

New York City Shooting Victims: Data Analysis Of The Most At-Risk Population

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Abstract—According to a report published by The City University of New York, it is estimated that in the year 2018 the number of visitors to New York City hit a record of 65.1 million (Tourism, 2020). New York City also consistently ranks high in lists consisting of the most populated cities in the United States. Even with the city already being so densely populated every year there are many people opting to make New York City their home because of the city’s historical, economic, and cultural impact. We use machine learning models to analyse victim data in this research.

Index Terms—Security, Machine learning, Data, Victims

I. INTRODUCTION

A. Background Information

According to a report published by The City University of New York, it is estimated that in the year 2018 the number of visitors to New York City hit a record of 65.1 million [8]. New York City also consistently ranks high in lists consisting of the most densely populated cities in the United States. Even with the city already being so densely populated, every year there are many people opting to make New York City their home because of the city’s historical, economic, and cultural impact.

It has been reported recently in an article by ABC 7 News that shooting incidents in New York City have risen to levels that had not been seen in years [10]. With so many people visiting and choosing to make New York City their home combined with the increased safety concerns around

gun violence, it creates a problem of understanding how at-risk a visitor or a resident of New York City is of becoming a victim of a shooting incident. On a broader scale, this also proposes the question of where could the biggest impact be made by law enforcement and public health officials to reduce the number of shooting incidents and make New York City safer, especially for the most at-risk population.

The analysis in this report focuses on uncovering the most at-risk population of becoming a victim of a shooting incident based on the attributes of age, gender, and race in New York City and in the boroughs that make up the city. It is important to have an overview of the demographics of New York City as a whole before looking at the populations most at-risk of becoming victims of shooting incidents. New York City is made up of five boroughs. These boroughs are Bronx, Brooklyn, Manhattan, Staten Island, and Queens. According to United States Census (US Census) data, the borough with the largest population is Brooklyn with 2,559,903 residents and the borough with the lowest number of residents is Staten Island with 468,730 residents [14]. US Census information for 2019 shows that the population of New York City was composed of approximately 52% female and 48% male with each borough closely following that same split of male and female residents [14]. Across all five boroughs and New York City as a whole, the three races with the highest populations are White (non-Latino), Hispanic or Latino, and Black [14]. Although the distribution of total population made up by these three races vary by borough, White (non-Latino) consistently has the highest concentration across all of the boroughs. With regards to age distribution, approximately 58% of the population of New York City is between the age of 18 and 64 with the remainder of the population leaning more heavily in being under 18 rather than over 65 [14]. This information is used to analyze how the statistics for the most at-risk population for shooting incidents in New York City compared to the rest of the population.

B. Points of Interest

When a shooting incident is reported, the New York City Police Department documents information for the incident such as the borough where the incident occurred as well as

whether the incident was fatal or not. Understanding the total number of incidents as well as the fatality of those incidents begins a high-level study of how shooting incidents are impacting New York City. This leads to the first point of interest:

1. How do the five boroughs of New York City compare in terms of total fatal and non-fatal incidents in 2019?

New York City has been described as being “in essence a living United Nations” [3]. New York City is described this way because of the rich diversity that the city has. There are many nationalities, languages, races, age groups, and other demographics represented by the population of New York City. Due to the diversity of the population, victims of shooting incidents fall into different categories in terms of age group, race, and gender. This leads to the second point of interest for this study:

2. Which group of people (as determined by gender, age group, and race) are at a higher risk of being a victim of shooting incidents for each borough based on data for the last five years that were reported?

The New York City Police Department provides the time and date of all shooting incidents. The location of the shooting incident is documented in terms of borough but also in terms of establishment. Understanding the date, time, and location at which at-risk populations are becoming victims of shooting incidents can help deploy the best law enforcement resources to aid potential victims before a shooting incident occurs. The need for this information leads to the third question to be answered by the analysis in this report:

3. What time interval and what locations are considered the most dangerous with regards to shooting incidents for New York City’s most at-risk population?

Different social and government agencies in conjunction with the police department of each borough have worked together to prevent the frequency of shootings over the years. Understanding which borough is having the most success in reducing the total number of shooting incidents year over year may help in formulating a plan for those areas that are seeing less success. The opposite is also true, uncovering a trend of increased number of shooting incidents year over year can be used to look at what factors may have led to the increase in shooting incidents so that they can be addressed. This leads to the following point of interest for this study:

4. Are there any trends in terms of decrease or increase of shooting incidents year over year for New York City as a whole as well as for each borough for the 2010s? Also, how does this trend compare when looking specifically at the most at-risk group year over year for the 2010s?

C. *Impact of this Study*

In the current political climate, there is often a discussion surrounding gun control and gun safety in the United States. It is not uncommon to see on the news reports of high-profile shooting incidents in public places or in private settings. There are also many more shooting incidents that go unreported to the public that are happening every day. New York City is no exception to these occurrences. Often times when shooting incidents happen there is a lot of effort that goes into creating a profile of the shooter and the public conversation turns to how to identify potential perpetrators of

gun violence to prevent them from accessing guns. This project flips the script on that and is motivated by providing insights into what group of people are at a higher risk of becoming a victim of a shooting incident. Working towards reducing the chance that a person will become victim of a shooting incident directly goes towards reducing the number of shooting incidents. Simply put: there is no shooting incident if there is no person to become the victim of the incident.

This report can be used to aid individuals in making better informed choices regarding their safety when deciding to visit or reside in New York City. On a larger scale, this report can be used to uncover which boroughs, if any, have made improvements in reducing the number of shooting incidents year over year and which have not. This study also has the potential of finding the factors in the population’s demographics that make the current solutions effective or ineffective in curbing the number of shooting incidents. Lastly, identifying the most at risk group of people can be used to ensure that the correct community health or social welfare programs are being used. This means having a clear understanding of what the target population is so that information and resources can reach them in the most effective and impactful ways.

II. LITERATURE REVIEW

When a shooting incident occurs, there are various possible outcomes for the victim of the act of violence. One possible outcome is the life of the victim ending because of the incident. Another outcome is the victim surviving the shooting incident with the potential of having short term or long term physical and mental trauma. It is reported by the Substance Abuse and Mental Health Services Administration that there are three stages that a victim goes through after an incident: “the acute phase immediately after the event, the intermediate phase several days to weeks afterward and the long-term phase” [5]. There are shooting victims that come out of these three stages and can come to an acceptance of it and find a way to integrate back into their everyday life without major impacts to their mental health. However, there are other victims that are not able to recover mentally from the incident. According to a study published by the American Psychological Association surviving victims of shooting incidents have an increased risk of experiencing lasting mental health problems such as depression, substance abuse and post-traumatic stress [5]. Another study by The National Child Traumatic Stress Network discovered that in some cases surviving victims of shooting incidents “become overly confrontational or aggressive, or engage in high-risk behaviors (e.g., driving recklessly, using drugs and alcohol)” [2]. It is evident that surviving a shooting incident may cause a major decline to the quality of life of the surviving victim which is why it is important to ensure that potential shooting incident victims are protected before becoming actual victims.

While there are proven negative psychological impacts to a surviving victim of a shooting incident as an individual, there are also negative impacts to the public health and safety of the community. It is reported that after a shooting incident, some surviving victims fall into a depression that can lead them to feel worthless or hopeless [2]. This feeling of hopelessness that a shooting victim may

be experiencing along with being driven to becoming aggressive or to developing substance abuse problems can put the safety of themselves and of the public at risk. A feeling of hopelessness combined with mental issues such as substance abuse has been proven to lead individuals to becoming the perpetrators of shooting incidents. Being able to prevent a person from becoming a victim of a shooting incident can also prevent them from becoming a risk factor for future shooting incidents which can ultimately help make communities safer.

The Prevention Institute has published a list of suggestions that address ways in which a potential victim of a shooting incident can be provided support that would keep them from becoming victims. The Prevention Institute explains that “people with mental illness are more likely to become victims of violence than perpetrators” [7]. For this reason, it is important that people with mental health issues are being provided the proper support and resources to prevent them from becoming victims of gun violence. This support could be giving potential victims the knowledge needed to detect when a situation is escalating to a point where they are at risk of being in a gun shooting incident. To provide this education in the most effective way possible it is important to understand who the audience is. For this reason, it is useful to have a profile of the most at-risk individuals on things such as age or location to ensure that information distribution is being given in a way that the potential victim will be able to process it. For example, depending on the age group most at risk, it may be more beneficial to distribute this information through social media rather than only distributing this information in grade school settings where the people who need it most will not get to it. By giving potential victims the tools to assess certain situations it could help in them removing themselves from the situation or seeking the best type of help to get them out of the situation.

The Prevention Institute also suggests that adequate community planning along with implementing community safety plans that focus on prevention and intervention are important to ensuring the safety of at-risk victims of shooting incidents. One intervention strategy is hospital-based support. According to the American Academy of Family Physicians bringing up the conversation of guns at home for households with children or bringing up the conversation with childbearing aged women of intimate partner violence can help to raise concerns of being at-risk of being a victim of a shooting incident [1]. Currently some states do not allow this conversation to be brought up but having the data show that these groups have statistically been victims of shooting incidents could help sway policy towards including this conversation in health screenings. Another strategy that could help prevent at risk people from becoming victims of shooting incidents is implementing upstream social programs such as youth employment, safe parks, and reducing alcohol outlet density [7]. A community health program in Minneapolis focused on using upstream strategies to keep young potential at-risk victims safe and saw a 62% reduction of gun shooting incidents [7]. This again goes to show that it is important to have a profile on who the most at risk population is so that various prevention strategies can be tailored towards those at-risk of becoming victims of shooting incidents.

Another way to protect victims of shooting incidents from becoming involved in those situations is to

deploy law enforcement resources to the correct places at the correct times. One example of this is Los Angeles’ “Operation Cul-de-Sac.” A study was conducted, and it was determined that there were certain geographic locations in Los Angeles where there was an increased number of drive-by shootings. The police department took this information and installed traffic barriers in specific locations which helped to block drive-through traffic and effectively reduce the number of shooting incidents in the area [6]. Another example of using the geographic profile of the most at-risk population occurred in Chula Vista, California, where analysis was done to find motels and bars where there was a high level of shooting incidents. This information was then used to police those motels and bars more closely. The information was also used to get the property management companies of those establishments to update their policies and responses to acts that put victims at risk of shooting incidents. Having a profile of the most at-risk individuals along with the geographic location of those at-risk of becoming victims can be effective in reducing the overall number of shooting incidents.

Repeatedly it has been proven that to have a successful strategy towards preventing the potential shooting victims from becoming involved in an incident requires having a profile of the most at-risk population. This means understanding things such as the age, race, and gender of a potential victim. This also means understanding things such as geographical location of the most at-risk population or time of day where they are most at risk. In this project a profile is being built for shooting victims in New York City to get a better understanding of what prevention strategies could be the most effective in curbing the growing number of instances of gun violence.

III. MATERIALS AND METHODS

A. Dataset

This project has the dataset titled “NYPD Shooting Incident Data (Historic)” at its core. The data was published to the City of New York’s OpenData webpage. This dataset can be used by the public to explore and gain knowledge about the shooting incidents in New York City. At the time of this study, the last update to the data occurred on July 2020 which included data on shooting incidents from the year 2006 to the most recent full year, 2019. This data set was obtained as a CSV file then uploaded to tools like Excel and R-Studio to do a high level study of the data to find points of interest and then dive in further. These tools are also being used to create visualizations and summary statistics which will be used to draw conclusions and propose potential solutions or next steps to take with the information uncovered in this report. The dataset consists of 21,600 rows where each row is a shooting incident along with attributes that describe the shooting incident. The following attributes from the dataset form the primary basis of analysis for this study:

- “BORO”: Borough where the incident occurred.
- “LOCATION_DESC”: Establishment category describing where the incident occurred.
- “OCCUR_DATE”: Month, day, and year in which the shooting incident occurred.

- “OCCUR_TIME”: Time of day in which the shooting incident occurred.
- “STATISTICAL_MURDER_FLAG”: Record stating whether a shooting resulted in the victim’s death.
- “VIC_SEX”: Victim’s gender
- “VIC_RACE”: Victim’s race as categorized by the New York City Police Department.
- “VIC_AGE_GROUP”: Victim’s age group as categorized by the New York City Police Department.

B. Methods

The study began by pulling the most up to date dataset from the New York City OpenData site in CSV format and uploading the dataset into Excel. From there to overcome issues with the high volume of data, cleanup began by removing fields that were deemed as not being of interest for the scope of this study. Next, the data was uploaded to R-Studio to begin a preliminary analysis using the programming language R. The preliminary analysis was done by generating visualizations for the different attributes that were deemed of interest as stand-alone attributes to see if any patterns or points of interest began to arise. Next, we began to group together attributes such as age, sex, and gender, or time of day and location to look at any patterns that may have been apparent once attributes were interacting with each other. This approach of Exploratory Data Analysis helped to further eliminate attributes that did not contribute to the purpose of this study.

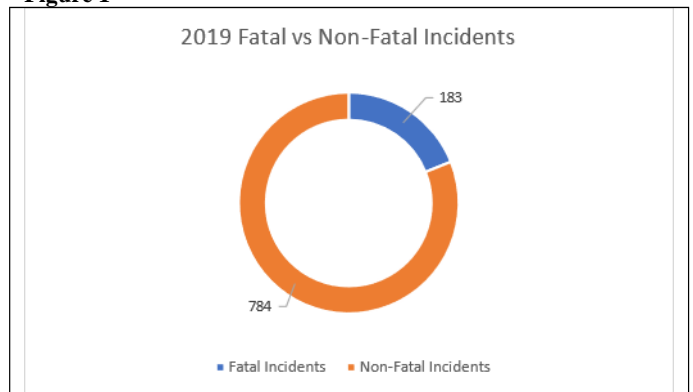
After cleaning up the data and doing a preliminary analysis to generate points of interest and eliminate attributes, the programming languages R and Python, as well as the program Excel were used to do further analysis. The steps taken were to complete summary statistics on different variables to see if the patterns that were being discovered visually matched what the data calculations were showing. The analysis began with identifying the most at-risk population categorized by race, gender, and age based on data for the most recent five years that were reported (2015 to 2019). A combination of density distribution graphs, pie charts, and bar graphs were used to visualize data before compiling the summary statistics. Queries were also ran on the data using Excel to further validate the visualization and summary statistics. After the most at-risk population was determined, we began to dig deeper to answer questions like what borough or time of year saw a higher frequency of shooting incidents for all of New York City as well as for the most at-risk population. Combining all our calculations and visualizations, we were able to build a profile for the most at-risk demographic as it relates to becoming a victim of a shooting incident in New York City.

Once the calculations were computed and the visualizations had been created, further study into validating patterns was conducted by exploring articles published by news organizations and scholarly sources. This helped to guide the discussion regarding what the data calculations and visualizations were revealing. Key words central to this study were used when looking at these sources to work through the variety of reports that were uncovered relating to shooting incidents in New York City.

IV. RESULTS

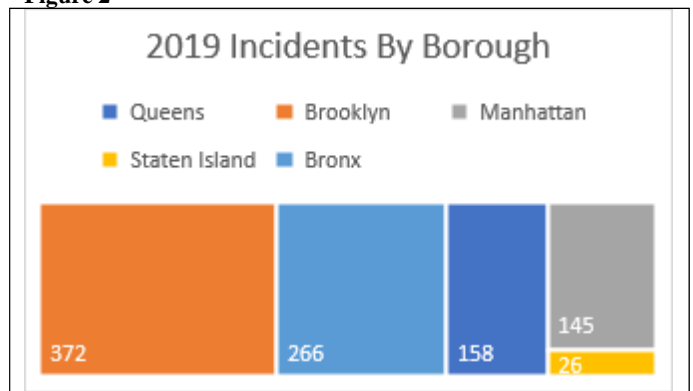
A. Fatal vs Non-Fatal Incidents in 2019

Figure 1



According to data retrieved from the New York City Police Department, in the year 2019 there were a total of 967 shooting incidents in New York City [1]. As figure one shows, most shootings were non-fatal with only about 19% of all shooting incidents resulting in the death of the victim.

Figure 2



The total number of shooting incidents that took place in New York City in the year 2019 can be broken down by borough to get an idea of which areas were impacted more than others. As figure two shows, the majority of shooting incidents in 2019 occurred in Brooklyn while the smallest portion of incidents occurred in Staten Island. When looking at US Census data, in 2019 the New York City borough with the lowest population was Staten Island and the borough with the highest population was Brooklyn [14]. The same trend is apparent when looking at the number of occurrences of shooting incidents by borough where Brooklyn had the most incidents and Staten Island had the least. However, the ranking of the other three boroughs in terms of population do not match the ranking of these boroughs based on total occurrences of shooting incidents. Therefore, it cannot be assumed that population density is a direct indication to number of occurrences of shooting incidents.

Figure two also shows that Brooklyn is impacted by shooting incidents at a substantial rate considering that summing up the total number of incidents for the three

boroughs with the lowest number of incidents still does not surpass the number of shooting incidents in Brooklyn alone. This data is further validated by information provided by the New York City’s Mayor’s Office of Criminal Justice regarding the rate of violent crimes by borough. According to this report, Brooklyn consistently ranks as the borough with the most shooting incidents and is second in overall violent crimes in New York City [4].

B. Most At-Risk Group

Figure 3

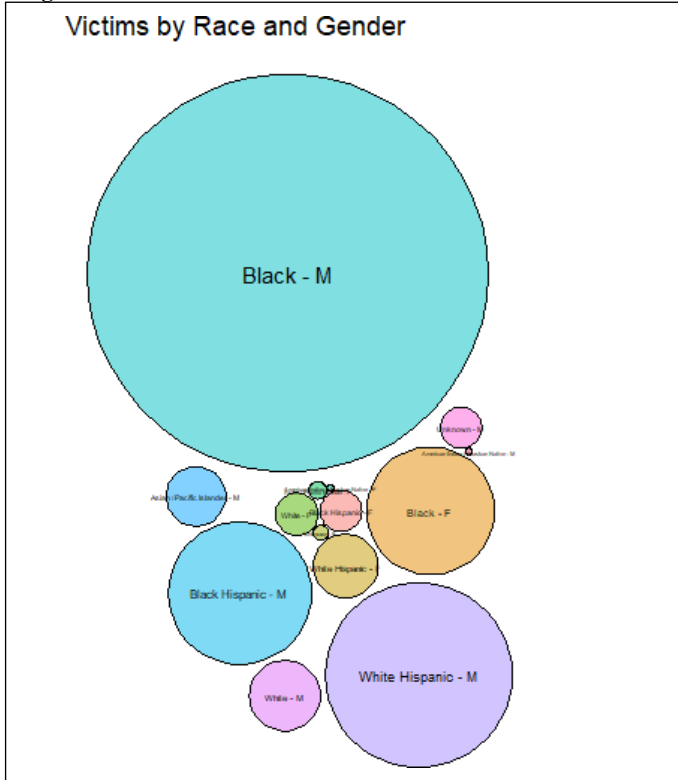


Figure three begins to answer the question of which population has historically been the most impacted by shooting incidents from the year 2015 to 2019. The group most impacted by shooting incidents, as determined by the shooting victim’s gender and race, is Black males. Analyzing the dataset provided by the New York City Police Department uncovered that about 69.936% of all shooting incidents reported for those five years showed the victim being a Black male. When comparing this to the rest of the data it becomes apparent that Black males have disproportionately been the victims of shooting incidents. The percentage of incidents where Black males are the victims is more than four and a half times higher than the group ranked second in terms of being victims of shooting incidents which is White Hispanic males.

The grouping of gender and race in figure three also reveals that only one group consisting of females appears in the top five most impacted groups in terms of being a victim of a shooting incident. Black females are amongst the top five groups of victims for shooting incidents in New York City. No other female group makes the list of the top five further showing how much more at

risk the Black population of New York City is of being a victim of a shooting incident, regardless of gender.

These findings appear to be consistent when looking at data related to deaths by shooting incidents across the United States. Data compiled by the Kaiser Family Foundation shows that there is a higher rate of deaths due to firearm incidents for the United State’s Black population when compared to White, Hispanic, Asian or Pacific Islander, or American Indian groups [12]. Another study by the gun safety advocacy group Everytown further validates these findings. According to Everytown, in major cities across the United States about 68% of gun-related homicide victims are Black [13]. This racial disparity is even more apparent when taking into account that for the total population of New York City, the population of Black residents is not the highest population of residents while being the highest population in terms of victims of shooting incidents. This all goes to show that creating programs or allocating resources towards reducing the chance of a person being the victim of a shooting incident needs to consider racial impacts.

Figure 4

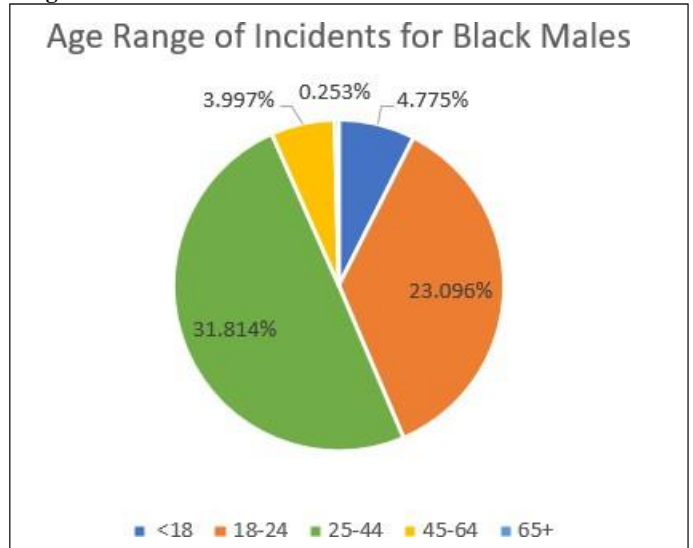


Figure 5

Profile of Top Impacted Victim Group By Borough			
Borough	Gender Race Age Group	Percent of Incidents for Borough	
Bronx	Male Black 25-44	33.084%	
Brooklyn	Male Black 25-44	31.983%	
Manhattan	Male Black 25-44	30.236%	
Queens	Male Black 25-44	31.354%	
Staten Island	Male Black 25-44	27.550%	

Having the gender and racial profile of shooting victims is important when deciding how to tackle the growing issue of people becoming victims of shooting incidents in New York City. Another dimension to this profile can be added by looking at age ranges of shooting victims. The age ranges were set by the New York City Police Department as follows: Under 18, 18 to 24 years of age, 25 to 44 years of age, 45 to 64 years of age, and over 65 years of age. As figure four shows, when looking at the most impacted population (Black males) in New York City, the age group suffering from the most incidents is the group

from 25 to 44 years of age. When the data is further broken down into boroughs, for all five boroughs consistently most victims of shooting incidents belong to the category of Black male between 25 and 44 years of age.

Although the age group of 25 to 44 years of age are the most impacted Black male victims of shooting incidents, the age group 18 to 24 follows in second place. When taking into consideration that the 18 to 24 age bracket has a smaller distribution than the 25 to 44 age bracket, it becomes apparent that the 18 to 24 age group should not be forgotten or ignored when discussing the most at-risk group of becoming the victim of a shooting incident.

Based on these findings, for this study the most at-risk population of becoming a victim of a shooting incident is being defined as Black males between the ages of 18 and 44 years old.

C. Time and Location of Shooting Incidents

Having an understanding of the time when most shooting incidents take place can be informative when deciding how to work towards reducing the number of shooting incidents in New York City. Information pertaining to time and location of incidents can be used to allocate law enforcement to those areas during the peak times of shooting incidents. This information can also be used to enact laws or regulations at certain establishments with the intention of preventing the most at-risk population from becoming a victim of a shooting incident.

Figure 6

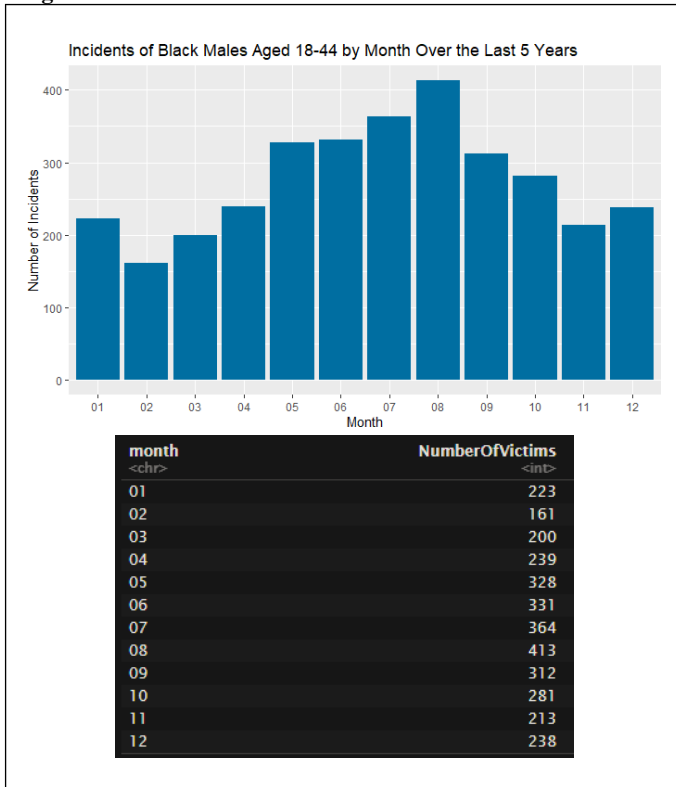


Figure six explores the question of which time of year do most shooting incidents occur. In particular, the

analysis looks at when most shooting incidents occurred over the years 2015 to 2019 that had the most at-risk group, Black males between 18 and 44 years of age, as the victim. As the figure shows, most incidents occurred in the month of August while the least amount of shooting incidents occurred in February. This can also be further generalized based on the data to say that the majority of shooting incidents occurred in the summer months (June, July, and August) as compared to the winter months (December, January, February) which had the least amount of shooting incidents. A study published by the Bureau of Justice Statistics shows that crime in general across the United States is also higher in the summer months than in the winter months [16]. This further validates the analysis on figure six by showing that there is general trend in seasonality that is seen when looking at violent crimes.

Figure 7

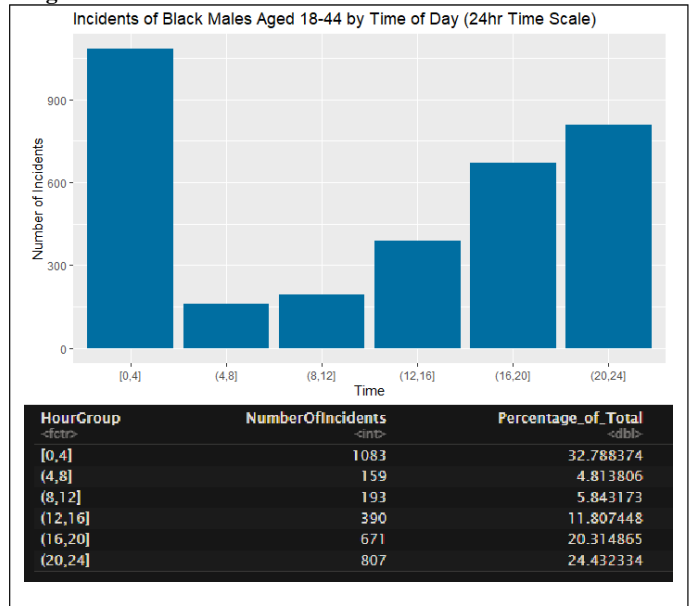


Figure 8

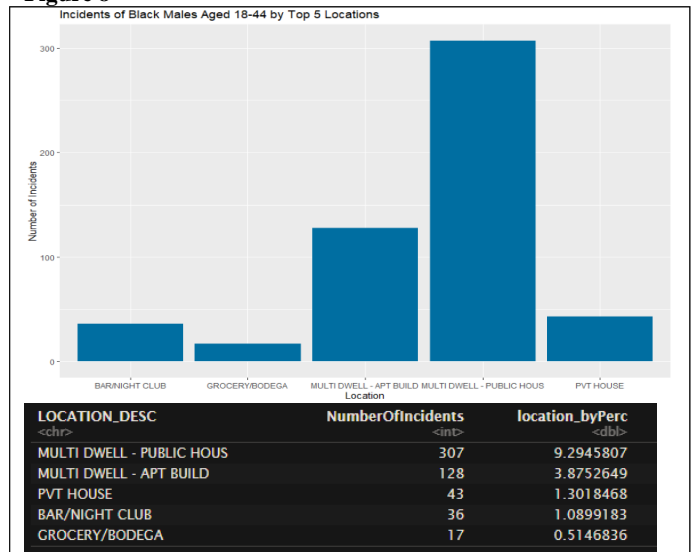
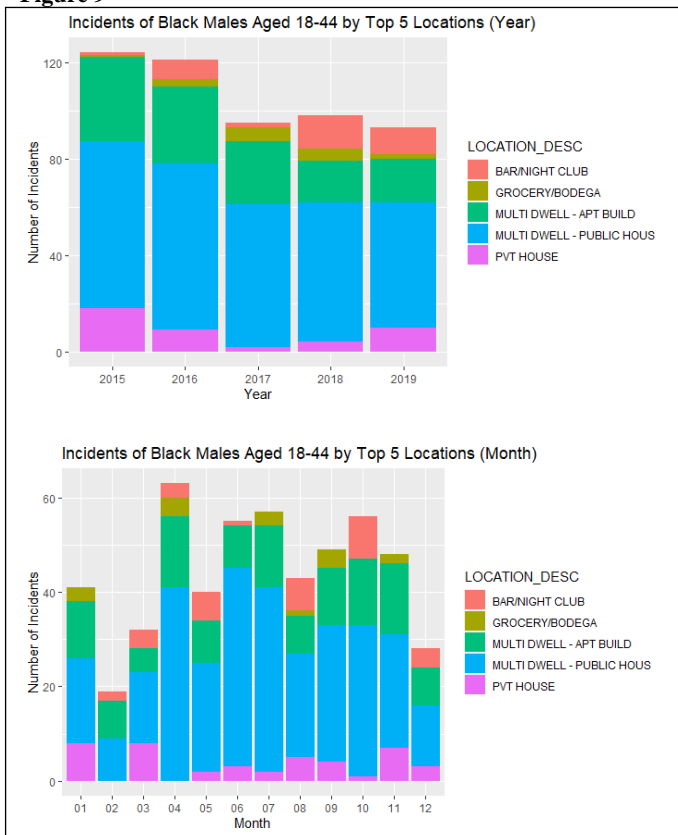


Figure seven looks at the time of the day in which most shooting incidents occurred, specifically focusing on the most at-risk group. The time of day was broken up into four-

hour intervals starting at midnight for this figure. As the figure shows, by far the majority of incidents reported took place between 0 hours (12:00 am) and 4 hours (4:00 am). Directly following this window is the lowest total number of shooting incidents, in the window between 4 hours (4:00am) and 8 hours (8:00 am). It is observed from the figure that the number of incidents steadily increases as day progresses into the night. When looking at percentages, about 57% of all shooting incidents where a Black male between the ages of 18 and 44 are the victims happen between 20 hours (8:00 pm) and 4 hours (4:00 am). This indicates that having law enforcement present during these hours at the places where most incidents occur could help to deter shooting incidents from occurring.

Figure eight dives into looking at locations, or more specifically establishments, where Black males between the ages of 18 and 44 became victims of a shooting incident. The figure shows that most incidents occurred in multi dwelling public housing. The rate of incidents in multi-dwelling public housing is almost three times the second location with the highest number of shooting incidents which is multi-dwelling apartment buildings. It is also important to note that the first three of the five locations with the most shooting incidents where a Black man between the ages of 18 and 44 is the victim is in a residential area.

Figure 9



Further review of location of incidents in figure nine indicates that multi-dwelling – public housing has been the location with the most shooting incidents through the years. However, incidents in multi-dwelling apartment complexes have shown a decreasing trend while those in bars and

nightclubs are showing an increasing trend year over year. Monthly variation in number of incidents also steadily shows that the majority of incidents for Black males between 18 and 44 are largely occurring in multi-dwelling public housing. This is pointing to the need to ensure that all year-round multi-dwelling public housing should be receiving resources, whether that is through law enforcement or through professionals trained in de-escalating situations, that can help to reduce the number of shooting incidents. This could also go to show that other socio-economic factors could come into play since so many of these incidents are occurring in public housing.

Figure 10

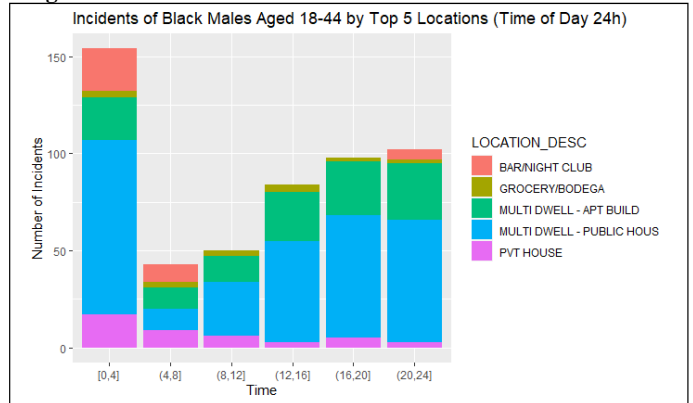
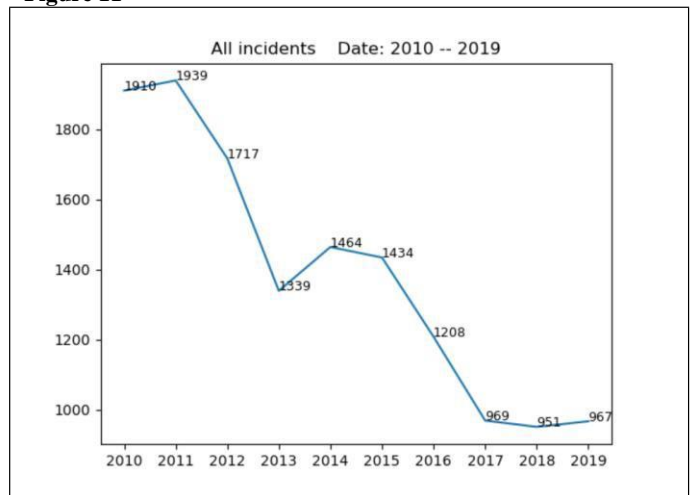


Figure ten groups together the location of shooting incidents with the time at which the incidents are occurring. For every time interval displayed it is evident that the majority of incidents happened at multi-dwelling apartment buildings and multi-dwelling public housing. This goes to further solidify the assertion that these locations need the proper resources to reduce the total number of shooting incidents for all of New York City.

D. Change Over Time of Incidents

Figure 11



Looking at the last ten years of data can be used to highlight a trend regarding shooting incidents in New York City as well as to show where any considerable advancements or fallbacks occurred in terms of curving the number of shooting incidents. As figure 11 indicates, there

has been a general trend of a reduction of shooting incidents over the last 10 years. There was a considerable increase between 2013 and 2014, but it still did not get up to the levels seen at the start of the 2010s. It is also apparent that in the year 2019 there started to be a slight uptick again in total number of shooting incidents. According to an article published by the New York Daily News, New York City saw an increase in all types of crime not only in shooting incidents in 2019 [15]. The increase in other crimes such as robberies could have contributed to the increase in shooting incidents when situations escalated.

Figure 12

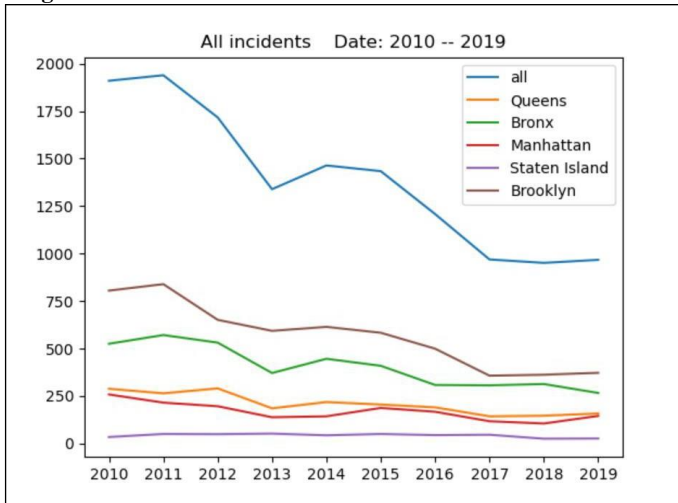
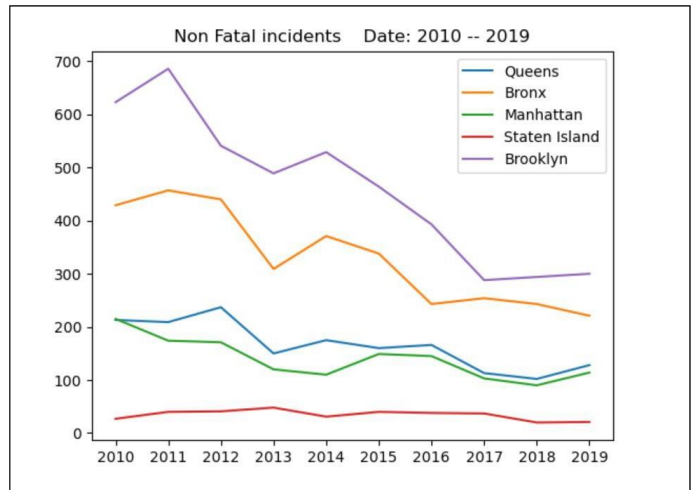
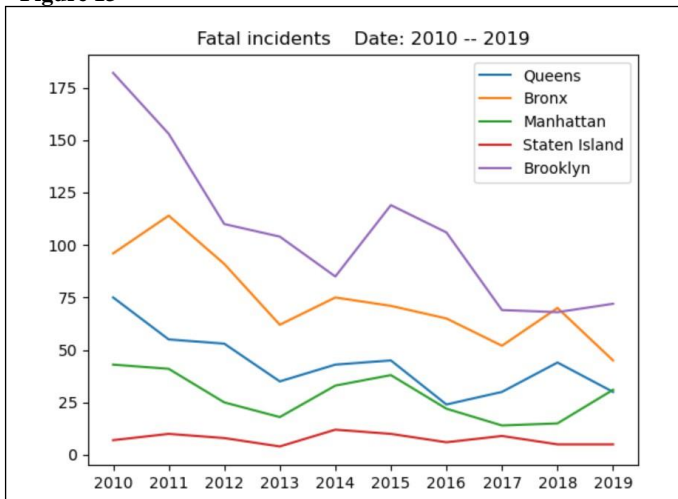


Figure 12 dives deeper into the trend for the last 10 years of shooting incidents for the different boroughs of New York City. In general, the same trend that was seen for all of New York City is seen for the individual boroughs where there has been an overall steady decrease in total number of shooting incidents from the early 2010s to the end of the 2010s. Staten Island stands out as having a generally consistent number of incidents, but there is still a slight decrease in number of shooting incidents. This goes to show that efforts to reduce the number of shooting incidents have not been centered around one specific borough but rather all boroughs are seeing a general decrease in shooting incidents.

Figure 13



For every year between 2010 and 2019 and for every borough there has consistently been more non-fatal than fatal shooting incidents. The trend between fatal and non-fatal incidents per borough follow the same general trend of showing a reduction of incidents from the start of the 2010s to the end of the 2010s. It appears that efforts being done across all of New York City to reduce the number of shooting incidents have also trickled down to the different boroughs in terms of fatal and non-fatal incidents.

Figure 14

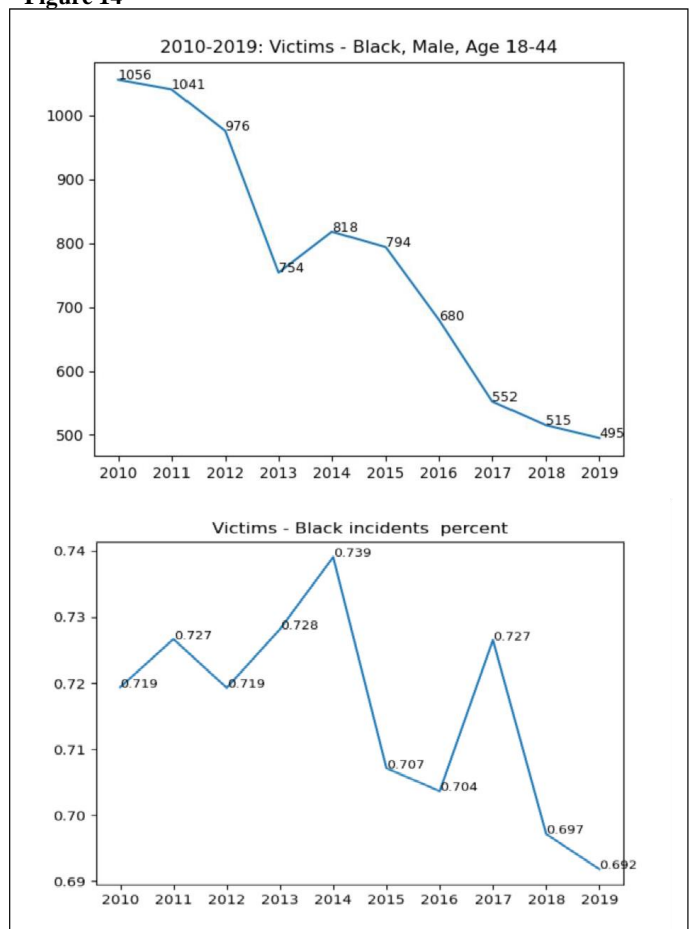


Figure 14 shifts focus to the most at-risk population in New York City: Black males between the ages of 18 and 44. The first visualization shows that the number of

incidents involving the most at-risk population has had a steady decrease between 2010 and 2019. It is also evident that although the total number of shooting incidents increased in New York City in 2019, the total number of incidents in which a Black male between 18 and 44 still saw a decrease between 2018 and 2019.

The second figure shows that although there has been a decrease in the overall total number of shooting incidents, the rate in which a Black male between 18 and 44 is a victim of a shooting incident has remained somewhat constant. At its peak in 2014, Black males between 18 and 44 accounted for 73% of all shooting incidents and at the lowest level in 2019, this same group accounted for being the victim of 69.2% of all shooting incidents. This indicates that although overall numbers are decreasing, there is work to be done to address how to keep the most at risk group from becoming a shooting incident victim.

V. LIMITATIONS AND NEXT STEPS

A. Limitations

There are a few key limitations to consider when exploring the data for this report. One limitation is that the shooting incident data that is reported does not say whether a victim is a resident or a visitor of New York City. This makes it difficult to say with complete certainty where preventative resources that are expected to be used before a situation escalates to a shooting should be deployed geographically. The information presented in this study should be looked at with an understanding that the victim's location was determined by the incident's location and not by their place of residence.

Another limitation is that there could be shooting incidents that are not reported. For example, if a shooting is not fatal or does not result in the need for medical care, there is a chance that the shooting could go unreported. As mentioned earlier, even if a shooting is not fatal, the victim still suffers from lasting impacts so it is important to know even when a shooting incident may not have been lethal.

A third limitation is that a focal point of this study was the age, race, and gender of the victim. In the dataset that was published by the New York City Police Department it is not explicitly stated how this information was obtained. It could make a difference if some of the reports were purely based on the reporter's speculation rather than looking at the victim's legal documents to gather this information.

A fourth limitation also relates to the focal point of this study being age, race, and gender. In the data reported by the New York City Police Department the exact age of the shooting victim is not known. This study was done using the same labels for age that were defined by the New York City Police Department. There is no explanation for how these age ranges were determined. The issue that could arise from this is that some age groups cover a bigger span of ages than others which could potentially skew the data when looking at total incidents in a certain age bracket.

A final limitation to take into consideration when looking at this study is that motive or the relationship between the victim and the perpetrator are not reported. Although it is important to understand the location and time of shooting

incidents, understanding the motive or if there is any relationship between the shooting victim and the perpetrator can help to better address the social welfare programs needed. For example, if the majority of cases are due to domestic disputes or if they are due to gang violence the approach to help victims before a shooting incident occurs would be different.

B. Next Steps

The data set used in this study included coordinate locations for the exact location at which shooting incidents took place. For this study we looked at the borough as the smallest representation of a geographic area. A next step would be mapping the coordinates of shooting incidents to uncover if there is a more prominent density of incidents inside the boroughs. Uncovering this information has the potential of providing a more accurate locations for which to allocate resources such as law enforcement officials.

At the time of this study the most up to date information available was for shooting incidents that were reported up until December 31, 2019. The data for the year 2020 is expected to be made available during the summer of the year 2021. A next step would be to look at the most up to date information to see if the patterns and trends that were uncovered in this study hold up with the new set of data that was recorded for the year 2020.

This study focused on the most at-risk population group based on the highest number of shooting incidents. A proposed next step is to look not only at the most at-risk group but potentially the two or three most impacted groups to see if addressing all these groups has a higher impact in the reduction of shooting incidents rather than focusing on just the group with the most victims of incident. However, it should be mentioned that if this approach is taken, it should keep the most at-risk group at the forefront of policies and resources aimed at reducing the number of shooting incidents to ensure that the group does not continue to be disproportionately impacted by shooting incidents.

With the information that was uncovered through this study another important step would be to present this data to community leaders and experts in community health and criminology to better strategize the ways in which the total number of shooting incidents can be reduced. Having the input of these experts guided by the patters of this study can lead to a positive impact in improving the safety of New York City as it relates to shooting incidents, especially for the group that was found to be the most at risk.

VI. DISCUSSION AND CONCLUSION

This analysis took information provided by the New York City Police Department regarding shooting incidents and created a profile, or a better understanding of the demographics, of the incident's victims. Often times when incidents occur the discourse and the analysis looks at the perpetrators but understanding what populations are most at-risk of becoming victims of a shooting incident can help in providing them with the resources needed to keep them from becoming victims. This victim focused approach that is often overlooked can have the result of reducing the overall number of shooting incidents.

Analyzing the data that was made public by the New York City Police Department regarding shooting incidents uncovered that Black males between 18 and 44 years of age were disproportionately the most impacted by shooting incidents. This designation as the most impacted group was given by looking at which group, comprised of age, gender, and race, had the highest portion of shooting incidents year over year. For every breakdown that was looked at such as time or location, Black males between 18 and 44 years of age consistently had the highest number of incidents where they were the victims of a shooting.

This study uncovered that overall, the total number of shooting incidents towards the latter half of the 2010s is lower for all of New York City as well as for the individual borough than the numbers that were seen at the start of the 2010s. There also appears to be a spike in shooting incidents at the end of the 2010s after a period of decline. However, although the total number of shooting incidents where a Black male between 18 and 44 years of age has been decreasing, the proportion in which this group is impacted has not. Consistently year over year this group has the highest number of shooting incidents compared to other age, race, and gender groups. This would indicate that there is an area of opportunity to provide the appropriate resources to this group to prevent them from becoming victims of shooting incidents.

It can also be concluded from this study that the majority of incidents for the most at-risk population in New York City occurs in residential areas with a clear majority of incidents occurring in multi-dwelling public housing. Generally, the demographic of people living in public housing points to lower levels of income, lower education rates, and higher rates of unemployment. These are all factors that could be further studied to get an understanding of why so many Black males between the ages of 18 and 44 are becoming victims of shooting incidents in these areas of New York City.

The goal with identifying the most at-risk population in this study is to reduce the number of shooting incidents in New York City. Having a profile of the most at-risk population as well as times of day and locations where they are most likely to become victims of shooting incidents can help with generating prevention strategies. This study has uncovered the need for these prevention strategies to take into account racial and cultural impacts since it is evident that race is major factor when looking historically at the group most impacted by shooting incidents.

The New York City Mayor's Office has created programs over the years to address the prevention of shooting incidents. Some of the programs aimed towards helping potential victims that already exist include the Public Safety Coalitions and Safe in the City Grants [17]. Although programs such as these have already shown success by reducing the overall number of shooting incidents over the last ten years, it could be useful to assess how they are addressing the risk factors impacting the most at-risk population. These programs could be tailored to ensure that the most at-risk population is also benefiting from these programs. Efforts could be made with professionals and experts in the fields of public health, criminal justice, social justice, and law enforcement for example to create and implement programs that are aimed specifically at helping

the most at-risk population in not becoming victims of shooting incidents.

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