subset our data. The "Big 3" tag includes individuals who were diagnosed with at least one of the following mental illnesses: schizophrenia, bipolar disorder, and major depressive disorder. The Mental Health (MH) tag includes individuals who were ever diagnosed with a mental disorder, including substance use disorders, anxiety, and others. These tags were created to replace the "Mental Alert" tag assigned by the DCDF that previous teams used for their analyses. We created different sets of tables to show general demographic characteristics and information on individuals during the COVID-19 pandemic (Tables 1, 2). Various metrics of bookings and incarceration status were compared for the "Big 3" and "Mental Health (MH)" groups (Tables 3, 4). Health care utilization was examined based on age (Table 5) and service area (Table 6). The occurrence of both substance use disorders (Figure 7, 9) and suicidal ideations (Table 8) were examined within the population with mental health diagnoses.

Results

Demographics

Table 1: Demographics Data Table 2014-2021

	Released from DCDF and saw provider 2014-2021 (n=17,606)		Diagnosed with a "Big 3" Disorder (n=4,139)		Not diagnosed with a "Big 3" Disorder (n=13,467)		Diagnosed with a MHD (n=9,460)		Not diagnosed with a MHD (n=8,146)	
	n	%	n	%	n	%	n	%	n	%
Demographic characteristics										
Race/ancestry										
Amer Ind/AK Native	24	(0.1)	<10	(<0.2)	17	(0.1)	13	(0.1)	11	(0.1)
Asian/PI	100	(0.6)	20	(0.5)	80	(0.6)	43	(0.5)	57	(0.7)
Black	12,371	(70.3)	2,664	(64.4)	9,707	(72.1)	6,480	(68.5)	5,891	(72.3)
White	3,694	(21.0)	1,250	(30.2)	2,444	(17.9)	2,383	(25.2)	1,311	(16.1)
Other/Multiple/DK	1,417	(8.0)	198	(4.8)	1,219	(9.1)	541	(5.7)	876	(10.8)
Latinx										
No/unknown	16,496	(93.7)	3,936	(95.1)	12,515	(92.9)	9,039	(95.5)	7,457	(91.5)
Yes	1,110	(6.3)	203	(4.9)	952	(7.1)	421	(4.5)	689	(8.5)
Gender										
Male	12,168	(69.1)	2,229	(53.8)	9,939	(73.8)	6,041	(63.9)	6,127	(75.2)
Female	5,435	(30.9)	1,909	(46.1)	3,526	(26.2)	3,418	(36.1)	2,017	(24.8)
Unknown	<10	(<0.1)	<10	(<0.2)	<10	(<0.1)	<10	(<0.1)	<10	(<0.1)
Age in 2021 (Mean, SD)	(39.1,	12.5)	(42.4	13.2)	(38.2	12.1)	(41.0	13.0)	(37.0 ,	11.5)

Black or African American, non-Latinx, male individuals comprise the majority of the population. Of the incarcerated population from 2014-2021 (n = 17606), almost 25% have been diagnosed with a "Big 3" mental illness (n = 4139). Over 50% have been diagnosed with a general mental health disorder (n = 9460). (Table 1)

Table 2: COVID Demographics Data Table 2014-2021

	Released from DCDF and saw provider 2014-2021 (n=17,606)		Diagnosed with a "Big 3" disorder (n=4,139)		Not diagnosed with a "Big 3" disorder (n=13,467)		Diagnosed with a MH disorder (n=9,460)		Not diagnosed with a MH disorder (n=8,146)	
	n	%	n	%	n	%	n	%	n	%
Tested positive for COVID-19										
No	17,367	(98.6)	4,067	(98.3)	13,300	(98.8)	9,304	(98.4)	8,063	(99.0)
Yes	239	(1.7)	72	(1.7)	167	(1.2)	156	(1.6)	83	(1.0)

	Released from DCDF, saw provider 2014-2021, and tested positive for COVID 19 (n=239)		Diagnosed with a "Big 3" disorder and tested positive for COVID-19 (n=72)		Not diagnosed with a "Big 3" disorder and tested positive for COVID-19 (n=167)		Diagnosed with a MH disorder and tested positive for COVID-19 (n=156)		Not diagnosed with a MH disorder and tested positive for COVID-19 (n=83)	
	n	%	n	%	n	%	n	%	n	%
COVID-19 cases resulting in hospitalizations										
No	104	(43.5)	38	(52.8)	66	(39.5)	68	(43.6)	36	(43.4)
Yes	135	(56.5)	34	(47.2)	101	(60.5)	88	(56.4)	47	(56.6)
Breakdown of positive tests by race										
Black/African American	165	(69.0)	48	(66.7)	117	(70.1)	111	(71.2)	54	(65.1)
Caucasian/White	34	(14.2)	16	(22.2)	18	(10.8)	27	(17.3)	<10	(<12.0)
Asian	<10	(<4.2)	<10	(<13.9)	0	(0.0)	<10	(<6.4)	0	(0.0)
2 or more/Unknown/other	<10	(<4.2)	<10	(<13.9)	32	(19.2)	17	(10.9)	22	(26.5)
Breakdown of positive tests by sex										
Female	88	(36.8)	37	(51.4)	69	(41.3)	69	(44.2)	19	(22.9)
Male	151	(63.2)	35	(48.6)	87	(52.1)	87	(55.8)	64	(77.1)

Using ICD10 code U07.1 for patients diagnosed with COVID-19, our team could analyze a sampling of individuals in our data set who contracted the disease. The chart shown above details the number of individuals who tested positive for COVID-19 across subgroups. Our team analyzed the demographics information of individuals who tested positive for COVID-19. We focused our analysis on race and sex characteristics, while also incorporating information pertaining to COVID-19 cases that resulted in hospitalizations. As shown in the chart above, 56.5% of those who tested positive for COVID-19 were hospitalized, and the likelihood of becoming hospitalized was more prevalent in groups not diagnosed with a "Big 3" or MH disorder groups. The overwhelming majority of those who tested positive are Black or African American, especially among individuals who were diagnosed with a mental health disorder. Females diagnosed with a "Big 3" disorder were more likely to contract COVID-19 than males, but this not the case among those who were not diagnosed with a "Big 3" disorder. (Table 2)

Bookings

Table 3: Bookings and Length of Incarceration by "Big 3" Diagnosis

FEMALE

	2014-2021 (n = 5435)				2019-2021 (n = 783)				April 1st, 2020-2021 (n = 229)			
	Diagnosed with a "BIG 3" disorder (35.1%)		Not diagnosed with a "BIG 3" disorder (64.9%)		Diagnosed with a "BIG 3" disorder (31.8%)		Not diagnosed with a "BIG 3" disorder (68.2%)		Diagnosed with a "BIG 3" disorder (29.3%)		Not diagnosed with a "BIG 3" disorder (70.7%)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Number of bookings	2.1	(2.2)	1.8	(2.0)	1.5	(1.1)	1.2	(0.7)	1.2	(0.6)	1.2	(0.6)
Median days of incarceration (per booking per individual)	4.5	(24.1)	4.8	(39.1)	3.5	(23.6)	1.9	(10.1)	6.6	(44.3)	2.0	(10.6)
Longest observed incarceration (per individual)	12.7	(45.2)	9.5	(52.1)	6.0	(26.2)	2.6	(12.6)	7.8	(45.1)	3.1	(15.8)

MALE

	2014-2021 (n = 12168)				2019-2021 (n = 1932)				April 1st, 2020-2021 (n = 611)			
	Diagnosed with a "BIG 3" disorder (18.3%)		Not diagnosed with a "BIG 3" disorder (81.7%)		Diagnosed with a "BIG 3" disorder (16.9%)		Not diagnosed with a "BIG 3" disorder (83.1%)		Diagnosed with a "BIG 3" disorder (18.2%)		Not diagnosed with a "BIG 3" disorder(81.8%)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Number of bookings	2.8	(2.9)	2.5	(2.6)	1.6	(1.4)	1.5	(1.1)	1.5	(1.1)	1.3	(0.9)
Median days of incarceration (per booking per individual)	14.8	(49.9)	12.0	(53.7)	20.1	(74.4)	11.3	(53.6)	23.3	(63.9)	8.5	(31.9)
Longest observed incarceration (per individual)	36.4	(79.6)	31.1	(89.7)	28.7	(82.5)	15.7	(61.5)	35.6	(83.8)	12.5	(40.3)

Individuals with "Big 3" diagnoses have more bookings and longer lengths of incarceration than those without across the board. A greater percentage (nearly double the percentage) of the incarcerated female population has been diagnosed with a "Big 3" compared to its male counterpart. A general trend can be observed about the booking situation of the female big 3-diagnosed population. Compared to 2014-21, the 2019-21 data frame has shorter median days of incarceration and shorter lengths of longest observed incarceration, implying that during the 2019-21 period both numbers have gone down from the past. However, the numbers go up again during COVID. Though with a little variance, the similar trend can also be found among the male diagnosed with "Big 3" (Table 3).

Table 4: Bookings and Length of Incarceration by Mental Health Diagnosis

FEMALE

	2014-2021 (n = 5435)				2019-2021 (n = 783)				April 1st, 2020-2021 (n = 229)			
	Diagnosed with a MH disorder (62.9%)		Not diagnosed with a MH disorder (37.1)		Diagnosed with a MH disorder (58.7%)		Not diagnosed with a MH disorder (41.3%)		Diagnosed with a MH disorder (56.3%)		Not diagnosed with a MH disorder (43.7%)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Number of bookings	2.1	(2.3)	1.6	(1.5)	1.4	(0.9)	1.2	(0.7)	1.2	(0.5)	1.2	(0.7)
Median days of incarceration (per booking per individual)	5.1	(36.8)	4.0	(30.4)	2.9	(19.0)	1.8	(9.2)	3.7	(31.9)	2.8	(13.4)
Longest observed incarceration (per individual)	12.8	(55.2)	6.9	(38.6)	4.4	(21.1)	2.6	(12.7)	4.4	(32.6)	4.5	(20.0)

MALE

	2014-2021 (n = 12168)				2019-2021 (n = 1932)				April 1st, 2020-2021 (n = 611)			
	Diagnosed with a MH disorder (49.6%)		Not diagnosed with a MH disorder (50.4%)		Diagnosed with a MH disorder (44.7%)		Not diagnosed with a MH disorder (55.3%)		Diagnosed with a MH disorder (45.5%)		Not diagnosed with a MH disorder (54.5%)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Number of bookings	2.7	(2.9)	2.3	(2.4)	1.6	(1.2)	1.4	(1.1)	1.5	(1.1)	1.3	(0.8)
Median days of incarceration (per booking per individual)	12.7	(48.3)	12.3	(57.3)	12.9	(54.4)	12.7	(60.3)	14.0	(47.8)	8.9	(32.0)
Longest observed incarceration (per individual)	33.9	(83.5)	30.3	(92.1)	19.6	(65.3)	16.5	(65.9)	20.8	(61.0)	13.4	(42.2)

Individuals with mental health diagnoses are booked more often and incarcerated for longer periods of time. The male incarcerated population overall has more bookings and longer incarceration compared to the female population. Across all three time frames, a greater percentage of female inmates has been diagnosed with some kind of mental health disorder compared to that of male inmates. By comparing the 2014-21 data frame and the new 2019-21 data frame, one can discover that both people with and without mental health diagnoses generally have shorter median days of incarceration and shorter lengths of longest observed incarceration in more recent years, though with the median days of incarceration for male individuals as an exception. However, no particular changes in booking patterns during COVID were found (Table 4).

Health Utilization

Table 5: Frequency of Encounters Across Duke Health Service Areas Among Individuals Under 40, and Individuals 40 and Above

Released from DCDF and saw provider 2014-2021 under 40

	Not diagnosed with a "Big 3" disorder	Diagnosed with a "Big 3" disorder
	Median over 7 yrs	
Median		
ED encounters	5	2
Lincoln encounters	3	2
Non-ED and non-Lincoln encounters	20	5

Released from DCDF and saw provider 2014-2021 40 and above

	Not diagnosed with a "Big 3" disorder	Diagnosed with a "Big 3" disorder
	Median over 7 yrs	
Median		
ED encounters	6	2
Lincoln encounters	7	3
Non-ED and non-Lincoln encounters	33	7

The chart above details the median number of encounters in the following Duke Health service areas: Lincoln Community Health Center, the Emergency Department, and Duke Health providers excluding the areas previously listed. In population under 40 and above, those diagnosed with a "Big 3" disorder visited health care providers more frequently than those not diagnosed with a "Big 3" disorder. However, it appears that overall health care utilization is higher in populations over 40. (Table 5)

Table 6: Comparing Health Care Utilization by Service Area from 2014-2021 and During the Pandemic

	2014-2021 Data										Apr 1st, 2020-2021 Data									
	Released from DCDF and saw provider 2014-2021 (n=17,606)		Diagnosed with a "Big 3" Disorder (n=4,139)		Not diagnosed with a "Big 3" Disorder (n=13,467)		Diagnosed with a MH Disorder (n=9,460)		Not diagnosed with a MH Disorder (n=8,146)		Released from DCDF and saw provider April 1st, 2020-2021 (n=489)		Diagnosed with a "Big 3" disorder (n=143)		Not diagnosed with a "Big 3" disorder (n=346)		Diagnosed with a MH disorder (n=295)		Not diagnosed with a MH disorder (n=194)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Healthcare utilization																				
Ever seen at Lincoln																				
No/missing	12,492	(71.0)	2,300	(55.6)	10,192	(75.7)	5,836	(61.7)	6,656	(81.7)	371	(75.9)	105	(73.4)	266	(76.9)	214	(72.5)	157	(80.9)
Yes	5,114	(29.0)	1,839	(44.4)	3,275	(24.3)	3,624	(38.3)	1,490	(18.3)	118	(24.1)	38	(26.6)	80	(23.1)	81	(27.5)	37	(19.1)
Ever seen in Duke ED																				
No/missing	3,686	(20.9)	396	(9.6)	3,290	(24.4)	1,162	(12.3)	2,524	(31.0)	246	(50.3)	57	(39.9)	189	(54.6)	138	(46.8)	108	(55.7)
Yes	13,920	(79.1)	3,743	(90.4)	10,177	(75.6)	8,298	(87.7)	5,622	(69.0)	243	(49.7)	86	(60.1)	157	(45.4)	157	(53.2)	86	(44.3)
Ever seen at Duke Health (non-ED, non-Lincoln)																				
No/missing	1,161	(6.6)	69	(1.7)	1,092	(8.1)	239	(2.5)	922	(11.3)	49	(10.0)	12	(8.4)	37	(10.7)	23	(7.8)	26	(13.4)
Yes	16,445	(93.4)	4,070	(98.3)	12,375	(91.9)	9,221	(97.5)	7,224	(88.7)	440	(90.0)	131	(91.6)	309	(89.3)	272	(92.2)	168	(86.6)

Duke Health encounters within our data set could have occurred at a number of health care service areas. Our team was especially curious about how health utilization varied across groups in the Lincoln Community Health Center, at the emergency department, and Duke Health providers excluding the areas previously listed. To compare how health utilization might have changed over the years, we subsetted our encounter data into the following categories: 2014-2018 data, merged 2014-2021 data, 2018-2021 data, and April 1st, 2020-2021 data. The chart shown above compares the merged 2014-2021 data to April 1st, 2020-2021 data so that we can understand how health utilization changed specifically during the pandemic. Across subsets, those diagnosed with a "Big 3" disorder utilized Duke health services more frequently than those who were not. Casting a wider net to include those diagnosed with a MH disorder, the trends are the same. During the pandemic, individuals in all subgroups were less likely to utilize health services, especially the emergency department. (Table 6)

Diagnoses

Figure 1: Comparing Drug Overdose Types Across Groups

Comparing Drug Overdose Types Across "Big 3" and non-"Big 3" Groups

Continuing our analysis on drug overdoses, the graph above compares drug overdose types, either opioid in dark blue or stimulant in light blue, across the following groups: those who overdosed and were diagnosed with a "Big 3" disorder, and those who overdosed but were not diagnosed with a "Big 3" disorder. Opioid drug overdoses are more common than stimulant overdoses in both subgroups. However, they are most common in groups not diagnosed with a "Big 3" disorder, as 92.7% of all people who overdosed, overdosed on an opioid drug at least once. However, among those who were diagnosed with a "Big 3" disorder, stimulant overdoses are slightly more common, as 32.6% overdosed on a stimulant drug at least once. (Figure 2)

Table 8: Comparing Incidences of Suicidal Ideations and Drug Overdose One Year Prior to And During the Pandemic

	Encounters from April 1st, 2019-April 1st, 2020				Encounters from April 1st, 2020-2021			
	Diagnosed with a "Big 3" disorder (n=2,856)		Not diagnosed with a "Big 3" disorder (n=5,946)		Diagnosed with a "Big 3" disorder (n=2,577)		Not diagnosed with a "Big 3" disorder (n=5,204)	
	n	%	n	%	n	%	n	%
Suicidal Ideations								
No	2634	(92.2)	5915	(99.5)	2384	(92.5)	5188	(99.7)
Yes	222	(7.8)	31	(0.5)	193	(7.5)	17	(0.3)
Drug overdose								
No	2775	(97.2)	5893	(99.1)	2494	(96.8)	5145	(98.9)
Yes	81	(2.8)	53	(0.9)	83	(3.2)	60	(1.2)

This year, our Data Plus team explored prevalence of suicidal ideations and drug overdoses using a combination of ICD9 and ICD10 codes that correspond to these diagnoses. Because mental wellbeing is related to likelihood of overdosing on drugs, we aimed to explore these diseases in relation to each other. The tables shown above compare the encounter data from April 1st, 2019 to April 1st, 2020 (one year prior to the pandemic), and to April 1st, 2020-2021 (during the pandemic) so that we can understand how incidences of suicidal ideations or drug overdoses changed during the pandemic. Rates of diagnosed suicidal ideations decreased during the pandemic, and rates of overdose increased during the pandemic. (Table 8)

Figure 2: Mental Health and Substance Use Diagnoses by Sex

Mental Health and Substance Use Diagnosis by Sex 2014-2021

The graph above compares the prevalence of mental health and substance use diagnoses between males and females. All mental health and substance use diagnoses except for schizophrenia spectrum disorder and alcohol use are more prevalent among females than males. (Figure 3)

Discussion

Consistent with prior years' findings, individuals who are released from DCDF and saw providers are composed mainly of Black or African American, non-Latinx, males.

Individuals in the "Big 3" group have longer lengths of incarceration and a higher number of bookings compared to individuals without a "Big 3" diagnosis. The percentage of the incarcerated female population that have been diagnosed with a "Big 3" disorder is nearly double the percentage of incarcerated males with a "Big 3" disorder. However, the male population generally has more average bookings and a longer length of incarceration than the female population.

Analysis of Duke Health utilization shows that both those diagnosed with a "Big 3" disorder and those with a more-general MH diagnosis utilized Duke health services more frequently than without these diagnoses. The group with a "Big 3" diagnosis also had higher percentages of mental health-related Emergency Department Encounters, non-Emergency Department Encounters, and encounters within the Lincoln Community Health Center than the non "Big 3" population.

A larger percentage of individuals in the MH group have mental health-related diagnoses for drug and alcohol use disorders. All mental health and substance use diagnoses — except for schizophrenia spectrum disorder and alcohol use — are more prevalent among females than males.

By examining patterns in suicidal ideation and overdose diagnoses, it became clear that those who were diagnosed with a "Big 3" disorder were more likely to experience suicidal ideations and drug overdoses. Over all, rates of diagnosed suicidal ideations were lower during the pandemic, and rates of overdose were higher during the pandemic.

From these initial findings, the team plans on continuing research on the impact of mental health and mental illness on rates of recidivism. Looking ahead, we plan to thoroughly examine the effects of COVID-19 pandemic on the trajectories of individuals in and out of both the DCDF and health care providers. With more data analysis, our team hopes to further illuminate the intersection of mental health and incarceration within Durham County.