Evaluating Administered Differences of Brief Jail Mental Health Screener and Impacts of Diagnoses & Treatment of Linked Inmates with Severe Mental Illness

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***Abstract*—The United States is the world's leading country in incarceration. American citizens constitute five percent of the global population, but 20% of the world's inmates [5]. Those suffering from mental illnesses are disproportionately affected. According to a 2017 study by the Department of Justice, 64% of inmates in local jails have a history of mental health problems, and 60% are actively experiencing symptoms [2]. To lower the number of Americans behind bars, effective mental health treatment needs to be provided to those in need within the criminal justice system.**

This project, supported by the Jefferson Area Community Criminal Justice Board, is the continuation of a decade of research into the intersection between mental illness and incarceration in the Central Virginia. The primary goal was to evaluate the efficacy of the Brief Jail Mental Health Screener (BJMHS) used by the region's two jails to determine whether an inmate needs further mental health evaluation following their release. Data was obtained from both jails: the Albemarle-Charlottesville Regional Jail (ACRJ) and the Central Virginia Regional Jail (CVRJ), as well as two community programs that provide services to former inmates, Offender's Aid and Restoration (OAR) and Region Ten Community Services (R10).

The BJMHS was found to predominantly identify people who had already received treatment. The screener's effectiveness was also found to vary by the location it was given and by the recipient's demographics: Females tended to make up a statistically significantly larger proportion of the screened-in population than expected, and black individuals a smaller proportion. When people took the screener multiple times at different locations (ACRJ, CVRJ, or OAR) and were changing their answers to therapeutic questions, they were more likely to acknowledge they were previously hospitalized for mental health treatment at OAR than they were at either jail. Additionally, of the cohort of inmates screening in multiple times at ACRJ, it was found that as their number of arrests increased, so did the proportion of the group that screened in and group that matched with R10. The findings of this paper will be used to improve the screener process and ideally increase its ability to correctly identify those who require mental health services.

Keywords—Mental Health, Criminal Justice, Recidivism, Community Health Services

Definitions—A "screened-in" individual is someone identified by the BJMHS as in need of mental health evaluation. "Matched" is a former inmate's successful connection to mental health or other community services.

I. Introduction

An estimated one in twenty individuals will spend some period of their life in jail, and over 50% will experience mental health symptoms during their incarceration. [1]. For some subpopulations, such as female inmates within state prisons or local jails, the estimated percentage is much higher at approximately 75% [1]. The BJMHS was developed to identify inmates to provide much needed mental health services to them. The eight-question screening tool consists of six diagnostic questions intended to identify symptoms of schizophrenia, borderline personality disorder, and major depression, and two therapeutic questions to determine if an individual is currently or previously in treatment for a mental health issue. An inmate is considered "screened-in" for further evaluation if they answer yes to at least two of the six diagnostic questions, yes to at least one of the therapeutic questions, or are recommended for further evaluation at the provider's discretion. The screener is typically administered to all inmates during the booking process, although the exact timing and environment vary by institution. The results are used to identify which individuals should be referred to further mental health evaluation.

The ACRJ, CVRJ, OAR, and R10 work together to address the needs of individuals in the criminal justice system, specifically the role that mental health plays in incarceration. These agencies help to match inmates who screen in through the BJMHS to mental health services and support in the community, both during incarceration and upon release. The three organizations that administer the screener, ACRJ, CVRJ, and OAR, do so under different circumstances, which can artificially impact inmate responses. At CVRJ, the screener is administered by a badged correctional officer at the time of the original intake. At ACRJ, the screener is done a day or two after booking, by a medical professional (usually a nurse). At OAR, the screener is administered usually on the first meeting between a probationer and their probation officer, who is trained in trauma response and in working with people with mental illness.

II. Methodology

A. Previous Work and Data Security Procedures

Prior research conducted by project teams at the University of Virginia analyzed similar data covering the 60 months between July 2015 and June 2020, the 30 months from July 2015 to December 2017, and the 18 months from July 2015 to December 2016. Key findings include that 26% of all inmates at ACRJ from 2015 to 2019 screened in for referral to further mental health treatment. Around 19% of those who did receive services from R10 returned to custody within 12 months, making them 8% more likely than those who did not receive services. Past research teams also focused on understanding key influences to mental health services and the screening process, tracking of inmates' progression through jail to mental health services, and analyzing the demographics of inmate relative to screener responses. All team members followed the same data security procedures discussed in detail in previous publications [3]. All team members received training on research with human subjects, adhered to security measures developed for HIPAA protected or personally identifiable information, and stored and accessed all data on a secure virtual machine with several layers of protection.

C. Data Acquisition and Merging

The data analyzed spanned 72 months from July 2015 to June 2021. Data sets from ACRJ and CVRJ included every booking event, and corresponding information such as gender, race, age, and crime severity (charge and class). The OAR data sets contained information for individuals receiving pre-trial services or probationary supervision. Each of the ACRJ, CVRJ, and OAR data sets contained the responses to the BJMHS from each time it was given. R10 provided three datasets: one recording each instance of treatment received by a patient (i.e., one therapy session), one with demographic information for each patient, and a third recording each time a diagnosis was given. The majority of the analysis was conducted using the ACRJ and R10 data, which was combined using perfect matches on full name and date of birth from a crosswalk table built by undergraduate data

science students. Those who were serving parts of their sentence on the weekends, had died while in custody, or those who were transferred to another jail or the Department of Corrections were removed from the dataset. Screener data from respondents that left any of the questions blank was also not considered. For demographic analysis considering race, all races other than Black and White were removed due to lack of representation in the data from the jails. Given the high number of outliers in each dataset, the number of arrests, diagnoses, and services received were all restricted to a maximum of 6 per person as at least 90% of booked individuals had less than 6 of each metric.

D. Research Goals and Analysis

The primary objective of the research was to evaluate the BJMHS's ability to identify those in need of mental health treatment, and the subsequent treatment matching process between involved organizations. To assess the performance of the BJMHS, trends in the following metrics were analyzed:

1. Number of yes and no responses to each BJMHS question
2. Changes in an individual's BJMHS responses between various organizations
3. Demographic information of individuals screening in/out and being matched/unmatched to services
4. Number of times an individual had been arrested and the number of services they received at R10
5. Type of service (mental health, emergency, substance abuse) and the number of treatment units (1 hour for mental health and substance abuse; 1 day for emergency)

Subsequently, the following questions were asked to accomplish the primary objective:

1. Are individuals screening in more often on the basis of diagnostic or therapeutic factors?
2. Are individuals of certain demographics screening in or matching at higher rates?
3. Are individuals with more arrests more likely to screen in because of diagnostic or therapeutic factors?
4. Do individuals receive services before or after an arrest?
5. How do the type and amount of service vary between the screened-in and screened-out populations?
6. Are there discrepancies in the screener responses for individuals who have taken the BJMHS at multiple locations?

III. RESULTS

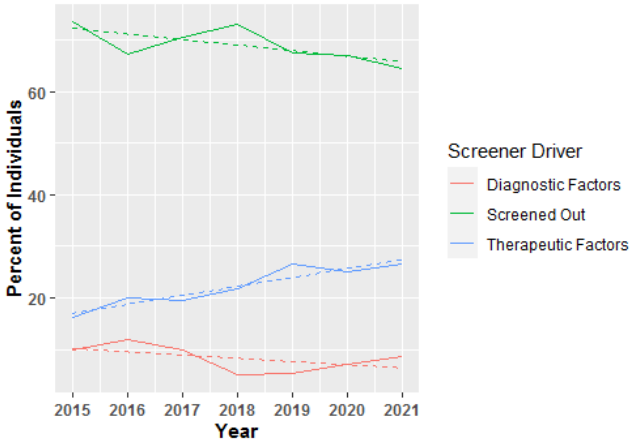

Fig. 1. ACRJ screener results by year: over time trends have remained fairly consistent, but there is a slight increase in individuals screening in.

The majority of individuals in the ACRJ screened out. 22.5% of the total ACRJ population screened in via therapeutic factors and 10.5% did so via diagnostic factors. The overall screen in rate was 33%. Fig. 1 shows that over the past 6 years the proportion of bookings with a screened-in BJMHS is increasing. Screening in via the diagnostic factors trended downwards, while therapeutic factors trended upwards. This upward trend may be a result of recent efforts to destigmatize mental illness. 586 individuals in the ACRJ database matched to R10. 43% of the matched population never screened in, and of those, approximately half had received services before their first arrest. 20% of the matched population screened in via the diagnostics factors, and of those 66% had received R10 services prior to their first arrest. 37% of the matched population screened in via the therapeutic path and 67% of those had been receiving R10 services before their first arrest. These numbers, however, are limited by the timeframe of the datasets.

To better understand the impact of the BJMHS and its administration, the demographic composition of the ACRJ population was compared to that of the subpopulation of people who screened. A one-sample test of proportions was used to compare 3 groups to the baseline ACRJ population: everyone who screened in, those who screened in via diagnostic factors, and those who screened in via treatment factors. All assumptions of the test were met, and a significance level of alpha=.05 was used. Black and White Females both make up a larger proportion of the screened-in population than expected based on their proportion in the baseline ACRJ population. Conversely, Black and White Males constitute a smaller proportion of the screened-in population than the ACRJ as a whole.

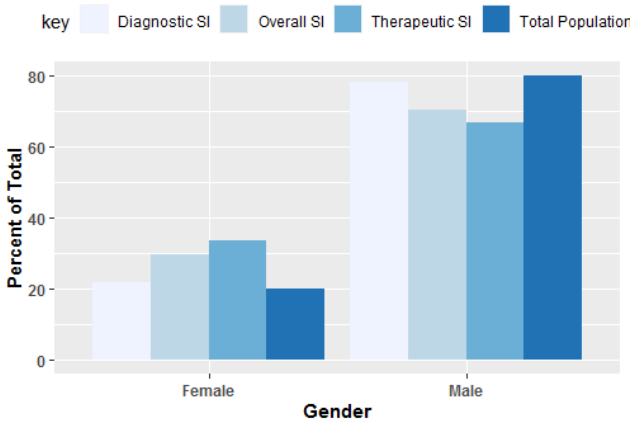

Fig. 2. Total ACRJ and screened-in ACRJ by demographic: Females screening in screen in at a higher rate for therapeutic factors than any other factor.

Looking solely at gender, roughly 20% of ACRJ is female. Though it is hypothesized that this 20% proportion would stay consistent throughout the three comparison groups, this was only true in the case of the diagnostic factors path. The proportion of females in the screened-in group (29.7%) and the therapeutic factors group (33.4%) were significantly higher (p-values=0.000). One potential explanation is that because the BJMHS is administered by a nurse, women feel more comfortable answering yes to treatment related questions. This could be confounded by the fact that most nurses are also women, so female inmates received same gender questioning.

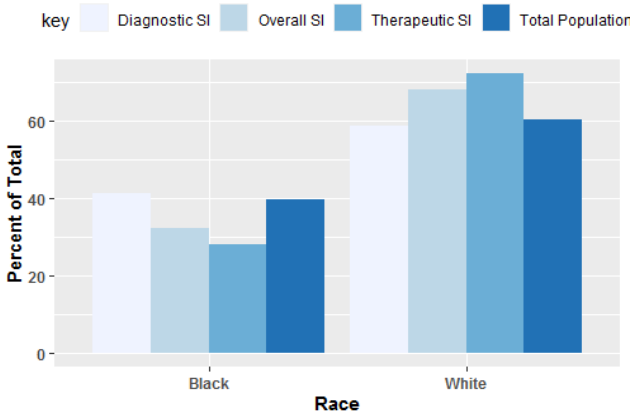

Fig. 3. Total ACRJ and screened-in ACRJ by race: Black inmates are disproportionately under screened-in compared to their White counterparts

Around 39% of the overall ACRJ population is black. Similar to gender, the Balck vs. White proportion of the screened-in population resulting from diagnostic factors did not significantly differ from the expected 39% (p-value=0.289). However, the percentage of Black individuals within the overall screened-in population and the population screening in via therapeutic factors was significantly lower than the expected 39% at 32% and 28% respectively (p-values=0.000). In other words, Black individuals make up a lower proportion of the screened-in population than expected. In the same way, White inmates are comprising a larger proportion of the screened-in and therapeutic factor groups than hypothesized. These findings support published evidence of Black inmates having lower odds of screening in on the BJMHS [4]. Further analysis is needed to identify the cause of this disparity.

The demographics of the matched population were also incorporated. Over 2 times as many people in the matched population had screened in via the therapeutic path versus the diagnostic path. Because a "matched" individual was defined as one found in both ACRJ and R10 databases regardless of chronological order, many in the therapeutic factors group might have received services from R10 prior to arrest. This could suggest that the BJMHS primarily identifies those who have already received treatment and is not as robust in identifying those who have yet to be formally diagnosed.

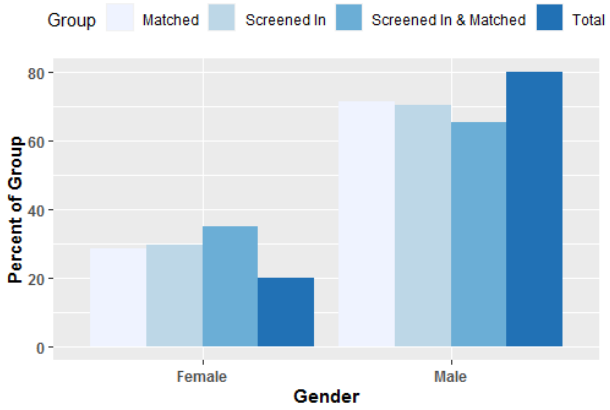

Fig. 4. Distribution of group by gender at ACRJ: Women who were screened at ACRJ screen in and are matched to R10 services at a greater rate than men who were screened at ACRJ

The distribution of gender in the subpopulations of those who matched, those who screened in, and those who did both was compared to that of the ACRJ. These three groups did not reflect the overall gender composition of the ACRJ, which is a 20% female. Women made up a significantly larger proportion of both the matched and screened-in populations (p-values=0.000), and an even larger proportion of the combined screened-in & matched group (p-value=0.000). This could mean women are the treatment resources available after their release at higher rates than men.

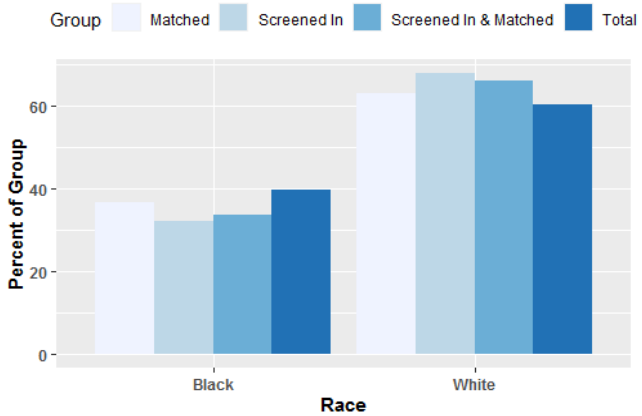

Fig. 5. Distribution of group by race at ACRJ: Black inmates are underrepresented in the matched and screened-in populations compared to the overall ACRJ population

Black individuals make up 37% of the matched group, reflecting the expected 39% of the baseline population (p-value=0.27). 32% of the screened-in population was Black (p-value=0.000). For those screened-in & matched, 34% were

Black (p-value=0.05). The screened-in & matched group is on the borderline of a significant difference. These results indicate race has little to no impact on whether an individual receives services at R10.

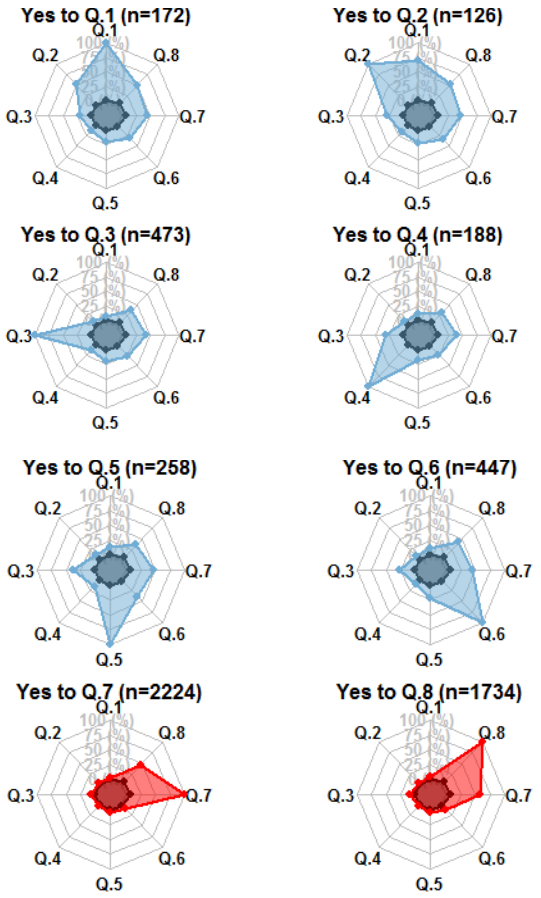

Fig. 6. Correlation of question responses for the BJMHS: The radio plots for the therapeutic questions (red) are far closer to the population baseline responses (black) than for the diagnostic questions (blue), implying a lack of correlation between responses to the two question types

A radio plot was made for each question of the BJMHS. Diagnostic questions were shaded blue and therapeutic one shaded red. The black area overlayed one ach plot represents the proportion of yeses to each question in the jail's overall population. As shown in Fig. 6, an individual who responded 'yes' to any of the 6 diagnostic questions is more likely than the average inmate to respond 'yes' to any of the other screener questions. There also appears to be a stronger relationship between a yes to questions 1 and 2 than other diagnostic questions. This is expected as questions 1 and 2 ask whether about feelings of reading others' thoughts or others being able to read your thoughts respectively.

Fig. 6 also shows that for therapeutic questions a positive response to either question is only slightly correlated with a positive response to any diagnostic questions. The relationships these two questions have with the rest of the screener is fundamentally different than that seen in the diagnostic questions. This is expected as the therapeutic questions target whether a screened individual is currently under the care of a mental health provider and taking medication (question 7) or been previously hospitalized for mental health services (question 8), unlike the diagnostic questions (1–6) which focus on active symptomatology. When compared to Fig. 1, this difference in correlation with other questions indicates that the BJMHS primarily screens in individuals who have already received mental health services and does a poorer job of screening in individuals showing signs of severe mental illness who are not already receiving help.

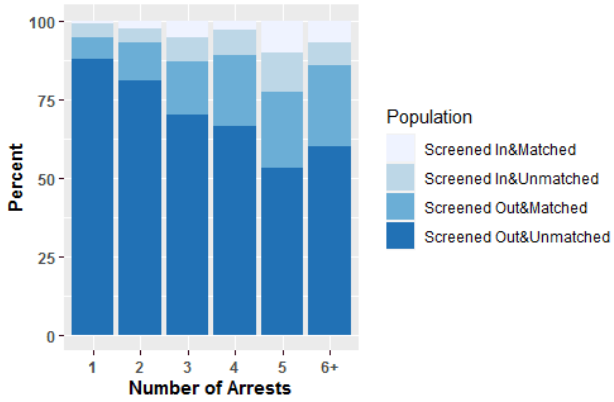

Fig. 7. Number of arrests vs population: As arrests increase for an individual, the proportion of the screened-in inmates at ACRJ increases.

Next, the ACRJ population and specifically the subpopulation matching to R10 were further analyzed to determine whether individuals are cycling back and forth between jail and treatment. In the ACRJ population, there is a strong positive relationship between the number of arrests and both the percentage of people screening in and the percentage of people matching (Fig. 7). Those with only one arrest from 2015-2020, for instance, screened in at 27%, while those with six or more results screened in at 71%. Moreover, the trend is consistent for individuals screening in via diagnostic factors and therapeutic factors. Just like the percentage of individuals screening in, the percentage of individuals matching to R10 increases with the number of arrests (Fig. 7). The screened-out and unmatched population decreases as the number of arrests increases, while the other three populations increase, with a slight deviation from 5 arrests to 6+. Thus, the more times an individual has been arrested, the more likely they are to both screen in and match.

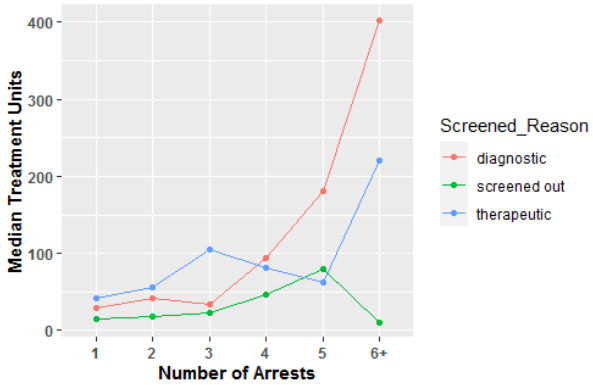

Fig. 8: Number of arrests vs median treatment unitS: The number of treatment uses at R10 is positively correlated with number of arrests.

Analysis of the R10 data shows that the number of times a person has been arrested is also positively correlated to the

amount of service time they received at R10 (Fig. 8). The median number of treatment units for those who screened in via both diagnostic and therapeutic factors was significantly lower in those who had one to three arrests compared to those with four or more. Additionally, 61% percent of individuals who were matched had already received treatment at R10 prior to their first arrest in the ACRJ database. For those who were only arrested once from 2015-2020, 66% had already received service from R10, potentially indicating arrests prior to 2015 that were not captured in the dataset. Thus, a large proportion of individuals being arrested already received treatment for mental health disorders. Moreover, individuals being arrested frequently receive more services and more service time. It therefore seems likely that a significant number of people are cycling back and forth between the ACRJ and R10, suggesting that serious mental illness contributes to re-incarceration, regardless of linkage to community-based mental health services. It may also indicate that those receiving the highest levels of treatment service are also are the highest risk of recidivism.

It is notable that this cyclical trend is also present in the screened-out population. Using a Mann-Whitney test, it was determined with 95% confidence that screened-out individuals who were arrested four or more times received significantly more treatment units at R10 than those who were arrested one to three times. Moreover, screened-out individuals constitute 22% of the matched population who have been arrested four or more times. These results suggest that, though an individual is more likely to screen in as their number of arrests increases, there is still a significant number of people cycling between ACRJ and R10 who are not screening in via the BJMHS. The following analysis aims to determine why individuals being frequently arrested and receiving R10 services are not screening in.

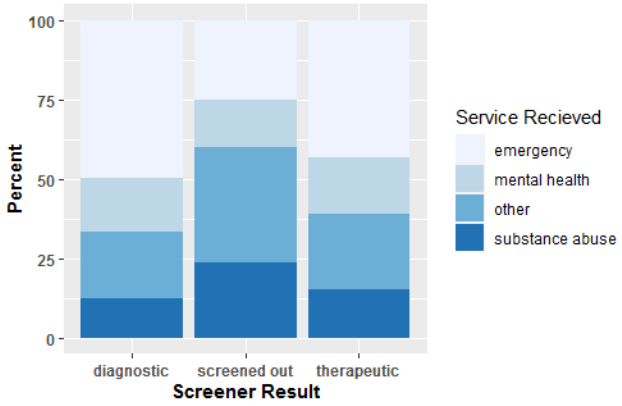

Fig. 9. Type of service by screener result: The screened-out population uses substance abuse services at a much higher rate than screened-in.

The distribution of service by screener result shows that a disproportionate number of those who screen out receive substance abuse services at R10 compared to both of the screened-in populations (Fig. 9). 24% of the screened-out population was at R10 for substance abuse counseling compared to 12% of the diagnostic screen-ins and 15% of the therapeutic screen-ins. Furthermore, the prevalence of substance abuse disorders among former inmates treated at R10 is striking compared to the baseline population. For individuals at R10 who were not found in the ACRJ database, substance abuse disorders consist are only two of the ten most common diagnoses. For those who were previously arrested, however, substance abuse disorders constitute 6 out of the 10. 14% of the R10 population unmatched to the ACRJ database is diagnosed with alcohol dependence compared to 34% of the matched population. The matched population also has a higher percentage being diagnosed with cannabis dependence at 38% compared to 8% in baseline, and opioid dependence affects 5% of the unmatched population compared to 25% of the matched population. There is strong evidence to suggest former inmates suffer disproportionately from substance abuse disorders.

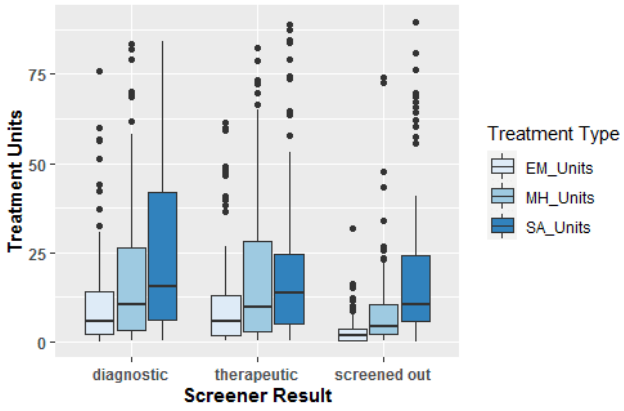

Fig. 10. Screener result vs treatment units: The population that screened in from the diagnostic questions uses more substance abuse services on average than those who screened in due to therapeutic questions or those who screened out.

The majority of the people who matched to R10, but did not screen in via the BJMHS during their ACRJ booking needed treatment for substance abuse. The distribution of treatment units by screener result and type (Fig. 10) shows that while the screened-out population received significantly less mental health and emergency services, the median number of substance abuse treatment units is not significantly different from the screened-in population regardless of route. Of the 586 individuals who matched, 250 were screened-out. 64% of these individuals received substance abuse counseling from R10. 26% of those who screened out and received substance abuse counseling also required emergency services from R10.

There are important differences between the diagnoses common for those who matched and screened in compared to those who matched and screened out. As shown, the group of individuals that never screened in on the BJMHS use proportionately more substance abuse services than those who screened in, regardless of path. This shows a similar pattern to an analysis for the screened-in and screened-out populations of the 10 most common psychological disorders diagnosed at R10. For the screened-out population, seven out of the ten most common diagnoses were substance abuse disorders, compared to six out of ten for the screened-in population. The most common non-substance abuse diagnosis among screened-out individuals, PTSD, is the 4th most common diagnosis overall and only found in 20% of the population. In the screened-in population, PTSD is second only to alcohol dependence and found in 37% of the population. A similar trend is observed in the proportion of the populations diagnosed with recurrent and moderate Major Depressive Disorder, the 7th most common diagnosis in the screened-in population and the 9th for the screened-out

population. 18% of those in the screened-in populations are diagnosed, 7% more than those who screened out. Thus, while both populations are commonly diagnosed with substance abuse disorders, the screened-in population has a higher prevalence of mental health disorders. This is further evidence by differences in the distribution of services received between the screened-in population and the screened-out population (Fig. 6). While the screened-out population has a similar distribution for the units of substance abuse service received, its distributions for mental health and emergency services are significantly lower. These differences suggest that while the screened-in population suffers from substance abuse disorders, these diagnoses are often co-occurring with mental health problems.

In addition to potentially missing a population cycling between the ACRJ and R10, analysis showed that screener results were also dependent on external factors like the location it was given. Circumstances around symptoms and treatment can change, so screener answers are expected to fluctuate. However, one's response to question 8 on the screener should rarely change as it asks if the individual has ever been hospitalized for mental illness. So, in order to validate the screener's ability to capture an honest answer, the responses of inmates who took the screener at both OAR and CVRJ or ACRJ were analyzed. Almost half of the people coming from either jail to OAR changed their answer to question 8 from 'no' to 'yes'. Similarly, about a quarter of the people going from OAR to either jail changed their answer from 'yes' to 'no' when coming from OAR to either jail: a quarter of each population. This might suggest the screener process at OAR leads to more honest answers.

IV. IMPLICATIONS AND CONCLUSION

The BJMHS was developed to identify all inmates that might benefit from further mental health evaluation. Findings by this group, however, suggest that external factors like race, gender, prior treatment, and location can impact on whether an inmate screens in. As shown in Section II, female inmates at ACRJ were overrepresented in the screened-in group compared to their male counterparts. White inmates were also overrepresented in proportion compared to their Black counterparts in the screened-in group. This white and female overrepresentation is mirrored in the population matched to R10 services. Regardless of race or gender, a larger portion of the people the screener identified were already receiving treatment for mental illness.

In the cohort of inmates arrested at ACRJ there is a strong positive correlation between number of arrests and the percentage of screened in individuals, the percentage of matched individuals, and time or amount of services received by R10. The trend is consistent for those screening in and matching for both behavioral and therapeutic reasons. Of the services being received at R10, however, the majority of those who were not screened in but matched to services received substance abuse treatment specifically. This group of people received more substance abuse service than those did screened in.

Of those with multiple arrests, the location the screener was given impacted the individual's response to the BJMHS question 8. People changing their answer were more likely to acknowledge having been hospitalized for mental health treatment in the past at OAR, rather than at ACRJ or CVRJ. Additionally, a larger percentage of people change their answer when going from OAR to CVRJ than from OAR to ACRJ. This could be because at OAR the screener is given in an office setting rather than a jail setting and the administrator has received trauma-informed training. Similarly, the higher rate of the answer change between OAR and CVRJ vs. OAR and ACRJ might be because the screening process is conducted by a badged officer at CVRJ, and a healthcare provider at ACRJ.

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