SHERIFF DENITA R. BALL

May 18, 2023

TO: Chairwoman Marcelia Nicholson

FROM: Sheriff Denita R. Ball,
Inspector Brian M. Barkow

RE: Milwaukee County Supervisor Ryan Clancy's request for jail incident data before and during the COVID-19 Pandemic

The following report details the findings from a time series analysis of violent incidents in the Criminal Justice Facility (CJF) from 2019 onward. The goal of the analysis is to explore the potential causes of why the number of incidents may rise or decline and to seek out solutions that can reduce the number of incidents overall.

Milwaukee County Jail Incident Analysis

Data Source:

All the data for the following analysis derive from the ProPhoenix Correctional Management Software used by correctional staff to manage jail operations and the Ceridian Dayforce personnel data used for recording staff employment and scheduling data.

Methodology:

This time series analysis was designed to explore the number of CJF incidents, and the factors potentially contributing to such incidents, over time. To provide a complete and thorough assessment, the analysis was designed to explore periods of time before, during, and after the outbreak of the COVID-19 pandemic. Therefore, the analytic timeframe includes all points in time from 2019 until the last full calendar month (March 2023).[1] This analysis is organized into the following steps:

- First, the total monthly incident counts will be explored independently of other factors. This will be done by focusing on graphical illustrations of the data. Some observations will be discussed based on the apparent trends.
- Second, the role of different factors data will be explored in juxtaposition of the incident data. These comparisons will address each factor, one by one, by focusing on a graphical portrayal of the data. For each comparison, set of observations will be made to describe the relationship between each factor and the total number of incidents. The factors that will be discussed include the following:
    A. The total population of occupants confined in the CJF
    B. The number of correctional staff employed at the CJF
    C. The number of occupants in the jail who have been involved in multiple violent incidents
- Lastly, the analysis will explore the statistical correlation between each of the factors to provide a more precise measure of the strength and direction of the relationships.

Exploring Total Incident Counts

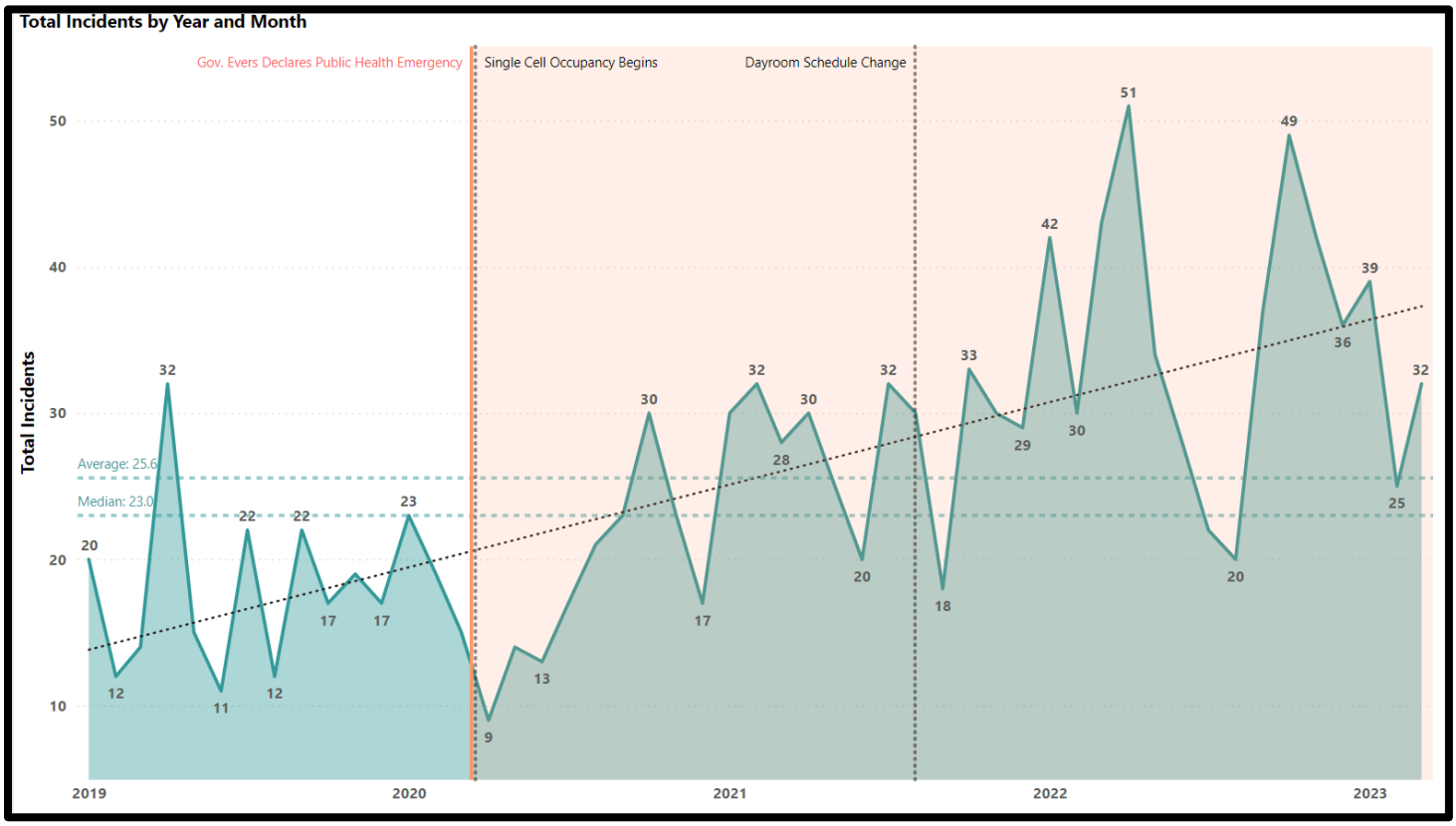
For the purposes of this analysis all incidents that involved physical violence or the use of force were included. The incidents included consisted of all occurrences involving one or more of the following:

- Fights between occupants
- Occupant assaults on another occupant
- Occupant assaults on staff
- Staff use of force

The following area chart portrays the total number of incidents per month from 2019 to the present (March 2023). As noted above, the incidents included in the analysis consist of any incidents in the CJF involving a fight, a physical assault, or a use of force. A couple of observations are illustrated by the chart. First, there is a clear pattern of high variability from month-to-month in the total number of incidents over time. The overall level of fluctuation in total monthly incidents counts suggests that the factors contributing to the occurrence of incidents are dynamic and variable from one month to the

[1] The analytic time frame includes all incidents occurring during the following date range: 1/1/2019 to 3/31/2023.

next. Second, there appears to be a general upward trajectory in the number of incidents from 2019 to the present. So, in addition to the factors resulting in short term fluctuations, there also appear to be factors that are resulting in long term shifts in the total number of incidents over time. For example, much of 2019 and 2020 have monthly incident counts that are below the overall average of 25.2 and the overall median of 23.0 incidents, while many months in 2022 and 2023 appear above the overall average and median values.



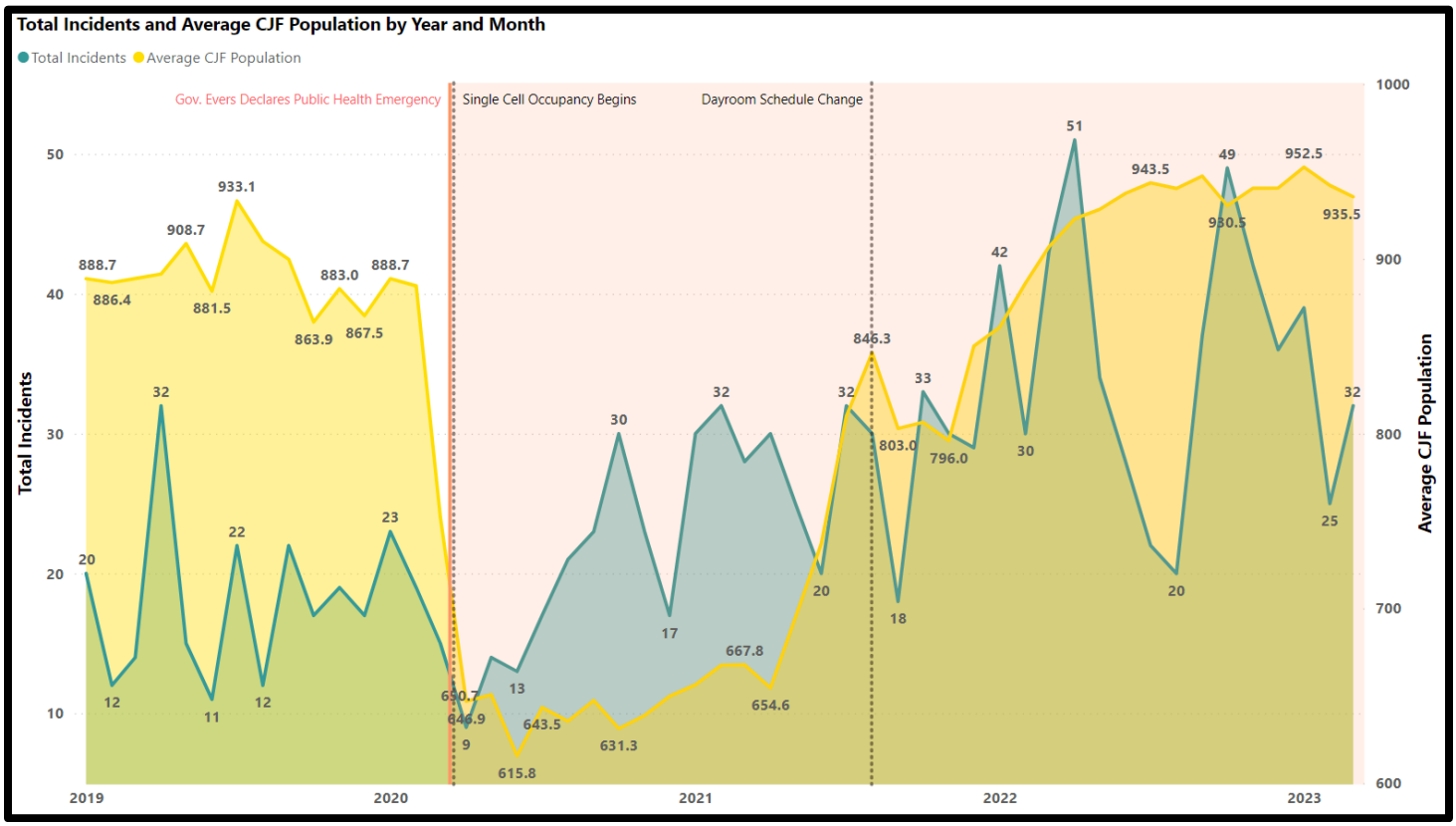
To better understand the variation in CJF incident counts over time a few factors are explored below. One by one, this analysis makes direct comparisons so that the trends in each factor can be understood in relation to the variation total incident counts.

Exploring The Effect of Total Jail Population

First, to understand the factors contributing to higher incident counts in the jail a comparison was made to the total population of occupants confined in the CJF. This included individuals those who are/were currently in custody ("Active-In") or those currently being booked in ("In Progress") but excluded all individuals who were not confined in the CJF ("Active-Out"). Individuals obviously need to be present to be involved in an incident, so in theory, larger population would correspond to larger total incidents. However, as can be seen directly below, this relationship does not appear to be supported by the data.

The area chart below compares the total monthly incident counts to the average monthly CJF population of confined individuals. The axis for the monthly incident counts (blue/teal) remains on the left side, but a new axis is added on the right to portray the CJF population values (yellow). This chart

reveals a couple of findings. First, the population values reveal a clear pattern in which higher average population numbers can be observed prior to the start of the COVID-19 pandemic (around when the CJF single occupancy cell policy was enacted) and again after May of 2021 when the impact of the pandemic began to lessen, and the single occupancy cell policy started to phase out. A second major observation portrayed by the data is incontinent relationship between overall population and total monthly incident counts. For example, prior to the pandemic, the CJF was occupied by a relatively high average population levels, but the incident counts were relatively low. Directly after the pandemic population numbers dropped substantially, while incident counts were on the rise. It was only during the last year that incident counts appear to be matched with high monthly CJF population totals.

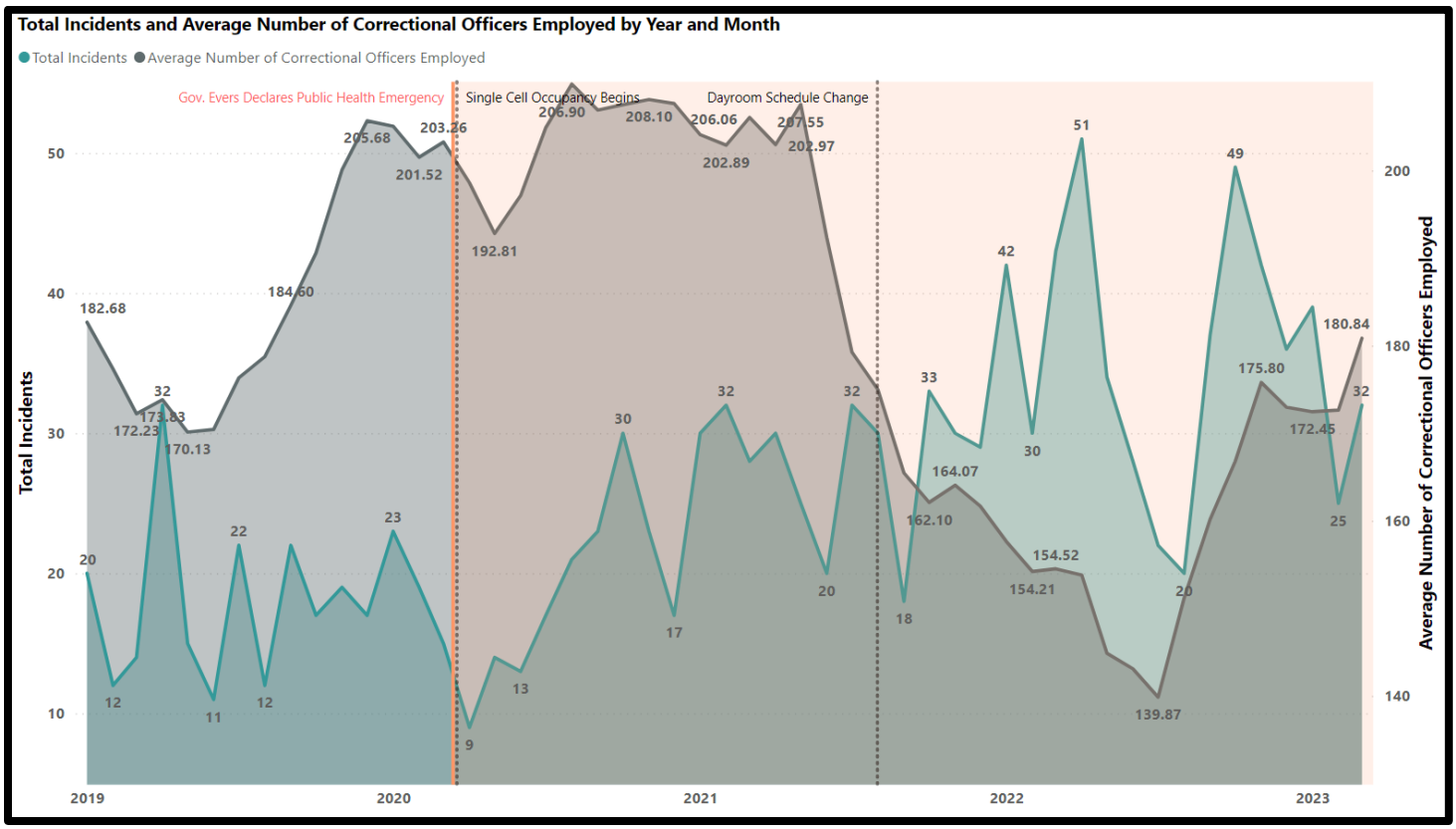


Exploring The Effect of Jail Staffing

Since overall CJF population totals do not appear to explain the variation in monthly incident counts, other factors must be contributing to the variation in total incidents over time. One key factor to consider is the role of staffing. Correctional officers can serve as a deterrent to disruptive behaviors and having additional staff nearby can help prevent a violent incident before it occurs. Conversely, when the jail is understaffed, it can be difficult for staff to prevent a disturbance or stop incidents from escalating.

In the area chart below, the total monthly incident counts are compared to the average number of CJF staff. The staff data is pulled from the Ceridian Dayforce database and includes all the Correctional Officers (CO), CO Lieutenants, and CO Sergeants that have been employed since 2019. The axis for the monthly incident counts (blue/teal) remains again on the left side, but a new axis is added

on the right to portray the average number of correction staff employed at the CJF (gray). A couple of points can be made based on the data trends. First, the average CO staffing level appears to be relatively high between December 2019 and May 2021[2] but drops precipitously to a low of around 140 officers in July of 2022. It is also worth noting that during 2022, the Milwaukee County Jail staffing shortage became headline news particularly as jail population numbers were increasing. A second point portrayed by the area chart is an apparent inverse relationship between overall staffing levels and the monthly incident counts. For example, during the period of in which the CJF was operating with a relative shortage of staff, incidents were at their highest and when staff numbers were relatively high, total monthly incidents number range from low to moderate.[3] These findings appear to support the logic of an inverse relationship, where low staffing may be contributing to higher incident counts and greater staffing numbers may be limited the number of overall incidents, whether as a result of general deterrence or by some other mechanism.



Exploring The Effect of More Frequent Offenders

[2] During the 18-month period between 12/1/19 and 5/31/21 there were about 204.03 correctional officers employed and assigned to the jail on average. In contrast, during the following 18-month period (between 6/1/21 and 11/30/22) the average number of jail staff dropped by about 20.99% to an average of 161.21 correctional officers.

[3] Looking at the same 18-month time periods, the data reveals that when staffing was relatively high (12/1/19 - 5/31/21), the average number of incidents was at about 21.4 per month, and during the subsequent period of lower staffing number (6/1/21 - 11/30/22) the monthly incident count increased by 53.27% to an average of 32.8 incidents per month. In other words, during the same period in which the average number of staff dropped by over one-fifth, the number of incidents had increased by over one half of the previous value.

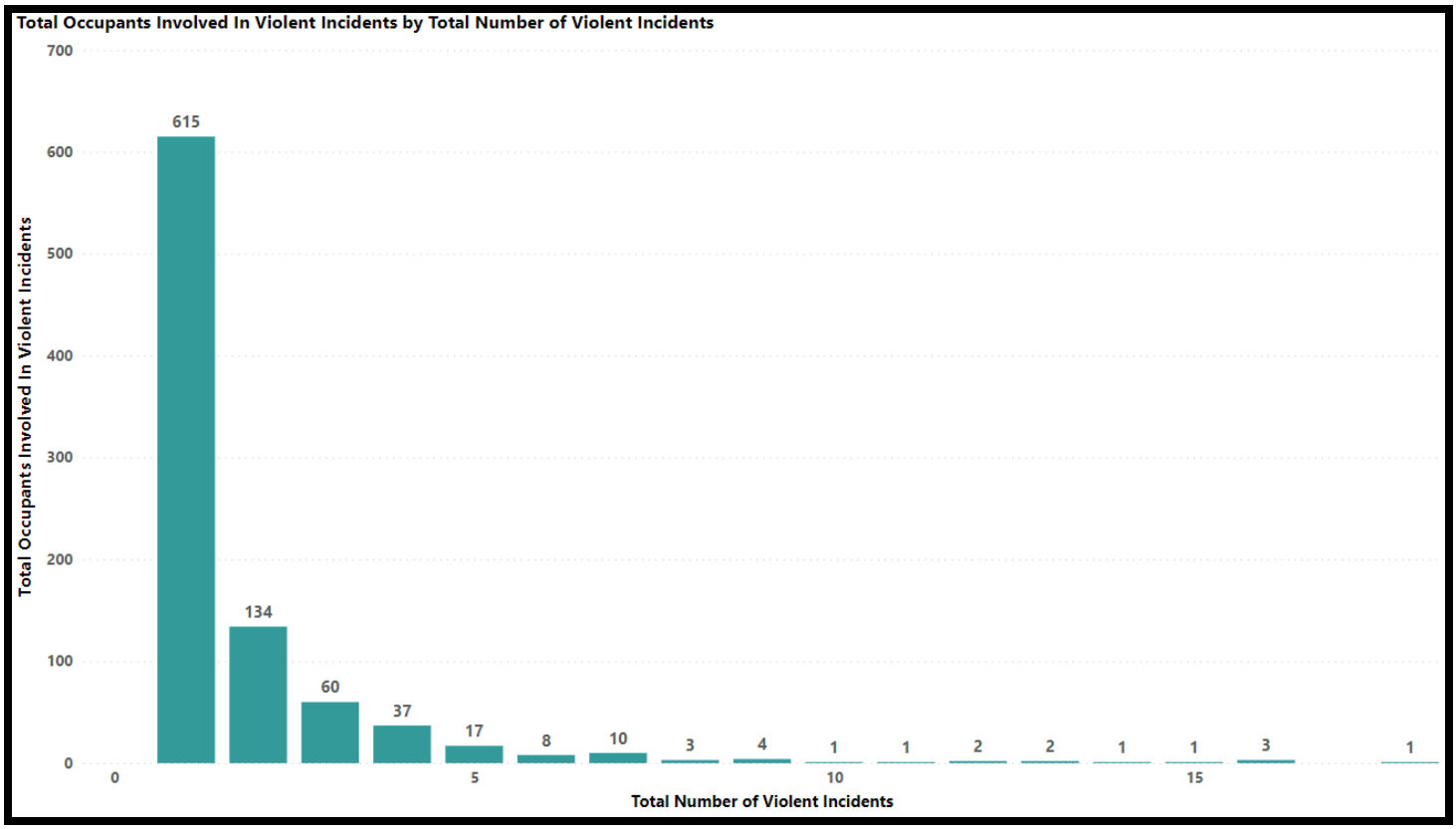
Beyond correctional staffing levels, another contributing factor to consider may be the role of more violent offenders who have been booked into the CJF over time. In theory, if something is causing more violent offenders to be booked into the jail (e.g. - a spike in violent crimes within Milwaukee County), the confinement of these individuals may account for a disproportionally large number of the total number of incidents compared to those who rarely or never become involved in a violent incident.

To explore this potential, a measure was created to identify all occupants in the jail who were ever engaged in more frequent physically violent incidents.[4] If an occupant was involved in one or zero violent incidents during their lifetime they were not counted among this group, but any individuals that were ever involved in two or more violent incidents were.[5] The bar chart directly below explores the population of individuals who ever engaged in a violent incident in the CJF during their lifetime. The chart identifies how many incidents these individuals were ever involved in. The data reveals that most individuals who were ever involved in a violent incident during their lives, were only engaged in a single violent incident. In contrast, a relatively small number of individuals appear to account for a disproportionately large number of incidents.[6] In fact, as can be seen in the bar chart below, four individual occupants have contributed to a total 66 of violent incidents in the jail during their lifetimes. The median number of incidents that this population was involved in was 1.0 incident and the average number of incidents was less than two (1.82). With this finding, the analysis proceeds to explore the role of occupants involved in more violent incidents by creating a measure of the monthly average number of occupants who were ever involved in 2 or more incidents.

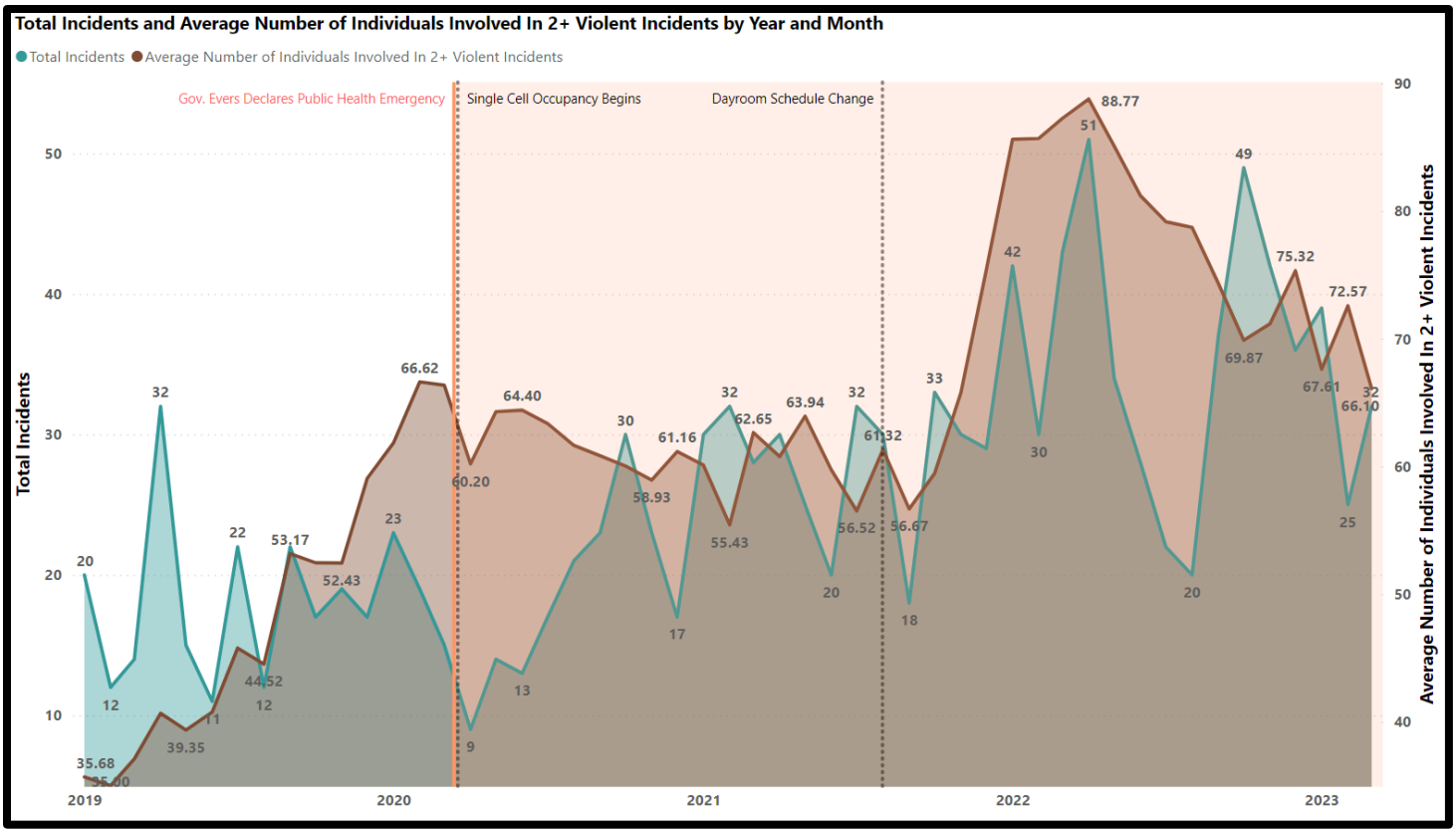
[4] It is important to note that this measure was based on the count of violent incidents only. So, if an individual was involved in many non-violent incidents (e.g. - refusing to follow an order), but never involved in a violent incident, they would not be included in that measure.

[5] The frequency of violent incidents was not limited to the period of 2019 to the present. Individuals were coded based on the total number of violent incidents they engaged in at the CJF during their lifetime. Consequently, it is possible that some of these individuals were engaged in 2 or more violent incidents prior to 2019 and never engaged in any incidents during the analytical period.

[6] Of the 900 individuals involved in incidents who are portrayed in the bar chart, a total of 615 of them (68.26%) were only ever involved in a single incident. Only 285 occupants (31.67%) were involved in multiple violent incidents in the jail during their lives. Furthermore, only 151 individuals (16.78%) were involved in 3 or more incidents. These findings reveal that certain individuals account for a disproportionate number of the total violent incidents. Overall, the median number of incidents is 1.0 and the average number of incidents per individual is 1.82.



In the area chart below, the total monthly incident counts are compared to the average number of occupants who were involved in two or more incidents during their lives. These individuals represent the more frequent offenders who have historically contributed to a disproportionately large proportion of the violent CJF incidents. The axis for the monthly incident counts (blue/teal) is on the left side, and an additional axis is added on the right to portray the average number of more frequent offenders who have engaged in 2 or more incidents (orange). The data portrayed in the chart illustrate that despite the existence of short-term monthly variations that the number of more frequent offenders has been increasing in general from a low of around 35 individuals early in 2019 to a high of about 89 individuals in April 2022. Since that point it appears that the number individuals involved in two or more incidents has been on the decline. A second key observation portrayed by the data is the generally consistent overlap between the pattern of incident counts and the trends of more frequent incident offenders. The data appears to support the logic that a small group of offenders who are involved in violent incidents more frequent may be contributing to a rise in the total monthly incidents. Despite some small deviations, there appears to be a modestly strong relationship between these variables.



Correlational Analysis of Total Incidents

Finally, statistical correlations are calculated to provide a more precise measure of the relationships between the number of CJF incidents and other the factors. A correlation coefficient provides a quantifiable measure of both the strength and the direction of a relationship between two factors. It ranges from zero (i.e. - no statistical relationship) to one (i.e. - a perfect relationship), and a positive (+) value reveals that the association is positively related, whereas a negative (-) value indicates a negatively related relationship.[7]

To conduct the calculations, a rolling average of the number of violent incidents in the jail compared to rolling averages of the following factors: [8]

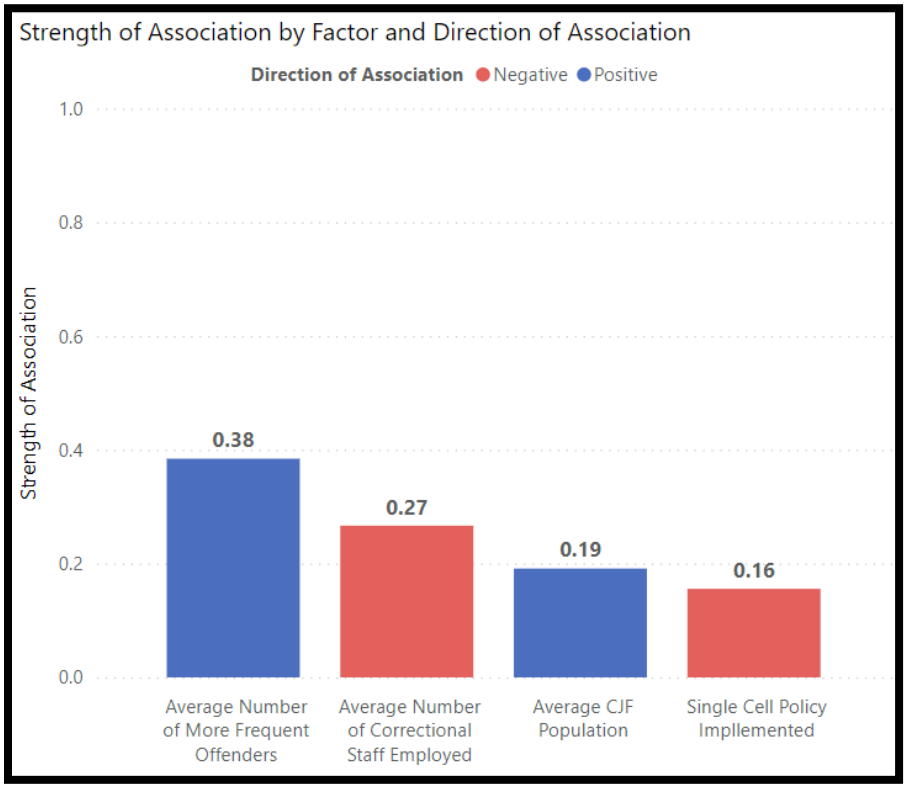
- Average CJF Population
- Average Number of Correctional Staff Employed at the CJF

[7] A Pearson correlation coefficient, which is represented by an (*r*), is generally evaluated based on the following scoring rubric (see the complete chart in Appendix A): 0.0 - 0.19 (very weak), 0.20 - 39 (weak), 0.40 - 0.59 (moderate), 0.60 - 0.79 (strong), 0.80 - 1.0 (very strong). Positive (+) correlation coefficients represent a relationship in which both factors tend to move in the same direction. For example, an increase in one factor corresponds to an increase in the other and a decrease in one factor is linked to a decrease in the other factor. In contrast, a negative (-) coefficient represents an inverse relationship. This means that the factors tend to move in opposite directions. For example, an increase in one factor corresponds to a decrease in the other factor.

[8] To accomplish the correlation, the Excel Data Analysis Correlation tool was used. This tool provides access to a Pearson coefficient calculation. The Pearson correlation coefficient (*r*) is a standard statistical measure of the linear relationship between two continuous variables. For this calculation the measures were transformed into 7-day rolling averages to convert the data from discrete counts into more continuous variables, which are what the Pearson coefficient is designed to analyze.

- Average Number of More Frequent Offenders (Involved in Multiple Violent Incidents)
- The Implementation of a Single Cell Policy[9]

Below, a bar chart provides a graphical representation of the strength and direction of the factors revealed by the correlation coefficients (See the full correlation matrix in Appendix A). A couple of points are clearly portrayed by the bar chart. First, among the factors explored in the analysis, the measure of more frequent offenders (i.e. - those involved in two or more incidents) was revealed to have the strongest relationship with the average number of incidents. While this measure is most closely associated, the association is only weak/moderate in strength. The positive value indicates that an increase in the number of frequent offenders is associated with a weak to moderate increase in total incidents overall. The positive relationship also suggests that a decrease in the number of frequent offenders is related to corresponding decrease total incidents.



The next strongest association was with the average number of correctional staff employed. This coefficient reveals a weak, negative relationship between the number of staff and the number of incidents suggesting that an increase in total staff is weakly linked to a decrease in total incidents and a decrease in staff is weakly associated with an increase in total incidents.

[9] The single cell policy was a policy implemented at the Milwaukee County Jail near the beginning of the COVID-19 pandemic to help prevent the spread of the contagion. It was phased out in May of 2021.To represent a measure for this factor, a categorical dummy variable was included in the correlational analysis. This is a dichotomous measure which was operationalized to indicate whether the single cell policy was in effect (1 = policy implemented) or not (0 = policy not implemented). The policy went into effect on 3/17/2020 and, for the purpose of the analysis, it was coded to end on 5/19/2021. The dichotomous nature of this measure prevents a transformation into a more continuous data type.

The two weakest relationships included in the analysis are with the average jail population and with the implementation of the single cell policy. The coefficient of the average total jail population is weak to very weak in strength and positive in direction. This suggests that the jail population does not have much of an effect on total incidents, but the direction reveals that, on average, increases in total jail population are weakly or very weakly linked to increases in total incidents. The single cell policy also appears to have a negligible effect on the total number of incidents. The little effect it has appears to relate negatively to the total incident counts, suggesting that when the policy was in effect, that there were slightly fewer incidents overall, but that when the policy was not in place there were slightly more total incidents. It should be added that the very weak relationship is likely due to the way that the single cell policy was measured since it was the only measure that could not be transformed into a rolling average for the Pearson correlation.

Conclusion

This analysis has explored a set of potential factors that may be contributing to the total number of violent incidents in the Milwaukee County Criminal Justice Facility (CJF). Overall, the number of frequent offenders and the number of correctional staff appears to be the two strongest factors included in this analysis. The average number of frequent offenders in the CJF appears to have a positive association with the total incidents, suggesting when the number of offenders increases, the total incident count has a corresponding increase. In contrast, the measure for total correctional staff was revealed to be negatively associated with the total incidents in the CJF, suggesting that an increase in the staffing may be linked with a decrease in incidents and vice versa. Ultimately, the total number of incidents occurring in the jail is likely due to the cumulative and interactive effects of all the factors addressed and as well as many other potential factors.

These findings may appear to imply that one factor is causing another, but it is important to note that correlation does not mean causation.[10] It is also important to remember that even the strongest correlate included in the analysis (i.e. - the number of frequent offenders), was not in fact strongly associated with the total number of incidents but only had a weak to moderate relationship. The lack of any strong or very strong relationships in this analysis suggest that there are other factors that are not being considered which are driving the rise and decline of total incidents overall. The Milwaukee County Sheriff's Office and will need to consider the findings of this analysis and work on implementing potential solutions to help reduce the overall number of violent incidents occurring in the jail.

[10] Even a very strong correlation does not indicate causation. The correlation only indicates that there appears to be some type of relationship. For example, it is not clear whether Factor A caused Factor B or that Factor B caused Factor A, or perhaps that an unknown Factor C could be causing both Factor A and Factor B to change. Furthermore, the existence of a statistical relationship could also happen by chance. For this reason, correlational analyses need to be based on theory and logic to aid in the interpretation of results.

Appendix A

Pearson Correlational Matrix

	AvgIncidentCount	*AvgPopCount*	*AvgEmployCount*	*SingleCellPolicy*	*AvgCntFreqOffender*
AvgIncidentCount	1				
AvgPopCount	0.191333324	1			
AvgEmployCount	-0.266680791	-0.712152268	1		
SingleCellPolicy	-0.155623115	-0.908386273	0.682149991	1	
AvgCntFreqOffender	0.384404449	0.13330476	-0.398843402	-0.054950714	1

Pearson Correlation Evaluation Rubric

Strength of Association	Pearson Coefficient (*r*)	
	Positive	Negative
Very Weak	0.01 to 0.19	-0.01 to -0.19
Weak	0.20 to 0.39	-0.20 to -0.39
Moderate	0.40 to 0.59	-0.40 to -0.59
Strong	0.60 to 0.79	-0.60 to -0.79
Very Strong	0.80 to 1.00	-0.80 to -1.00

The Pearson correlation matrix above was produced in Excel to illustrate the statistical correlations between the 7-day rolling average of the total incident counts (*AvgIncidentCount*) and the other factors discussed in the analysis. A conditional formatting was applied so that strong positive associations are portrayed in darker blue and strong negative correlations are portrayed in darker red. More pale colors represent weaker correlations. The scoring rubric provides some rough guidelines for how to interpret the strength of a Pearson coefficient.

Focusing on the findings relating to the average incident counts (provided in the left most column), these reveal that while the measure for the population of more frequent offenders (*AvgCntFreqOffender*) has the strongest association overall (r = +0.38), this is still only a weak (near moderate) correlation. The second strongest correlate with total incidents is the average number of correctional staff (*AvgEmployCount*). This relationship is weak and negative (r = -0.27). The next strongest correlate of average incident counts is the measure for Average Total Population (*AvgPopCount*), which has a value of (r = +0.19) suggesting a weak/very weak association. Lastly, the relationship with the effective days in which the single cell policy was in place (*SingleCellPolicy*) had negative and very weak value (r = +0.16). This very weak result may be a result of the single cell policy measure being a dichotomous (not continuous) variable (1 = policy in effect; 0 = policy not in effect) and could not be transformed into a data type that Pearson coefficients are better suited to analyze.