COVID-19: Examining the Impact of the Global Pandemic on Violent Crime Rates in the Central Valley of California

Derek Avila, Huan Gao, Blake Randol and Sriram Chintakrindi[*]

California State University, Stanislaus, USA

Abstract: This study focuses on how a global pandemic like COVID-19 affects violent crimes in the city of Stockton, California. The violent crimes that we will be examining are homicide, robbery, rape, simple assault, and aggravated assault. We obtained crime data from the LexisNexis Community Crime Map and obtained COVID-19 data from the San Joaquin County Health Department regarding the city of Stockton. We developed the results of this research by using time-series plots and interrupted time-series analysis. Our results demonstrate that COVID-19 caused a statistically significant change in the slope for rape, robbery, and simple assault violent crimes. Finally, we discuss in our policy implications section that the Stockton Police Department should establish more community outreach programs that could help prevent these types of violent crimes.

1. INTRODUCTION

In the United States of America, the year 2020 has been an extremely difficult year economically, socially, physically, and mentally for almost every individual that is living in the U.S. Most explanations for the troubles faced by American citizens in 2020 are directly related to the sociological and criminological effects of the global pandemic known as Coronavirus 2019 (COVID-19) and how this virus has reshaped societal norms and social structures across the globe (Adhanom, 2020). Unlike a localized natural disaster or a tragedy that only affects a limited number of individuals in a specific region, the COVID-19 pandemic has in many ways impacted the life of every individual living in the year 2020.

For example, in 2020, urban commercial zones, which are typically crowded with white-collar workers and executives commuting to office complexes, these routines were largely abandoned due to social distancing policies to prevent the spread of the COVID-19 virus. Non-essential blue- and white-collar workers immediately shifted to working from home using online technology, such as cloud computing applications and video conferencing tools that allowed for the decentralized collaboration of workforces scattered across the globe. Furthermore, corporations and workers have been heavily impacted by global supply chain shortages and increased societal dependence on automation for managing the industrial production of consumer items and the flow of goods across the globe. This anomic shift in the social, economic, and

political structure of society which has been exacerbated by the COVID-19 pandemic has fundamentally transformed societal norms and has accelerated the decentralization of the workforce away from historically valuable urban commercial real estate areas into suburban regions due to work from home policies being implemented to prevent the spread of the virus. The implementation of work-from-home policies across the U.S. has created inflated real estate values for housing, such as single-family homes and rentals in apartment complexes in suburban regions, and has caused the value of the commercial real estate to plummet as office complexes remain abandoned. The changing housing market has created a housing shortage on an unprecedented scale. The decreasing emphasis on the social and economic value of urban commercial centers may interestingly be tied to increased crime rates, poverty, and mental illness rates due to social isolation and worker alienation.

The Concentric Zone Model (The Burgess Model), features concentric rings or zones that are incrementally moving away from the Central Business District (CBD) of an urban center to highlight the changing land values and crime rates. The rings change from the CBD to the factories and industries zone, zone of transition, working-class residential zone, and commuter zone. The Burgess Model continues to provide insight into why property and violent crime rates are historically higher in the dense urban regions of a city than compared to the outskirts of a major city which is typically more suburban and residential (Porter *et al.*, 2015).

Furthermore, Social Disorganization Theory and the concept of collective efficacy provide the theoretical foundations for empirically examining how crime rates

*Address correspondence to this author at the California State University, Stanislaus, USA; E-mail: schintakrindi@csustan.edu

are tied to aggregate social conditions. Shaw and McKay's Social Disorganization Theory remains a highly relevant criminological paradigm for explaining how the combination of poverty, familial disruption, residential turnover, and racial-ethnic heterogeneity in communities promotes low civic participation and lack of supervision for teenagers. A lack of social structure and collective efficacy produces weak social controls and can lead to high rates of crime and delinquency and overreliance on the criminal justice system for managing social relationships (Porter *et al.*, 2015).

The type of stress and mental health issues that COVID-19 has evoked depends on the individual and the circumstances or situations they are being faced with during this global pandemic. Some individuals may have an understanding of how to deal with the stress that they are facing at the time while others may not. We hypothesize that based on Agnew's (1992) General Strain Theory of crime individuals have turned to criminal activity to deal with the general stress that COVID-19 has caused in their lives. This has led to an increase in violent crimes committed specifically in Stockton, California. The criminology theory that supports this claim is the General Strain Theory of crime.

2. LITERATURE REVIEW

In 1992, the theorist Robert Agnew presented the core ideas of the General Strain Theory of criminology (Agnew, 1992). This theorist developed that the main premise of the general strain theory is that individuals respond to stressors and strain in a different ways in which some individuals respond negatively to those stressors with anger and frustration (Agnew, 2001). The general strain theory argues that constant or momentary strain and stressors in an individual's life increase the possibility of the individual turning to crime to deal with the strain or stressors (Agnew, 2001). Engaging in criminal activity is assumed to reduce strain and relieve the emotions that individuals with strain are experiencing (Agnew, 2001).

2.1. What is a Strain?

Next, to understand the general strain theory and how it relates to criminology we must define what strain is. The first generalized definition that Agnew came up with for strain in 1992 was strain is the relationship in which other individuals are not treating the individual as the individual would prefer to be treated (Agnew, 1992). Therefore, depending on the researcher and the

situation that is being described, strain can be defined in many ways (Agnew 1992). In 2001, Agnew came up with three general definitions to help clarify the meaning of strain in the general strain theory (Agnew, 2001). However, as scholars are still researching the General Strain Theory, the category or types of strain are still evolving and are changing regularly (Cullen, 2017). For instance, when the core ideas of the General Strain Theory were first presented in 1992, researchers only focused on one type of strain which was the inability to achieve success (Cullen, 2017). However, the General Strain theory now includes vicarious and anticipated strains that can most likely result in crime (Agnew, 2002). For this research, the different types of strains that will be covered are objective, subjective, emotional, vicarious, and anticipated strains.

2.2. What are the Types of Strain?

2.2.1. Objective Strains

Furthermore, in 2001 the three types of strains that Agnew discovered was objective, subjective, and emotional response strain (Agnew 2001). Objective strains are defined as members of a given group who disapprove of an event or condition (Watts & McNulty, 2013). Therefore, when research states that an individual is experiencing objective strains, the individual is experiencing a situation in which the situation is disliked by the whole group that the individual is involved (Agnew, 2001). An example of objective strains is physical assault or domestic violence in which the majority of the group, society, dislikes this type of condition or situation. Criminal victimization, divorce, and poverty are also examples of objective strains that can contribute to the criminal activity of an individual (Cullen, 2017). However, depending on the individual characteristics of the individual, like age, has an impact on the type of objective strains that an individual may be faced with or deal with at the time. As human beings, the type of objective strains we are faced with at a certain time in our lives can have a strong influence on our age, family, friends, and occupation (Watts & McNulty, 2013).

2.2.2. Subjective Strains

The next type of strain that an individual can be faced with in their life is subjective stains. Subjective strains are defined as situations or events that are disliked by the individual that is experiencing them (Agnew, 2001). Unlike objective strains, subjective

strains are based solely on the disapproval of the situation by the individual (Thaxton & Agnew, 2018). Therefore, subjective strains are the individual's evaluation of the action, and this determines the individual's response to the strain (Watts & McNulty, 2013). Therefore, an individual may respond emotionally to a strain while one of their peers responds to a strain in a physical manner. The main reason for this is that every single individual is constructed mentally, psychologically, and emotionally differently. An individual's evaluation of the strain is based mainly on an individual's traits, goals, personal resources, experiences, and past life. (Agnew, 2001). These aspects of the individual may depict whether the individual may respond to strain in an angry manner while another individual may respond to the same type of strain in a depressed manner (Agnew 2006). Also, this assists in the explanation of why some individuals respond to strain criminally and others seek mental help to assist them in dealing with the same type of strain.

2.3. What are the Generalized Types of Strain?

Therefore, to fully grasp the idea of the general strain theory we must discuss the generalized types of objective and subject strain that can cause an individual to turn to criminal activity to deal with strain. However, Agnew describes that every human being is different, and we all cope with stress in different ways (2001). Not only does the theorist discuss that every living human being is different, but the theorist illustrates that not every human being may have the same type of strain in their lives (Agnew, 2006). The general list that Agnew (1992) suggests that causes strain in an individual's life is anything that threatens the accomplishment of a positively valued goal, the removal or loss of a positive stimulus, and the encounter of negative stimulus (Hoffman, 1997).

Not only can these three types of strain cause an individual to become delinquent, but their personal and social coping skills have an impact on their reaction to strain (Hoffman, 1997). If an individual has not developed good personal coping skills, then they are more likely to turn to criminal activities when faced with subjective strain (Agnew et. al, 2006). As a result, an individual is more likely to commit a criminal act when the individual does not have the adequate self-management skills and means to cope with the strain in an appropriate manner (Agnew, 1999). Also, these individuals do not have strong social support, have strong social control, place the blame for their actions

on others, and are inclined to commit criminal activity (Hoffman, 1997). Not only do these characteristics have an impact on whether an individual will commit criminal acts, but the severity of the strain experienced by the individual also has an impact on the individual (Hoffmann & Cerbone, 1999).

2.4. Do Strains have a Time Frame?

Researchers have described that there is not one single instance or type of strain that can be pinpointed to describe why an individual committed a criminal activity (Hoffmann & Cerbone, 1999). However, the time frame in which the individual keeps on facing the same type of strain repeatedly has an impact on the individual (Hoffmann & Cerbone, 1999). This theory depicts the time frame in which strain happens repeatedly as a constant strain. Constant strain is the idea that an individual faces the same type of strain repeatedly for a long period (Agnew, 2007). A few examples of constant strain are not having a monthly income, the need to provide for your family or dependents, and the constant burden of bills (Agnew, 2007). The failure at coping with these constant strains weekly or even monthly can lead an individual to turn to criminal activity to satisfy these needs (Agnew et al., 2006). The momentary strain on the other hand is characterized as a short-term strain in which an individual is faced with a situation in which they do not have adequate funds to pay for something at the time (Agnew, 2013). Therefore, they turn to criminal activity to cope with this strain and to meet their needs at the time of the strain. Once the need or needs is met, the strain goes away, and the individual may be faced with a different type of strain (Cullen, 2017). Therefore, it is important to discuss the different types of strains that increase the likelihood of an individual turning to crime to cope with the strain in their lives.

2.5. Criminal Coping Skills to Deal with Strain

The final category that increases the likelihood of an individual committing a criminal act when faced with strain is, the development of some sort of criminal coping manner to deal with the strain that they are facing. The main premise behind this category in the General Strain Theory is the idea that sometimes to reduce the strain or boost their ego individuals cope through crime to do so, and this gives them an incentive to engage in criminal activity (Cullen, 2017). Agnew (2013) explains that individuals are most likely to use criminal coping skills when they have poor resources and coping skills, low social control, hardly

any social support, opportunities for crime to happen, have some sort of knowledge that is favorable to crime, and association with others that commit criminal acts. Criminal coping skills are something that can be learned from others or an individual's own experience (Agnew, 1999). For instance, some strains correlate with other types of strains and provide an example of how to cope with that strain criminally (Thaxton & Agnew, 2017).

2.6. The Impact of Strain on California and its Central Valley

The Great Recession not only had a significant impact on the United States as a whole, but it also had a significant impact on the State of California. Researchers claim that the state of California suffered the worst financial crisis and had the most unaffordable housing during this time (Bardhan & Walker, 2011). Research also described that California had taken a biggest hit than any other state in the country (Bohn & Schiff, 2011). In California alone, the unemployment rate during this time reached 12.4 percent and the state lost over one million jobs during this period (Bardhan & Walker, 2011). Not only did the unemployment rate increase during this period, but the suicide rate also increased. The suicide rate increased from 11.2 percent to 12.9 per 100,000 people (Matthay, Galin, & Ahern, 2017).

As a result of the Great Recession, the citizens that resided in California during this time were faced with a great amount of strain daily. For instance, the one million individuals that lost their jobs during this time were faced with the strain of providing for their families even though they had little to no income at the time. This is especially evident when looking at how much the suicide rate increased during this time. The strain that some individuals were facing during this time was extremely substantial in they took their own lives because the strain placed such a heavy burden on them.

The Great Recession also had a tremendous impact on the Central Valley of California and the city of Stockton in many ways. For instance, the exports of California during this time fell 23 percent to $76.1 billion from $98.9 billion in the first eight months of 2008 (Bardhan & Walker, 2010). This had an extensive impact on the Central Valley. The reason for this is that the Central Valley is known as the most advanced center of agribusiness in which most of the agricultural goods are exported out of California (Walker, 2004). This has a trickle-down effect in which the farmers are

not getting paid what they usually get paid for their export goods because the demand for their goods is not needed. Then the workers are getting laid off or let go because the farmers do not have the money to pay them for their work. This then leads to the workers being unemployed and not having a monthly income.

The strain that was imposed on these farm workers was exceptionally hard for them to cope with. This is especially evident when the central valley had one of the highest foreclosure rates in the state in which the rate was above 50 per 1000 households foreclosed (Bardhan & Walker, 2011). Also, during the Great Recession, the inland areas of California like the Central Valley and Stockton were some of the worst areas hit by the Great Recession (Bardhan & Walker, 2011).

The city of Stockton is in the heart of the Central Valley and is one of the cities that got hit the hardest by the Great Recession. The reason Stockton suffered drastically from the Great Recession was people from the bigger cities like the Bay Area were moving towards the Central Valley to buy houses for a cheaper price than the Bay Area and to find jobs. During this time before the Great Recession hit, the city of Stockton became one of the best sought-after places to buy a home (Kirby, 2009). However, these individuals were buying homes for inflated prices which cost more money than they were making at their jobs (Bardhan & Walker, 2011). Therefore, when individuals started losing their jobs, they could not make their house payments and started foreclosing on their homes. These individuals that lost both their homes and job had a substantial amount of strain in their lives during this time. Researchers describe those inland areas of California like the city of Stockton were one of the hardest hit areas in the country in which unemployment rates hit 20 percent and even more in some other places (Kirby, 2009). Also, one in every 60 houses in Stockton during this time was in some form of foreclosure (Kirby, 2009).

Furthermore, to make up for the job loss and no income individuals had to turn to other alternatives for income. Therefore, these are the individuals that had to turn to illegal activities to make money and provide for their families. Depending on the individuals, the illegal activities they might have engaged in to make money could be selling drugs, stealing vehicles, and robbery. Also, individuals who must deal with this type of strain might turn to criminal gangs in which they engage in this criminal enterprise to help cope with the stress.

This is evident in the city of Stockton in which there are 70 documented gang operations in the city (Adams, 2019).

The constant strain from the pandemic has led some individuals to turn to criminal activity to cope with this strain. As a result of the strain from the global pandemic, individuals may have turned to violent criminal acts like homicide, robbery, rape, simple assault, and aggravated assault. This is especially true in the city of Stockton, California. This thesis will research whether the violent crimes of homicide, robbery, rape, simple assaults, and aggravated assaults were significantly impacted by the global pandemic. This thesis will argue that the strain from the global pandemic did cause an increase in the rate of these violent crimes in the city of Stockton.

3. METHODOLOGY

3.1. Hypothesis

This research will examine whether COVID-19 had a statistically significant impact on the homicide rate, robbery rate, rape rate, simple assault rate, and aggravated assault rate in the city of Stockton, California. Robert Agnew's General Strain theory is the main link between the strain or stressors that COVID-19 caused on individuals and their motivation to seek other activities like violent crimes to cope with the burden that COVID-19 placed on them.

In this research, the time frame for measuring crime is from January 2018 till the end of July 2021. However, the time frame for COVID-19 will be from January 2020 to July 2021. Likewise, this thesis will research whether the infection of COVID-19 had any correlation with the changes in violent crime rates including the number of homicides, robberies, rape, simple assault, and aggravated assault in the city of Stockton during the global pandemic. We hypothesize that the COVID-19 pandemic has had a direct impact on the violent crime rate. More specifically, we hypothesize that violent crime rates increased and are correlated with the infection rate of COVID-19.

3.2. Variables & Measurements

Therefore, in this study, the global pandemic is the independent variable. The infection of COVID-19 in the region has a direct correlation with the strain placed on the individuals like fear and their stress level. This study will use the number of cases and the changes in the cases over time in this local region to measure the independent variable. Based on the data received from the San Joaquin County Health Department there were a total of 37,414 confirmed cases of COVID-19 within the city limits of Stockton during this time frame. Since this research will be using interrupted time series analysis to test the hypothesis, this research has classified April 2020 as the reference point in which COVID-19 had the largest impact on the population the most.

The dependent variables on the other hand will be the number of violent crimes committed during this time frame. The violent crimes that this study will examine are homicide, robbery, rape, simple assaults, and aggravated assault. This research will examine whether the intervention of COVID-19 had a statistically significant impact on these violent crime rates. The research will construct an interrupted time series analysis for each of these violent crime rates.

3.3. Profile of Research Site

Stockton is in the heart of the Central Valley in California and San Joaquin County. This city is located 83 miles east of San Francisco and 45 miles south of the capital of California (*About visit Stockton,* n.d.). The San Joaquin Delta is one of the main geographic aspects of the city of Stockton which serves as a major shipping point for a variety of manufactured and agricultural products of Northern California (History, 2016). The population of Stockton is about 312,697 with roughly 27.7 percent of the population being over 18 years of age. About 44.8 percent of the population race in Stockton is white and 42.7 percent of the population is Hispanic or Latino race. The population per square mile of Stockton is about 4,730 people and the land area of Stockton is 61.67 square miles. In Stockton, 17.9 percent of the population lives in poverty while the median income per household is $54,614 (Bureau, 2019).

3.4. Sampling Procedures

Moreover, this research will collect data from March 1, 2020, to February 28, 2021, for COVID-19 data. This gives a full year of data to process and analyze for this research. This will increase the sampling size and the number of limitations that can be placed on this research. Not only does this increase the sampling size, but this time frame includes major aspects of the global pandemic. This time frame includes when individuals first started getting exposed to the virus in the United States and when the number of cases dramatically increased in the United States. Also, this

year's time frame includes all the fluctuation in the number of cases in Stockton, California especially around the major holidays. This time frame allows the research to study the time in which COVID-19 first came about in Stockton and when COVID-19 was at its peak in Stockton.

For the dependent variables, on the other hand, the research will collect data from January 2018 to July 2021. This time frame allows the research to analyze the fluctuation in crime rates over four years. Not only does this allow the research to see a fluctuation in the crime rates, but it also enables the study to examine what happens when the intervention of COVID-19 is introduced into the study. This allows the research to get a more realistic representation of how the intervention of COVID-19 impacted the violent crime rates in the city of Stockton.

3.5. Data Collection

The data collected displays that a total of 37,414 individuals contracted COVID-19 during the time frame of this study. Of those 37,414 cases, 12,571 of those confirmed cases were Hispanic/Latino individuals. This is about 33 percent of the confirmed cases were Hispanic/Latino and this race had the highest percentage of confirmed cases. The next race that had the second highest number of cases was white, and this race had 4,321 confirmed cases. The Asian race on the other hand had 3,683 confirmed cases while the Black or African American race had 1,801 confirmed cases. Overall, the population of Stockton, California is about 312,697 people (Bureau, 2019). This is about 12 percent of the population in the city of Stockton that got infected with COVID-19.

Moreover, the 25-34 age group had the most confirmed cases in the city of Stockton. This age group had the highest number of confirmed cases with 7,456 cases of COVID-19. This is about 20 percent of the confirmed cases between the ages of 25-34. The next age group that had the second most confirmed cases was individuals between the ages of 35-44. This age group had 6,348 confirmed cases. The 45-54 age group had 5,353 confirmed cases while the 18-24 age group had 5,000 confirmed cases. Appendix A displays this data in a chart format.

3.6 Statistical Model

To assess the impact that the rate of COVID-19 had on the violent crime rates in the city of Stockton, this research used the Interrupted time-series analysis

(ITSA). ITSA enables researchers to examine the statistical significance that a global pandemic had on violent crime rates in a city. One of the greatest aspects of ITSA is that it provides the viewers and researchers a visual on whether the independent variable had a significant impact or not on the dependent variables in a study. The ITSA models in this study represent place a regression line to the independent variable (positive cases of COVID-19) to determine whether there is a statistically significant relationship with the violent crime rates in the city of Stockton. The formula for ITSA is composed as follows:

$Y_t = B_0 + B_1 * time_t + B_2 * intervention_t + B_3 * time after intervention_t + e_t$[1]

Here, *Yt* is the number of positive COVID-19 cases in the city of Stockton in month *t*. A continuous variable in this study is time *t* which represents the months in this study from the start of the observation period (January 2018). The intervention portion of this formula represents the time *t* occurring before and after the global pandemic. *B0* is the estimated baseline for the crime rates before the monthly intervention, whereas *B1* evaluation of the change in the monthly crime rates that happened each month before the implementation of COVID-19. *B2* is the change in the baseline level after the monthly intervention for the crime rates and *B3* estimates the change in the slope of the crime rate after the intervention.

4. RESULTS

4.1. Descriptive Statistics

Table **1** gives a breakdown of all the positive COVID-19 cases on a month-by-month basis. The month that had the most positive cases in the city of Stockton was the month of December with 10,985 cases. The month with the second highest number of cases was the month of January 2021 with 7,412 positive cases. There was a dramatic increase in the number of positive cases between November 2020 and December 2020. This increase was the biggest in the entire data set for the number of positive cases.

Next, Figure **1** demonstrates a time series plot for the "Number of Homicide Crimes" committed from

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[1]This equation was obtained from Evaluation of Youth-related Crime and Disorder in the Metcalfe Park Neighborhood: Assessing the Impact of the White House's Building Neighborhood Capacity Program written by Blake Randol.

Table 1:   COVID-19 Positive Cases March 2020- February 2021

Total Number of COVID-19 Cases					
Month 2020-2021	**Raw Number**	**Cumulative Percent**	**Month2020-2021**	**Raw Number**	**Cumulative Percent**
March	133	8.3	September	952	33.3
April	203	16.7	October	1,138	41.7
May	394	25.0	November	3,204	75.0
June	2,839	66.7	December	10,985	100.0
July	5,735	83.3	January	7,412	91.7
August	2,331	58.3	February	2,096	50.0

January 2018 through July 2021. This plot demonstrates that there was a steep increase in the number of homicides committed at the end of the year 2020 and the beginning of the year 2021. The largest number of homicides were committed in December 2020 and the least number of homicides committed a year prior in December 2018. Figure **1** also depicts that there was a dramatic decrease in the number of homicides committed before intervention of COVID-19 and saw a sensational increase in the number homicides after the intervention of COVID-19. The average number of homicides committed during the time frame of this study was 3 per month.

Figure **2** on the other hand, displays a time series plot of "The Number of Robberies" committed from January 2018 through July 2021. The plot in Figure **2** portrays that in there was a dramatic increase in the number of robbery crimes committed in August 2018 and October 2018. However, after October 2018 there was the dramatic decrease in the number of robberies committed. This is the steepest decrease in the whole slope. The average number of robberies that occurred

during the time frame of this research was about 70 robberies.

Likewise, Figure **3** portrays a time series plot for the "Number of Rape Crimes" committed from January 2018 through July 2021. Overall, this plot has a steady incline with a low of 1 and a high of 19. Figure **1** displays that the number of rape violent crimes leveled off at around 10 at the end of the year 2019 and the beginning of the year 2020. The average number of rape crimes that occurred during this time frame was about 10. However, Figure **3** then portrays a dramatic spike in the number of rape crimes during the beginning of the year 2021 and then started to decrease after April 2021.

Figure **4** on the other hand is a time series plot illustration of the "Number of Simple Assaults" committed in the city of Stockton from January 2018 through July 2021. The average number of simple assaults that occurred during this period was 278 per month. The plot is erratic but eventually becomes a decreasing plot towards the end of the study around
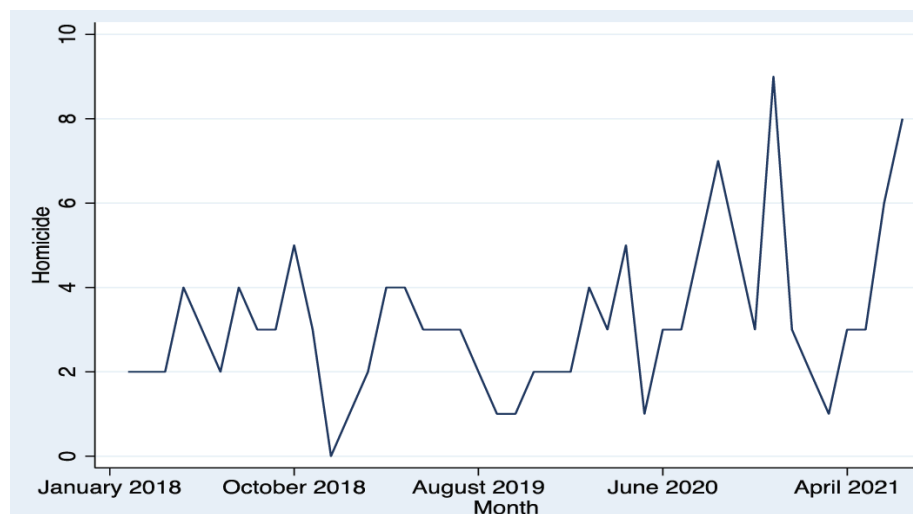
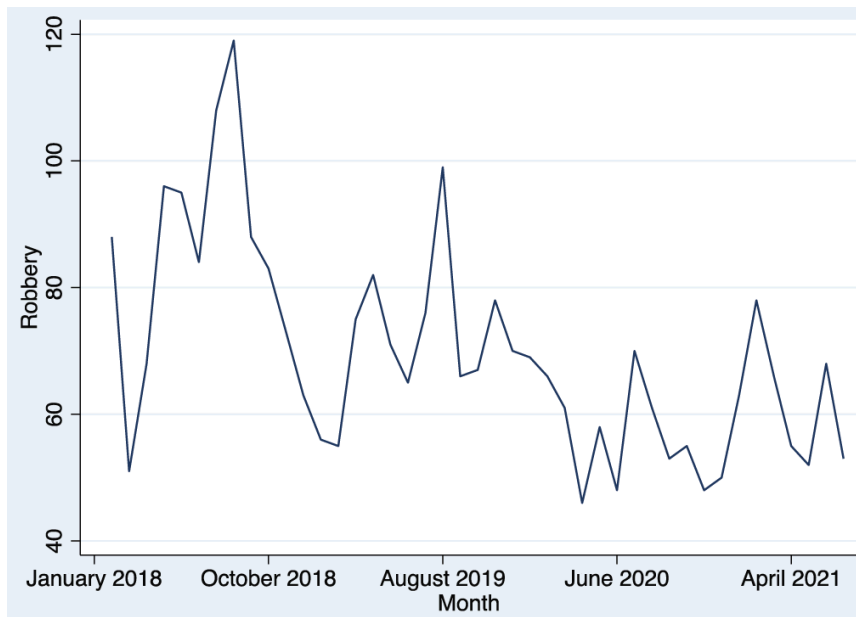**Figure 1:** Number of Homicide Crimes.
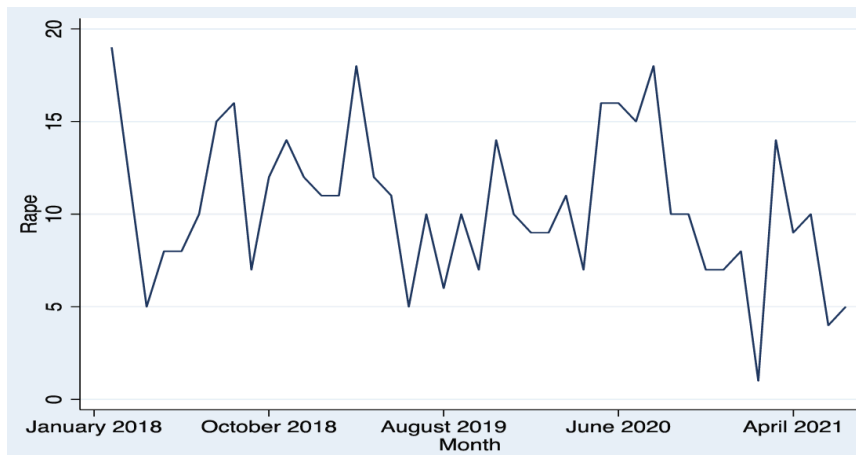
Figure 2: Number of Robbery Crimes.

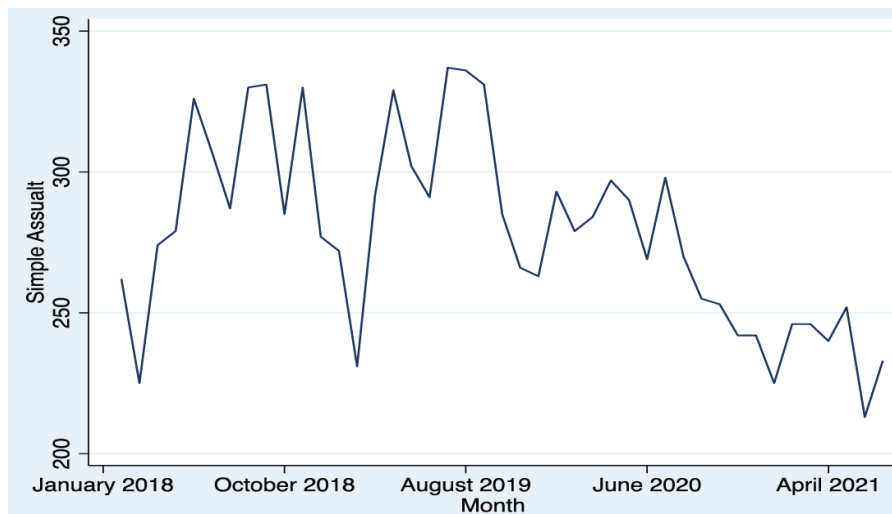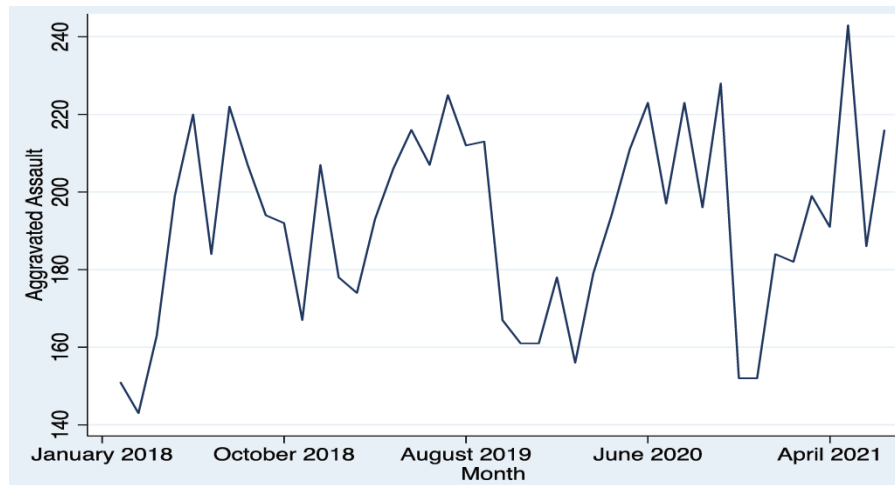**Figure 3:** Number of Rape Crimes.

Figure 4: Number of Simple Assault Crimes.

Figure 5: Number of Aggravated Assault Crimes.

August 2019. This plot also shows that the number of simple assaults occurred more during the beginning of this time frame and dramatically decreased towards the end of the study.

Finally, Figure **5** is a display of a time series plot for the "Number of Aggravated Assaults" committed from January 2018 through July 2021. On average there were 192 aggravated assaults committed during this time frame. The majority of the increases in this plot correspond with a decrease right after the increase. However, the most notable decrease and increase in this time series plot is in the proximity of April 2020, which is when the intervention of COVID-19 took place.

In summary, the descriptive analysis discloses that crime like rape, homicide, and aggravated assault saw a dramatic increase in the number of crimes around April 2021. This was when the intervention of COVID-19 was implemented into these crime rates. Aggravated assaults and homicides on the other hand did not have a significant increase in the plot during this month. Each of these plots had a substantial difference in the coefficients. However, the following section "inferential analysis" will implement the interrupted time-series analysis to determine whether COVID-19

had a significantly significant impact on the different violent crime rates.

4.2. Results from Interrupted Time-Series Analysis (ITSA) Models

Tables **2** through **6** display the statical outcomes from the interrupted time-series analysis (ITSA) models. The graphical representation of these results can be further looked at in Appendix B. These figures exhibit the results from each violent crime type with the implementation of COVID-19. The findings reveal that three of the violent crimes have a significant relationship with the implementation of COVID-19. The violent crimes that have a statically significant relationship are rape, robbery, and simple assault.

The number of rapes committed before the implementation of COVID-19 was about 4.58 rapes per month. Table **2** displays that after the implementation there was a decrease of -.47 rape crimes committed per month after the implementation of COVID-19. This caused the slope to be a downward trend slope. Before COVID-19 rape was at the 92% confidence interval and after COVID-19 rape increased to the 95% confidence interval. This study is 95% confident COVID-19 had a

Table 2:   Rape Statistics

Variable	b	t	P
Constant	12.05	6.52	0
Time Frame	-0.095	-0.93	0.358
Pre- Covid-19	4.58	1.79	0.081
Implementation of COVID-19	-0.47	-2	0.053
$F_{(3,39)} = 3.14$ ($p < .05$)			

Table 3: Robbery Statistics

Variable	b	t	P
Constant	86.29	10	0
Time Frame	-0.74	-1.67	0.103
Pre- Covid-19	-12.34	-2.27	0.029
Implementation of COVID-19	1.22	2.07	0.045
$F(3,39) = 8.30$ ($p < .05$)			

statically significant impact on the number of rapes that took place in the city of Stockton ($p < .05$).

Table **3**, on the other hand, portrays that before the implementation of COVID-19 robberies over time were decreasing by -12.34 units per month and then after the implementation of COVID-19 the number of robberies increased by 1.22 units per month. This caused the slope to change from a downward trend slope to an upward trend slope. The reason for this drastic change in the slope is unclear and should be studied later. The confidence interval for robbery is 99% and this study is 99% statistically confident that robbery is true after the implementation of COVID-19 ($p < .05$).

Table **4** on the other hand, reveals that there was a decrease in the number of simple assaults that took place after COVID-19 hit. Before COVID-19 hit, simple assaults were decreasing by 11.60 units per month and then decreased to -4.79 units per month after the hit of COVID-19. Before COVID-19 the confidence interval

for simple assaults was 66% confidence interval and after the implementation of COVID-19, the confidence interval rose to 99%. As a result, this study is 99% confident that simple assault is statistically significant and that COVID-19 had an impact on the rate of simple assault ($p < .05$).

The two violent crimes that did not have a statistically significant change in the slope after the implementation of COVID-19 were homicide and aggravated assault. Table **5** depicts that the homicide rate did not have a static significance change in the slope after the implementation of COVID-19. The number of homicides committed before COVID-19 was about 1.17 units per month and saw a decrease to .10 units per month after COVID-19. Table **5** also displays the p-value for homicide which makes this variable not statistically significant ($p > .05$).

Nonetheless, Table **6** displays that aggravated assaults increased by 12.97 units per month before COVID-19 and decreased -.28 units per month after

Table 4: Simple Assault Statistics

Variable	b	t	P
Constant	287.15	19.13	0
Time Frame	0.43	0.46	0.646
Pre- Covid-19	-11.60	-0.77	0.446
Implementation of COVID-19	-4.79	-4.42	0
$F(3,39) = 27.21$ ($p < .05$)			

Table 5: Homicide Statistics

Variable	b	t	P
Constant	2.78	6.47	0
Time Frame	-0.01	-0.54	0.594
Pre- Covid-19	1.17	1.14	0.259
Implementation of COVID-19	0.10	0.74	0.463
$F(3,39) = 1.89$ ($p > .05$)			

Table 6:   Aggravated Assault Statistics

Variable	b	t	P
Constant	188.12	13.96	0
Time Frame	-0.01	-0.01	0.989
Pre- Covid-19	12.97	0.83	0.41
Implementation of COVID-19	-0.28	-0.22	0.829
$F(3,39) = 0.57$ ($p > .05$)			

COVID-19. Also, this decrease in the slope is not statistically significant to reject the null hypothesis for aggravated assault. Since the decrease in the slope is not statistically significant, this variable did not have any impact by the implementation of COVID-19 ($p > .05$).

5. CONCLUSION

5.1. Discussion

The findings in this study indicate that the violent crimes that had a statistically significant impact by COVID-19 in the city of Stockton were rape, robbery, and simple assault. The violent crimes that did not have a statistically significant impact by COVID-19 were homicide and aggravated assault. Not only did COVID-19 cause some of these violent crime rates to decrease, but also caused an increase in these rates as well. The violent crime rates that saw a 99% statistically significant increase were robbery and simple assaults. The slope of robbery was decreasing and then COVID-19 caused the slope to turn into an upward trend slope. However, COVID-19 had a different effect on the rate of simple assaults. Simple assaults were decreasing around 11 units per month before COVID-19 but only decreased by 4 units per month after COVID-19. The reason for the differences that COVID-19 had on these violent crimes is not addressed in this research but should be studied further.

5.2. Limitations

This research has had a few limitations placed upon it throughout the whole research. One limitation that this study has is that the knowledge of COVID-19 and the impact that it may have had on crime is still an ongoing event. COVID-19 came about in America barely in the year 2020 and not much research has been done about it. Scientists vaguely have an understanding of the anatomy of the disease or even how the disease came about. Therefore, the way COVID-19 impacted these violent crimes at this time may have a different outcome ten years from now once more knowledge is gained about this disease and as time progresses. Since the virus COVID-19 just became discovered, this study was only able to collect data for a year regarding COVID-19 from the San Joaquin County Health Department.

5.3. Policy Implications

As addressed earlier, the results of this research indicate that COVID-19 had a statistically significant impact on rape, robbery, and simple assault crimes in the city of Stockton. The result of this research portrays that the global pandemic induced a significant amount of stress in the lives of Stockton residents. This significant amount of stress experienced by some individuals caused them to turn to violent crimes like rape, robbery, and simple assault to cope with the stress. The findings of this research can help speculate what tasks or issues police departments need to focus their attention on.

The findings of this research are important for law enforcement departments, especially for Stockton Police Department in a few different ways. The first way these results are important for police agencies is by they could allocate more resources to these types of violent crimes and establish more community outreach programs that could help prevent these types of violent crimes. For instance, a community outreach program could teach community members how to prevent burglaries and what actions they could do to reduce their odds of becoming a victim of a robbery. Also, police departments could educate individuals on how to speak up against rape or simple assaults or even how to stand up against these types of crimes. The findings of this research can guide state policymakers and criminal justice agencies by these individuals need to focus on other external factors and not just the criminal aspect of a crime. These findings portray that other

external factors influence an individual to commit criminal activity that need to be addressed as well.

Not only has COVID-19 had an impact on the violent crime rates in the city of Stockton, but COVID-19 has also impacted crime rates in Queensland, Australia. According to a research study conducted in the country of Australia, some crime rates decreased significantly during the beginning of the lockdowns and began to rise once the social restrictions became lessened (Andresen & Hodgkinson, 2020). These researchers also concluded that some areas in Australia experienced a great increase in the number of robberies and domestic violence-related crimes as well (Andresen & Hodgkinson, 2020). One last main conclusion that these authors reached is that the increase in these crimes in Australia is influenced by the loss of jobs and individuals using drugs to help them deal with stress induced by the COVID-19-related lockdowns (Andresen & Hodgkinson, 2020). Another study conducted in the city of Los Angeles and Indianapolis concluded that COVID-19 caused a significant decrease in the number of traffic stops in both cities (Mohler, Bertozzi, Carter, Short, Sledge, Tita, Uchida, & Brantingham, 2020). This research also reported that an extraordinary increase in domestic violence calls for service in these cities (Mohler et. al., 2020).

The findings of this research correlate with the findings of the existing literature. First, some violent crimes did decrease once the implementation of COVID-19 was introduced which is similar to the findings of these other literature. Also, some violent crimes like simple assault saw an increase in the city of Stockton just like domestic violence calls for service increased in Queensland, Australia. The correlation between COVID-19 and the crime rates has a correlation with the stress or strain induced by COVID-19 which supports the premise of the General Strain Theory.

5.4. Ethical Considerations

This research was approved by the Institutional Review Board (IRB) at **BLIND COPY OF MANUSCRIPT**. The IRB approval number that was given to this study was 2021-093 and this letter from the IRB can be examined more in Appendix C. The principal investigator for this study was a **BLIND COPY OF MANUSCRIPT**. This research did not receive any internal or external funds. As a result, this study does not believe there is any conflict of interest associated with the collection of data and the results of this study.

APPENDIX

Appendix A

Covid-19 Cases Breakdown

Race	Total
Hispanic/Latino	12,571
White	4,321
Asian	3,683
Black or African American	1,801
American Indian or Alaska Native	104
Native Hawaiian or Other Pacific Islander	222
Other	5,577
Unknown	9,135

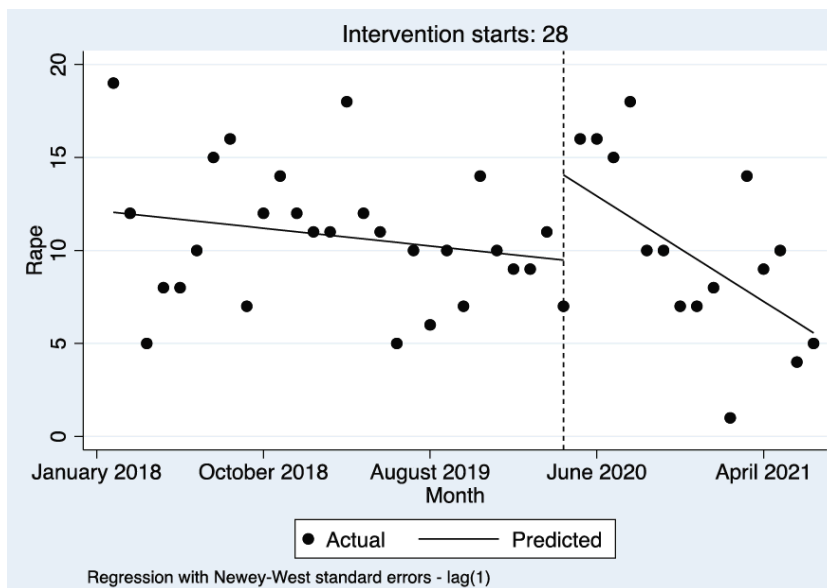| Age Group	Total
0-17	4,204
18-24	5,000
25-34	7,456
35-44	6,348
45-54	5,353
55-64	4,377
65-74	2,768
75-84	1,260
85+	648

Appendix B

Graphical Results of Interrupted Time-Series Analysis
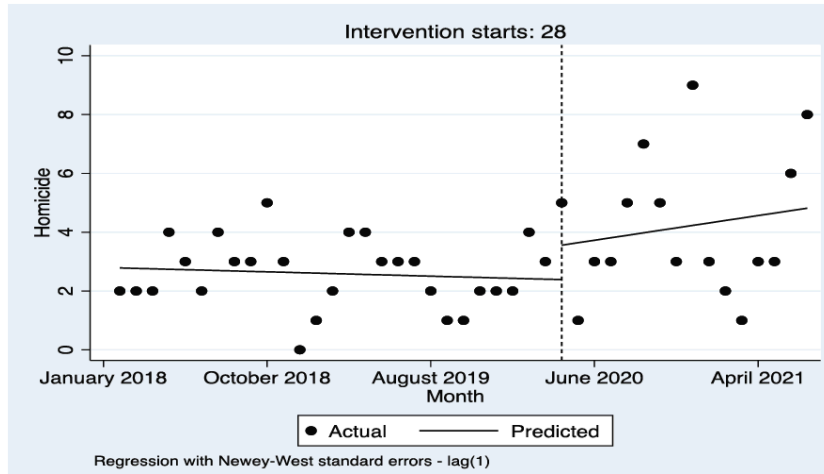
Figure 6: Homicide.
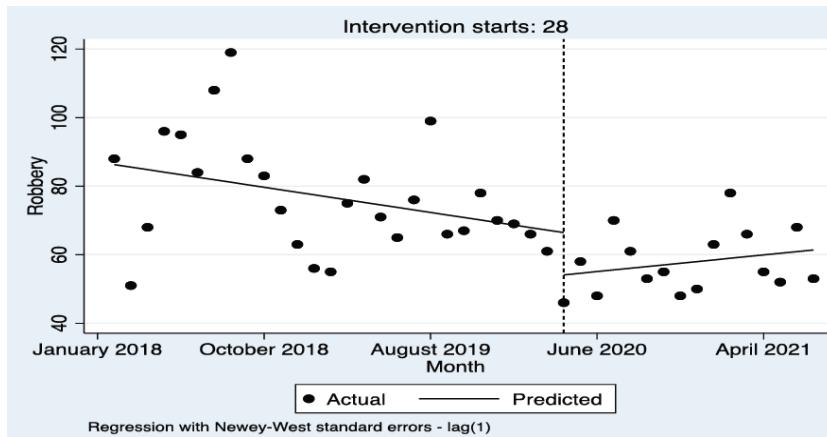
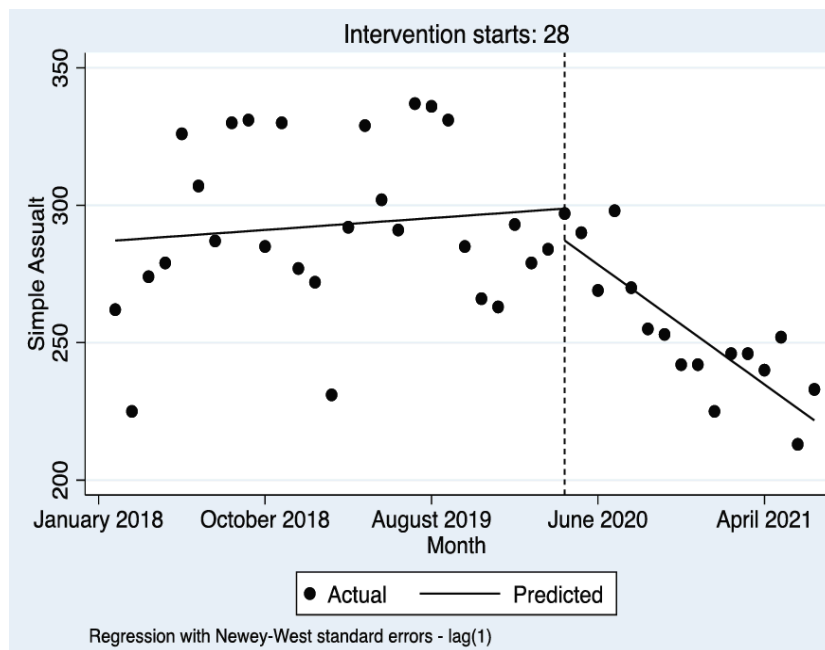**Figure 7:** Robbery.

Figure 8: Rape.
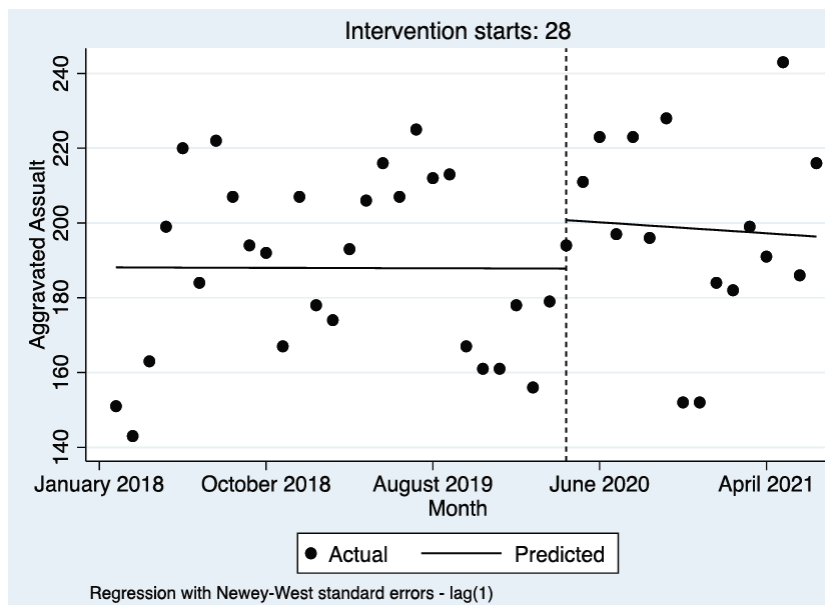
Figure 9: Simple Assault.

Figure 10: Aggravated Assault.

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