

# Exploring How Temperatures Impact Crime Rates in Virginia

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## Introduction

In 1972 Robert Baron did an experiment to test whether temperature would cause more aggression. His hypothesis was that if the participants experienced prior anger arousal, being in a hot room would cause the participants to overly punish, in this experiment, by “shocking” the confederates but the hypothesis was not supported and instead the participants hid their anger instead of showing it (Baron, 1972). The problem with this study is there are too many factors that were not considered, like how long the study would last, the fact that participants were students wanting extra credit, whether this would be different if they knew they were not being watched. Therefore, the best way to see if temperature really affects crime in this experiment, researchers must use the crime statistics because these are real crimes committed during the given months and years with accurate temperature data.

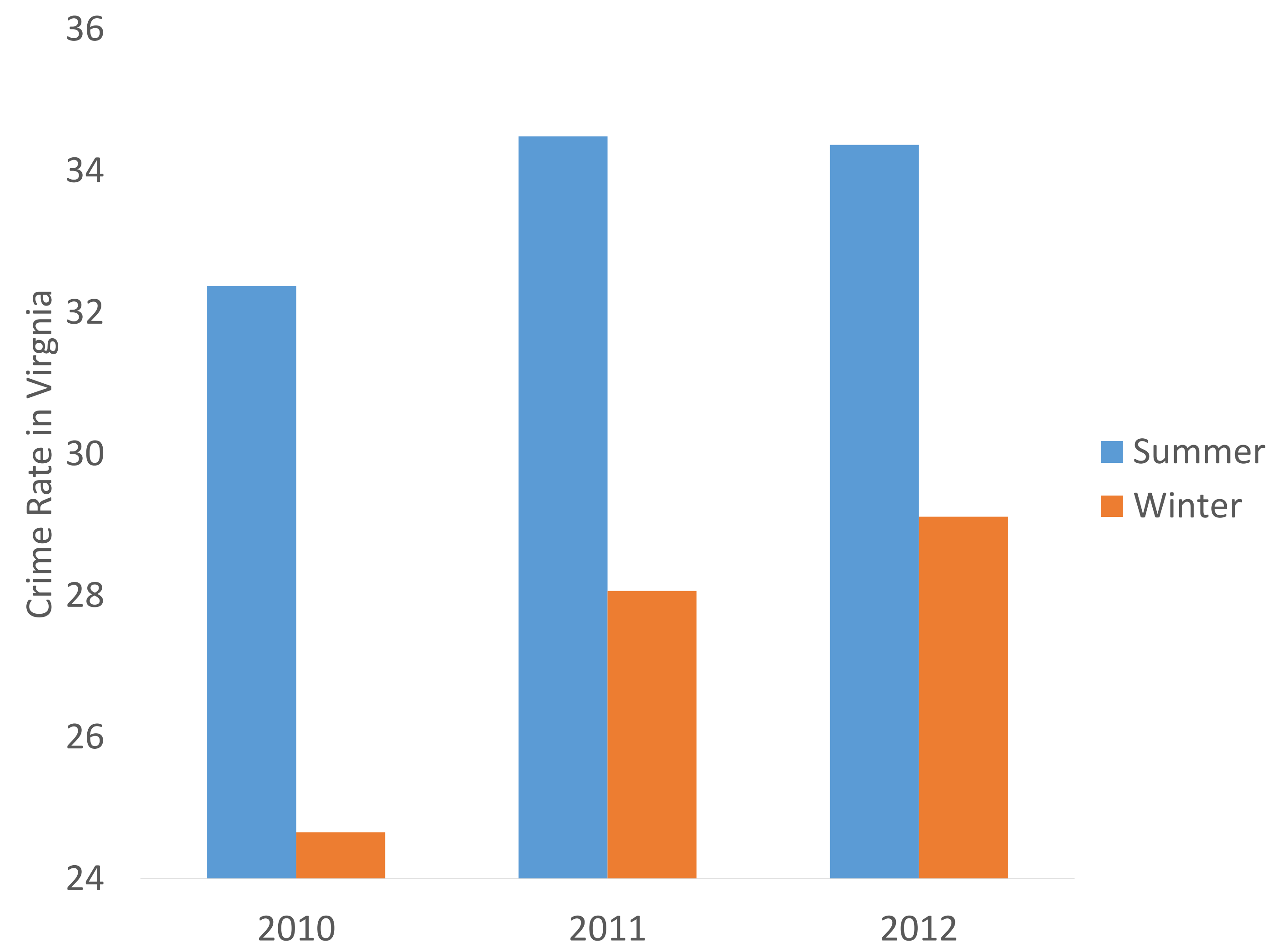
The negative affect escape model is the idea that as the temperature increases to a certain point so do your feelings of aggravation, anger, displeasure, but after the temperature has passed the certain point an individual will do anything to avoid the heat (2). In contrast, the routine activity theory by Cohen and Felson indicates that there must be certain factors in place, like finding vulnerable individual or individuals to commit the crime (3). Factors like someone leaving their home to go for a vacation due to the warm weather can lead to a criminal breaking into their home, “thus predicts an increase in violence to be linear function of increase in temperature” (2, p. 128). Similarly, there is the social escape/ avoidance theory which basically is just an individual avoiding going out because either it is too hot or too cold (2).

The goal of this paper is to see whether temperature is what is causing a rise in crime in the summer in Virginia. This will be done by comparing crimes; rape, aggravated assault, and murder and temperature during the months of January, February, June, July, August, and December between the years 2010, 2011, 2012, 2015, 2016, and 2017. Statistical analysis and figures can be seen to show the correlations if there are any.

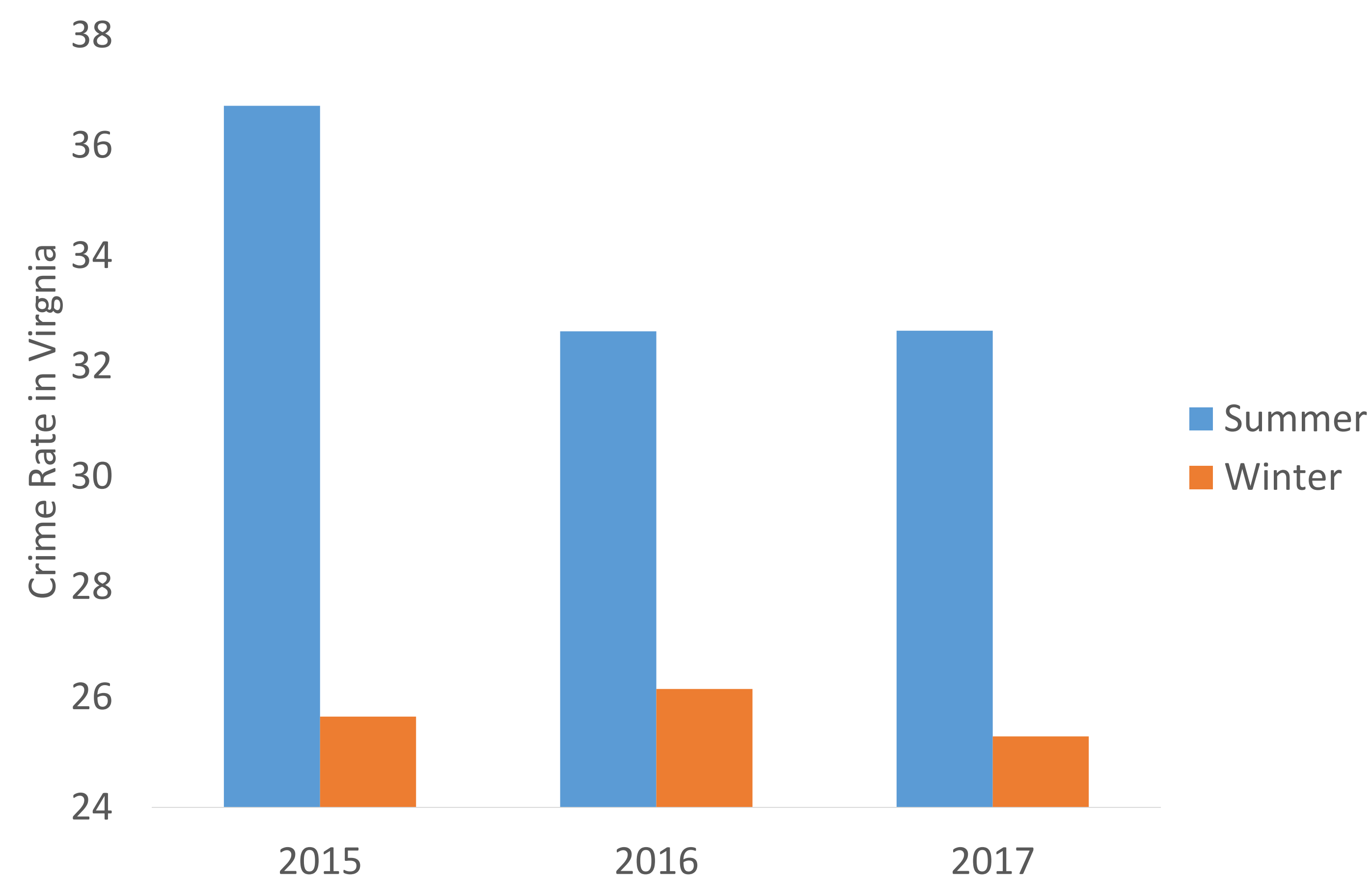
## References

- Baron, R. (1972). Aggression as a function of ambient temperature and prior anger arousal. *Journal of Personality and Social Psychology*, 21(2), 183-189. Retrieved from <http://content.ebscohost.com/ContentServer.asp?T=P&P=AN&K=1972-31564-001&S=L&D=pdh&EbscoContent=dGJyMMvI7Esep644wtvhOLCmr1Cep7JSsaq4TbaWxWXS&ContentCustomer=dGJyMPGut1C2q7BMuePfgex44Dt6fIA>
- Butke, P., & Sheridan, S. (2010). An analysis of the relationship between weather and aggressive crime in Cleveland, Ohio. *American Meteorological Society*, 2, 127-139. doi: 10.1175/2010WCA51043.1.
- Mapou, A., Shendell, D., Ohman-Strickland, P., Madrigano, J., Meng, Q., Whytlaw, J., & Miller, J. (2017). Environmental factors and fluctuations in daily crime rates. *Journal of Environmental Health*, 80(5), 8-23. Retrieved from <http://content.ebscohost.com/ContentServer.asp?T=P&P=AN&K=126361011&S=R&D=asn&EbscoContent=dGJyMTTo50SeprU4wtvhOLCmr1Cep7JSsaq4TbaWxWXS&ContentCustomer=dGJyMPGut1C2q7BMuePfgex44Dt6fIA>
- NOAA National Centers for Environmental Information. (n.d). Data tools: Find a station. Retrieved from <https://www.ncdc.noaa.gov/cdo-web/datatools/findstation>
- Virginia State Police. (2011). *Crime in Virginia 2010*. Uniform Crime Reporting Section Department of State Police Retrieved from [http://www.vsp.state.va.us/downloads/Crime\\_in\\_Virginia/Crime\\_in\\_Virginia\\_2015.pdf](http://www.vsp.state.va.us/downloads/Crime_in_Virginia/Crime_in_Virginia_2015.pdf)

## Results



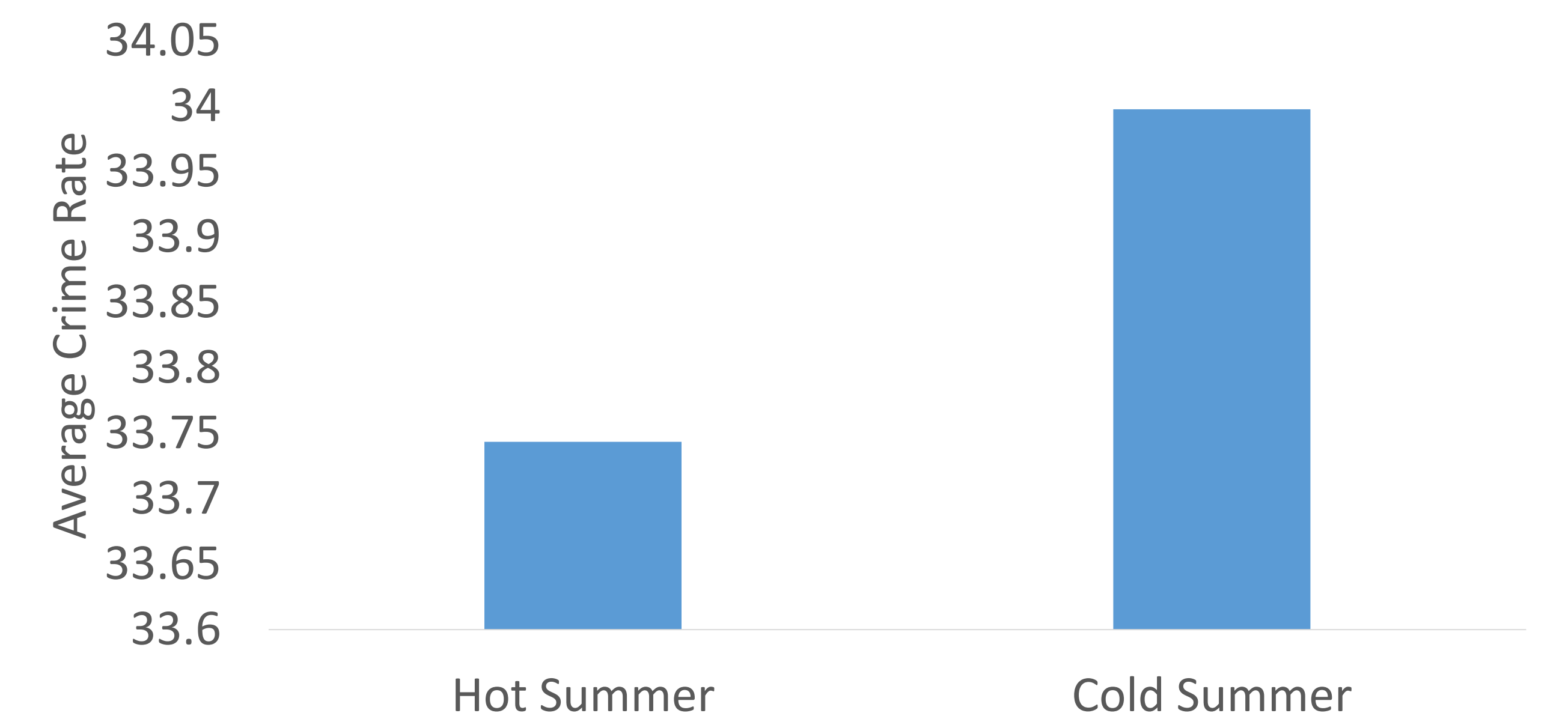
**Figure 1:** Crime rate in summer vs. winter during the hottest years in Virginia. There was a significant difference ( $p < 0.05$ ) between the summers and winters of hot years



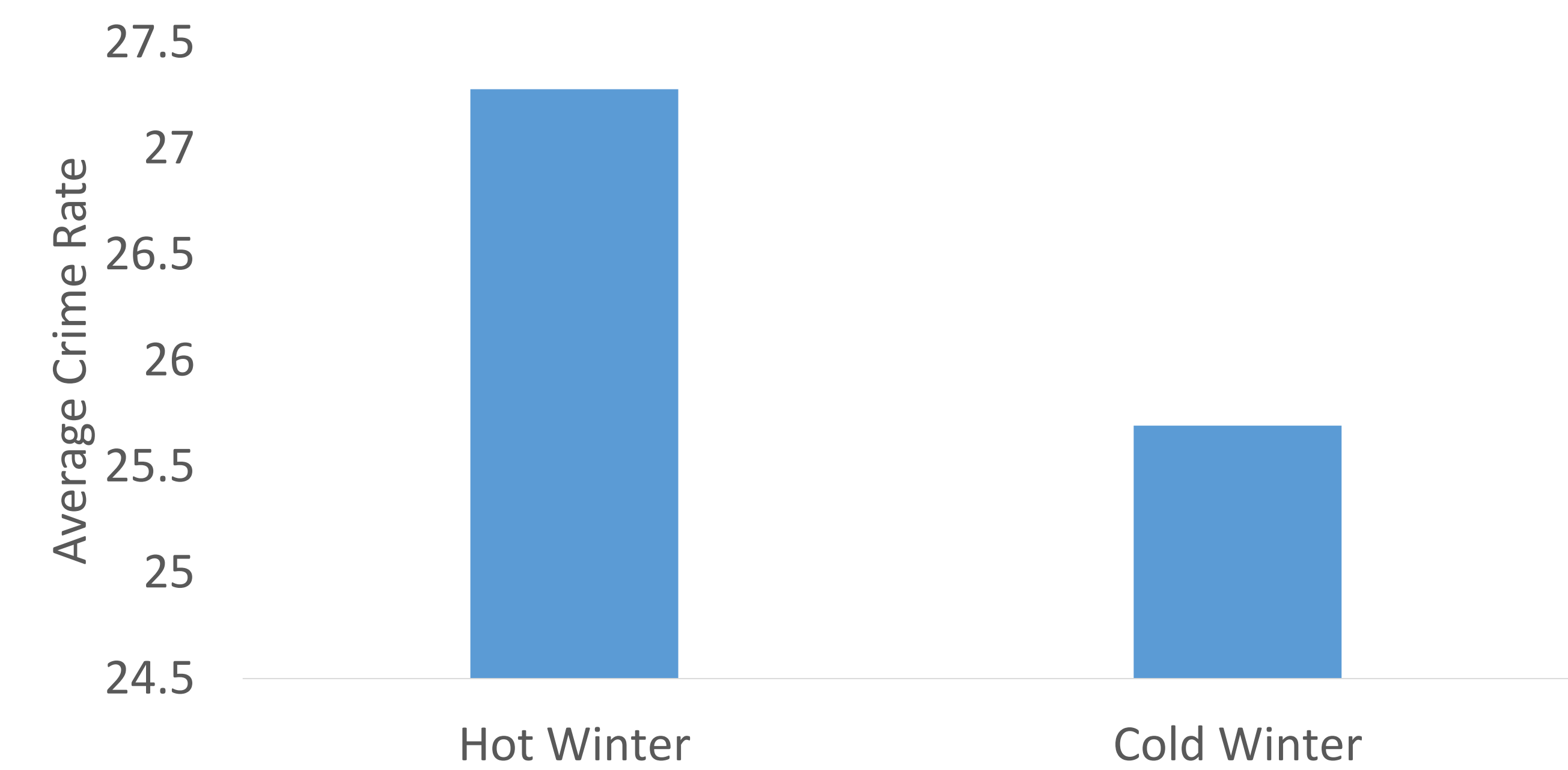
**Figure 2:** Crime rate in summer vs. winter during the coldest years in Virginia. There was a significant difference ( $p < 0.05$ ) between the summers and winters of cold years

## Methods

The temperature data was retrieved from NOAA National Center for Environmental Information, an organization that is able to have information on weather and other environmental data. The crime data was found from the Uniform Crime Reporting Section Department of State Police. The website has reports of crime in Virginia and within the reports, the reader can see that there is the total of crimes, types of crimes, the age of victims and perpetrators, etc. Only three months were chosen for the six chosen years from the NOAA data. The six years were split into two categories. The average temperature for the month was then found as well as the lowest and highest temperature of the month. Four t-tests were done to see if the temperature and crime had a significant statistical difference.



**Figure 3:** Crime rate in hot vs. cold summers; the difference was not significant ( $p < 0.05$ ).



**Figure 4:** Crime rate in hot vs. cold winters; the difference was not significant ( $p < 0.05$ ).

## Discussion

The results for this experiment disprove the hypothesis that more crimes would be committed due to higher temperatures within a season because the p-value was .88, showing no significant difference between temperature and crime. Although there was no significant difference for the hypothesis, there was a significant difference for winter and summer during both the hottest years and coldest. The p-value was .02 for the hottest years and .03 for the coldest years. This means that although there is no direct correlation between climatic temperature rise and crime rate, there is a higher rate of crimes happening in the summer than in the winter.

A study similar to this experiment was by Butke and Sheridan, they did an experiment where they compared weather and aggressive crime in Cleveland, Ohio, they wanted to see if past studies that temperature correlates with crime were true. Like this study they used records of past crimes by using the Case Western Reserve University’s Center on Urban Poverty and Social Change. The timeline of this study is crimes from 1999-2004. They had six categories instead of three, the categories were similar to this study because it included aggravated assault, rape, and murder in addition to robbery, domestic violence assault, and nonaggravated assault. The weather data was obtained from National Climatic Data Center. Unlike this study, they focused on time of day and hourly data. The results of their study were that there was an increase in crime in the summer than in the winter. They also believed that weekends had an even higher amount of violent crime, and in their opinion it could have something to do with meeting new people either not in a workplace or school. The study supported previous studies that the higher the temperature the chances of crime rates rising (2).

Problems with this experiment were not using even more diverse crimes. Not taking other variables like the studies above have, variables like poverty and the age. Instead of focusing on Virginia as a whole, the top four largest cities should have been chosen all around the same in poverty and age levels so that they could be compared. Instead of hypothesizing that all crime rate would increase, a specific type of crime should have been chosen as the one that correlates with temperature. Future studies done could be focusing on one specific crime and seeing if it is actually heat that is causing a rise of the crime in certain seasons or if other variables are involved or the actual cause.