Source: “Congressional Art Contest Winner Depicts Police Brutality and Protests.”

POLICE VIOLENCE IN THE U.S.A

A statistical analysis of fatalities following the 2016 U.S. election.

ABSTRACT

Police brutality has become an increasingly prevalent issue in the United States. It’s often contested whether or not it is racially targeted. The following analysis seeks to elucidate what factors can predict how likely the victim of a fatal incident is to be a minority, defined as a non-white person in this study. Variables of interest included age, gender, whether the state voted Republican or Democrat in the 2016 election, and if the police officer was wearing a body camera. Based on the #BlackLivesMatter movement, the hypothesis is that young black males will be most affected in Republican states by police officers not wearing a body camera. Results showed that being young and male in a Democratic state with police wearing a body camera all increase the odds of being a minority victim over a white victim.

BACKGROUND

The United States has been facing an insurgence of fatal cases due to police brutality. Following the first widely-publicized case in 2012, the heart wrenching loss of Trayvon Martin, the #BlackLivesMatter movement started – an organization that called out systemic violence against black people (Sidner). They have ignited conversation and statistical analysis about potential targeting of police violence. In 2015, one study found that minorities made up 37.4% of the US but they made up 62.7% of unarmed people killed by police, which represents a clear bias against minorities (Swaine).

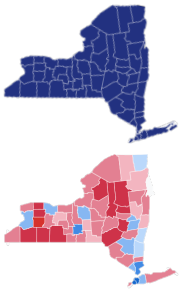
The following year, Donald Trump was elected President of the United States for the Republican party. PEW research found that 75% of Republicans think that police are treating racial and ethnic groups equally whereas only 25% of Democrats hold those same sentiments (Brown). Because of the divergence of political party view on police, location of the incident could be an important factor to consider. Accountability thereafter could be influenced by the political climate of the area, and may influence how likely they are to resort to violence in a questionable situation. One method of accountability is body cameras, which can be used to evaluate if appropriate action was taken (i.e. if the victim was armed/posing real threat).

This provides the basis for the following analysis of fatal police incidents for the year following Donald Trump's election. This time frame has the most accurate data regarding the political views of the states. Many factors, such the age, gender, race, whether the state of incidence voted red or blue in the election, and the body camera status of the officer, will be used to predict the likelihood of a minority victim.

METHODS

The data was compiled by the Washington Post beginning on January 1st, 2015 by scouring law enforcement websites, local new reports, social media, and independent databases for mentions of fatal encounters (Wullum). The Post also acquired supplemental details if they were available; therefore, some data entries have more information than others. The aim of this research is to determine covariates to predict race of the victim following the 2016 election; as such, the original data was subsetted to the correct time frame and the only coefficients retained were age, race, gender, state, and body camera. From the original dataset, the covariates for ID, name, and city were excluded because they are fairly unique per case and deemed unfit to be predictors. The coefficients for arming of victims, signs of mental illness, threat level, and if the victim fled were also excluded because the information may not be accurate, or potentially from a biased account from the police officer.

The dates of the data range from 11/08/2016 to 7/31/2017. The #BLM movement claims that young, black men are highly targeted; age and gender were included in the analysis to test that claim because it could indicate whether victims tended to be younger or older and male or female. Minority status is the outcome of interest and was recoded from race to be a binary representation of white and non-white. Lastly, there is a state color variable that is based on how the state voted in the 2016 election (United States, Congress, Office of Communications, and Steven T Walther). The overall political views of the state can be modelled during this time period, but not for years prior, by how they voted, which could be an important factor due to possible biases, varying accountability, and different views on guns and police. Logistic regression combined with backward model selection will be used to predict what determinants significantly predict the if the victim is white or not.



There are a few confounds to note. Washington Post leans left which exposes the data to possible confirmation bias. The red vs. blue distinction for political climate of a whole state can be misleading. For example, New York is a blue state, but most of the counties in NY vote Republican ("2016 United States Presidential Election in New York."). Additionally, state ideology may have changed quickly following the election, yet there is no way to account for that so the analysis assumes that for the entire period until 7/31, a state's politics reflect how they voted. Additionally, cases may have gone unreported, especially if the victim was undocumented, which could mean that certain races are underrepresented in the dataset.

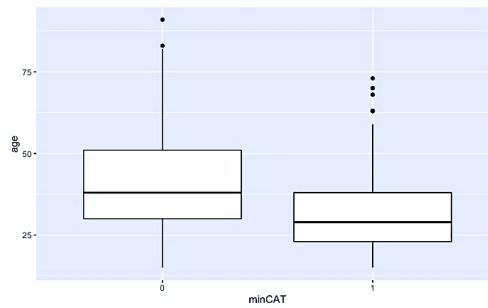
RESULTS

I. Descriptive Statistics for Post-Election Data

	Total Victims (n= 587)
Age	Minimum = 15 1st Quartile = 25.00 Median = 34 Mean = 36.42 3rd Quartile = 45 Maximum = 91 NA = 13
Gender	Men: 565 (96.3%) Women: 22 (3.7%)
2016 State Color	Blue: 217 (37.0%) Red: 370 (63%)
Body Camera	Camera: 59 (10.1%) No Camera: 528 (89.9%)
Minority	Minority: 293 (49.9%) White: 294 (50.1%)

The table to the right contains univariate summaries of the four predictor variables (age, gender, state color, and body camera) as well as for the minority outcome. There is a vast majority of male victims. Most incidents occurred in red states and most occurred without the a body camera. Lastly, there were approximately equal numbers of minority victims as white victims. However, it's important to note that this percent may not necessarily be proportionate to the percent of minorities in the US.

The mean age of white victims (n = 289; $\bar{x}$ = 41.08; median = 38; s = 14.15) seems to be much greater than the mean age of minorities (n = 285; $\bar{x}$ = 31.7; median = 29; s = 11.30). A Welch t-test yields a test statistic of 8.7819 and a corresponding p-value of 2.28e-17. It can be said with 95% confidence that the true difference in age for white victims and minority victims lies between 7.28 and 11.48 years. Therefore, we have sufficient evidence to conclude that minority victims are younger than white victims.



Of the female victims, a significantly higher proportion was white (p=0.02), whereas there was no difference in proportions of white men victims to racial minority victims (p=0.68).

	Female	Male	Sum
White	15	279	294
Minority	7	286	293
Sum	22	565	587

A similar pattern exists for body camera status in which the majority of incidents were documented without a body camera, and of the incidents with a camera, there was a significantly higher proportion of minority victims when compared to white victims (p=0.00047). There was no difference in proportions for incidents without a body camera between minority and white victims (p=0.22).

	No Camera	Camera	Sum
White	274	20	294
Minority	254	39	293
Sum	528	59	587

Lastly, only 37% of incidents occurred in blue states. Of minority victims, 56% were killed in a red state and 44% occurred in a blue state; this difference is significant with p= 0.004. Therefore, given that the victim is a minority, the incident is more likely to occur in a red state. Interestingly though, blue states had more minority victims than white victims, which goes against the original hypothesis that minorities would be less targeted in Democratic states. A one-tailed two proportion z-test showed that this difference in proportions is significant (z = 3.93; p = 0.00004). Given that an incident occurs in a blue state, the victim is more likely to be a minority.

	Blue	Red	Sum
White	88	206	294
Minority	129	164	293
Sum	217	370	587

II. Model Selection

The logistic regression analysis will enable determination of significant factors that can predict whether a victim is more likely to be a minority or white. The backward selection regression analysis produced the following model:

$$logit(\text{odds minority}) = 1.533273 - 0.055946age + 0.770299male - 0.504511red\_state + 0.430933body\_cam$$

AIC=720.86

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	1.533273	0.571100	2.685	0.00726 **
age	-0.055946	0.007566	-7.394	1.42e-13 ***
gender1	0.770299	0.506938	1.520	0.12863
statecolor1	-0.504511	0.187464	-2.691	0.00712 **
body_camera1	0.430933	0.307635	1.401	0.16128

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '*

According to a Wald test, age and state color were the only factors that contributed significantly to the model (all $p < .01$). This is surprising, given that the backward selection did not filter the other variables out. Despite not contributing significantly the model, gender and body camera status did seem to have a substantial effect on predicting whether a victim was a minority or not.

According to the model, the odds of being a minority victim change multiplicatively by 0.946 with each successive year of age, given that the other predictors are held constant. The odds of being a male minority victim are 2.160 times greater than a female minority, when all else is equal. The odds of being a minority killed by police in a red state holding all else constant are 0.604 times that of being killed in a blue state. In other words, the odds of being killed in a blue state for a minority are 1.656 times that of a state who voted Republican in the 2016 election. Given that the other predictors are held constant, the odds of being a minority victim and the police wearing a body camera are 1.539 times greater than if the police is not wearing a body camera. Based on these results, being young, male, in a Democratic state, and the police wearing a body camera all increase the odds of being a minority victim.

DISCUSSION

Based on the #BlackLivesMatter movement, the hypothesis explored was that young, black, males will be most affected in Republican states by police officers not wearing a body camera. Logistic regression was performed as well as univariate and bivariate analyses to analyze if this claim holds, as well as establish what factors can be used to predict the race of the victim.

Factors that influence minority status significantly are age, state color, gender, and body camera (although age and state color are the only two variables that contribute to the model with statistical significance; this is potentially because gender and body camera both had large disparities in sample sizes between their respective levels). The logit model predicts that being young, male, in a Democratic state, and body camera on the police all *increase* the odds of being a minority victim over a white victim. White victims tended to be older, and their incidents tended to occur more in red states.

For all non-white races, the incidents were more likely to occur in a blue state than a red state. This conflicts with the original hypothesis that minorities may be more targeted in Republican. Recalling the PEW research that found that three-quarters of Republicans and one-quarter of Democrats think that police are treating racial and ethnic groups equally, the wide gap in opinion could perhaps be due to Democrats hear about more minority cases occurring nearby; this is a reasonable explanation given that the majority of victims in blue states are minorities. The #BLM movement does not appear to touch on this political disparity and it definitely seems like a significant factor that should be further evaluated.

This analysis has shortcomings. First, not every data point has information for each covariate, which led to exclusion of those automatically during model selection. However, they were not fully excluded in the bivariate analyses, only the 130 rows missing race data were removed. This could also potentially explain why a bivariate analysis (for example, female victims being significantly more likely to be white) led to a different conclusion than the regression, in which gender wasn't considered significant. Additionally, state color as a gauge for the political climate can be misleading due to the fact that not every city within the state holds the same view and it can change quickly. This analysis assumes that a state's ideology did not change after the election, at least until the data ends on July 31st 2017. The possible lack of reporting for undocumented victims perhaps means that certain races aren't fully being accounted for.

Lastly, this analysis did not fully address the idea of disproportionate targeting. A quick racial breakdown of the victims revealed that 26.7% were black, 19.1% were Hispanic, 50.1% were white, and the remaining were other racial categories. While the majority were white, it's unclear whether or not the distribution of victims is proportionate to the distribution of those races in the US during that time. For example, black people comprised 13.3% of the 2016 US population, but were 26.7% of victims ("Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States, States, and Counties."). Operating under the assumption that black people are equally likely to be involved with the police as every other race, then this could be considered disproportionate targeting. This is an area of research that deserves further investigation.

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