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Utilizing Emergency Department Data to Understand Violent Injuries and Reporting Status

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Utilizing Emergency Department Data to Understand Violent Injuries and Reporting Status

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Abstract

Utilizing Emergency Department Data to Understand Violent Injuries and Reporting Status

By Gretchen Baas

Background: Personal demographic characteristics, violent injury type, and medical history's association with reporting violent injuries to law enforcement remain under-research areas within both the public health and criminal justice spheres. Although violence impacts millions of people each year, there is a dearth of research bridging data from law enforcement and healthcare facilities to provide accurate data on these violent injuries and how they are, or are not, reported to law enforcement. This study aims to examine the associations and predictors of reporting status by personal demographic characteristics, violent injury type, and a chart review.

Methods: This is a secondary data analysis of the Cardiff Model dataset from Grady Memorial Hospital in Atlanta, Georgia. The matched dataset from the original pilot study from May 2015-November 2017 was utilized for secondary data analysis. An additional chart review was conducted and merged to the main dataset before analyses were conducted. In the pilot study, participants were screened in the emergency room at Grady Memorial Hospital by the Information Sharing to Tackle Violence (ISTV) screen. approximately 152,000 patients were screened of those approximately 3000 presented with intentional injuries, and 300 were mappable violent injuries regardless of reporting. Emergency department data was matched with police department data at three location sensitivities: 100m, 500m, and 1000m. Preliminary analysis was conducted through descriptive statistics, chi-square, and simple logistic regressions at each location sensitivity. Primary analyses were conducted through three multivariable logistic regressions at 100m, 500m, and 1000m respectively.

Results: Chi-square results conclude significant associations between means of arrival, mechanism of injury, acuity, gender, chief complaint, and financial class at various location sensitivities. Multivariable logistic regressions revealed significant predictors between means of arrival (walk-in) (100m, $p=0.044$; 500m, $p=0.028$), location of injury (street) (500m, $p=0.031$), and gender (500m, $p=0.015$; 1000m, $p=0.010$) at various location sensitivities.

Conclusions: There are associations between personal demographic characteristics, violent injury type, and chart review variables and reporting status at all three location sensitivities. Additionally, we can conclude that means of arrival, location of injury, and gender are significant predictors of reporting status. However, conclusions also exemplify the need to further research these concepts within different populations and geographic locations to understand these trends.

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CHAPTER ONE

Introduction

Violence is a complex and comprehensive term used by researchers, practitioners, and lay-people alike to describe any harm done to a person, and it continues to cause large mortality and morbidity rates worldwide. Yearly, roughly 5.8 million people worldwide suffer a fatal injury. Of those fatalities, one third are caused by an intentional violent act, placing violent injuries as one of the leading causes of death globally (World Health Organization, 2010).

Within the United States, homicide is the seconding leading cause of death in adolescents and is the leading cause of death in adolescent non-Hispanic males (Centers for Disease Control and Prevention, 2018b; Christoffel, 1990; Rockett et al., 2012). In the United States, more individuals die from injuries and violence in the first three decades of life than any other cause (Haegerich et al., 2014). Emergency department data from 2018 recorded 67,972 deaths due to violence within the United States (Centers for Disease Control and Prevention, 2018b). When compared to other high-income countries, the United States continually has higher homicide rates. According to 2012 data, the United States homicide rate was 5.4 per 100,000; Canada's was 1.8 per 100,000 and the United Kingdoms' was 1.5 per 100,000 (Sumner et al., 2015).

Traditionally violence has been viewed from the perspective of criminal justice rather than public health; however, in recent years there has been a transition. Due to this, various data sources, such as the National Crime Victimization Survey, provide data markers that are not yet readily available in public health datasets. Thus, it is critical to

note that throughout this paper, violence will be explained through terms violent injury of violent crime, interchangeably.

Violent injuries throughout the United States account for high morbidity and mortality rates in all age groups and ethnicities. In 2017, the National Crime Victimization Survey (NCVS) reported an increase of 17% in violent crime between the years of 2015 and 2017. The survey estimate that 3.1 million persons 12 years and older had been a victim of a violent crime during in the past six months within the United States (R. E. Morgan, Truman, J. L., 2018). In 2019, Georgia reported having 341 violent crimes per 100,000 people, in comparison to the national average of 379 per 100,000 people (U.S. Department of Justice, 2019). Moreover, in 2018, violent injuries accounted for more than 300,000 ER visits in Georgia, specifically (Centers for Disease Control and Prevention, 2018a). Not only do violent injuries account for above average mortality rates, as well as impose a substantial burden on the health and wellbeing of those affected by it, they also pose a significant financial burden for the United States. In 2010, the United States spent more than $513 billion dollars in medical care as well as loss of productivity across the lifespan due to 31.2 million unintentional and intentional injuries (Haegerich et al., 2014). Reports from 2018 estimate violence costs billions of dollars every year. This data suggests violent injuries pose a significant burden to individuals and communities across the United States and Georgia alike. (Haegerich et al., 2014).

Although data from law enforcement agencies and emergency departments have been used separately to determine the burden of violent injuries, there is still a gap in reliable data. The Cardiff Model, created by Jonathan Shepherd of Cardiff, Wales, has been shown to help facilitate a better understanding of how violent injuries occur within

individual communities (Centers for Disease Control and Prevention, 2019). The foundation of the model involves cross-sectoral data sharing to create a more complete picture of the violence occurring in a community. The Cardiff Model utilizes data linkage method to provide more complete data in order to improve understanding of violent injuries and provide opportunity for injury prevention interventions. To do so, those that present in the emergency department with a violent injury complete a short screen to gather more information about the violence they endured. Following this, matched data is constructed by utilizing key data markers from collected emergency department data in comparison to those violent events that have been reported to law enforcement. With research concluding that a majority of violent crimes occur at only a small number of geographical locations in urban areas, community-based interventions are essential (Sherman, 1989; Weisburd, 2004).

After comprehensive review of Cardiff Model data, violent injury data is incomplete and oftentimes inaccurate due to the lack of reporting to law enforcement (Wu, 2019). In fact, given an estimate of only one third of violent crimes being reported to law enforcement, there is an obvious need for a refined surveillance system to better capture violent injury data (Florence, Shepherd, Brennan, & Simon, 2011; Markovic, 2012; Shepard, 2016). Furthermore, the initial implementation of the Cardiff Model in Atlanta, Georgia showed promising and significant results furthering the understanding of violent injuries. In the adapted model, 83.2% of violent injuries went unreported to law enforcement which is much greater than the Department of Justice's estimate of 52% (Wu et al., 2019). Thus, the discrepancies of unreported violent injuries to law enforcement exemplify the fact that violent injury data is incomplete.

With gaps in surveillance, the public health approach is unable to function efficiently in order to effectively address the needs of the larger public through the development, evaluation, and implementation of these programs. As seen in Figure 1, surveillance is the foundation to the public health program. However, as exemplified earlier, there is a gap in completeness of violence data; thus, building an inaccurate foundation for violence programming. To this end, it is exceptionally important to fill knowledge gaps at the surveillance stage in order to address violence within communities.

Comorbidities of Violent Injuries

The consequences of violent injuries are substantial throughout a person's life. Besides the obvious physical injuries sustained during a violent event; psychological burden is an ongoing affliction experienced well after enduring a violent injury (Rivara, 2019). Exposure to violence is associated with an increased risk of behavioral disorders and mental illness such as depression, anxiety, and eating disorders among others (Hillis, Mercy, & Saul, 2017; World Health Organization, 2010). This association has been confirmed replication studies across the world, indicating that exposure to violence increases the risk of suffering from a variety of mental illnesses (Devries et al., 2011; Kessler et al., 2010).

Beyond violence's impact on mental illness, there have also been an abundance of other studies examining the risk of violence recidivism. In fact, those that experience one violent injury have a much higher risk of experiencing another violent injury than those that never sustain a violent injury (Carter et al., 2015; R. Cunningham et al., 2003; R. M.

Cunningham et al., 2015). A 2-year prospective study found that the risk of experiencing another violent injury in those drug-using youth was two times greater than those drug-using youth with no prior violent injuries (R. M. Cunningham et al., 2015). Violence's influence on the further violent injuries is apparent in more than just physical injury sustained, it is also associated with higher risk of the development of substance use disorders (R. Cunningham et al., 2003; R. M. Cunningham et al., 2015; Widom & White, 1997). Given violent injuries provoke these additional psychological and physical health conditions through one's lifetime, the need to address this issue is a critical next step in research and prevention efforts. Specifically, further research is needed to explore the relationship between previous violent injury in relation to demographic variables, mental illness, and substance use to better inform violence prevention efforts.

Risk Factors for Violence Victimization and Perpetration

Due to the large burden violent injuries cause, different factors impact the risk of being involved in a violent altercation, as a perpetrator or a victim, and are explained through the use of adverse childhood experiences (ACEs) and the socio-ecological model. ACEs explore childhood experiences that may negatively impact the health and wellbeing of adults, with a variety of direct and indirect health outcomes explored. From a different lens, the socio-ecological model is a four-level prevention tool that has been used in a variety of interventions to address different public health concerns (Figure 2). The model is comprised of the individual, interpersonal, community, and societal levels, acknowledging the complexity and import of effects and interaction of each sector on a public health issue. At each level, practitioners identify intervention points to address

behaviors or barriers to effect change for a variety of health topics (Centers for Disease Control and Prevention, 2020).

This model can be explored specifically to address violent injury (Figure 2). Individual risk factors that have been associated with sustaining a violent injury include increased substance use, history of mental illness diagnosis, and previous abuse as a child (Abaya, Atte, Herres, Diamond, & Fein, 2019; Resko et al., 2016; Schmidt et al., 2019; Sumner et al., 2015). At the interpersonal level, increased family conflict and financial stress, and lower social connectedness within a social support system contribute to an increased risk of being involved in a violent altercation, either as a victim or perpetrator (Sumner et al., 2015). Community level risk factors include increased exposure to neighborhood violence and access to firearms. These factors increase individuals' risk for victimization or perpetration in regard to violent injuries (Haegerich et al., 2014; Harding, 2009; Pahl, Williams, Lee, Joseph, & Blau, 2020). Educational and income inequality, poverty, and the glorification of violence have been found to be societal risk factors that are associated with a heighted risk of being involved in a violent injury as the victim or perpetrator (U.S. Department of Health and Human Services, 2000; Wright, 2013).

There is a dearth of quality research on the risk factors of violent injury in the United States. Thus, there is still a great need to explore a wider variety of risk factors; however, this has yet to be completed due to research barriers like lack of funding and low recruitment numbers in research studies. Due to this lack of understanding for critical factors related to violent victimization and perpetration, there are significant gaps in interventions to address these injuries. These gaps could be reduced by using a process

that integrates similar data, helping to better connect the information that has been gathered.

Cardiff Model

The Cardiff Model (Figure 3) is used to provide data linkage between law enforcement agencies and emergency departments injury data. First implemented in Cardiff, Wales, Dr. Jonathan Shepherd, a surgeon, noticed the abundance of violent injuries he was treating within his emergency department. After he conducted his own research, he concluded that only a fraction of injuries were reported to police. Creating cross-sectoral injury prevention partnerships which included local communities, the Cardiff Model was introduced as a violence prevention program to both collect data and provide opportunity for intervention.

Data is collected within emergency departments and law enforcement agencies, a matching process is conducted, and a larger, more complete dataset is generated (Centers for Disease Control and Prevention, 2019). Community partnerships are then able to produce more complete violence maps to inform injury prevention initiatives.

Data Linkage and Hot Spots

Data linkage is a process in which one rich, more complete data set is generated by merging two other data sets. In this process, data entries from different sources can be paired when generating the larger data set (Bohensky et al., 2010). Data linkage provides sectors more accurate, reliable data that guides the implementation of various violence prevention strategies. This process is crucial when determining the area in which violent

crimes are more likely to occur. However, the current system in the United States has not implemented system wide data linkage policies due to the complexity of linking data. Many different factors have contributed to the lack of system wide data linkage policies which include unique identifiers per different datasets and sources, as well as the possibility of duplicate of data.

Currently, in the United States the main surveillance systems used to document violent injuries and fatalities lie in various sectors with different data collection processes and use of data. Law enforcement will gather data with crimes reported and cases solved (i.e. homicides). Reported crimes are collected through the voluntary reporting system that victims utilize. If a murder is reported, homicide detectives then attempt to solve the case and it is reported. Although slight adaptations may occur across the United States, this is the foundational process. Police departments voluntarily provide this information to the Federal Bureau of Investigation to generate nationwide reporting. That being said, there are complex and detailed databases that serve as a foundation to collet criminal justice-based data on offenders. In Georgia, one of the more robust data systems reside in the criminal justice sphere is the Statewide Correctional Repository and Information System (SCRIBE), in which data is collected as offenders continue through the penal system. With the complex and detailed nature of the database, SCRIBE provides criminal justice practitioners key data to understand offenders. Additionally, SCRIBE serves to house information on those offenders that have been sentenced to prison or are on probation.

Another data surveillance system is used collect information on violent injuries and fatalities through the coroner's office records and public health departments. One key

database utilized in this surveillance system is the National Violent Death Reporting System (NVDRS), one widely used in public health spaces. The National Violent Death Reporting System is a state-based surveillance system that combines multiple different data sources in order to design and implement interventions around violent injuries and deaths. Information collected through NVDRS includes homicide, suicides, death of an undetermined intent, deaths by legal interventions, and unintentional firearm death. Additionally, information about both the victim of the injury and the suspect are collected (Centers for Disease Control and Prevention, 2019b). Although the United States continues to improve its surveillance system to provide accurate violent injury data linkage is vital in continuing to improve these systems in a timely manner.

The Cardiff Model utilizes data linkage method to provide accurate, timely data in order to better understand violent injuries and provide injury prevention interventions. Mapping violent crimes is a strategy implemented within law enforcement by identifying "hot spots" where locations and times in which crimes are committed, and then placing them on a map (National Insitute of Justice, 2009). In order to map crimes, location measures (address, street name, block, business names) are identified through the emergency department data and then distance is calculated to the match data to reported crimes that have closely similar location measures, time and date, and injury type (ie. firearm injury). Identifying where the majority of violent crimes are occurring allows for focused violence prevention strategies and subsequent decreases in crime rates and violent injury rates. By having access to the most timely and relevant data, these interventions provide more accurate based on the data, in the hopes of preventing violent injuries from occurring and increasing their reporting rate.

Cardiff evaluations found that the hot spots created from law enforcement data were significantly different than those created from hospital data, suggesting that violent injuries were occurring in locations that law enforcement data did not capture (Markovic, 2012; Shepard, 2016). With only 43% of violent crimes being reported to police departments, it is vital to increase data linkage across sectors to further understand and examine the prevalence of violent injuries, characteristics of those that individuals that report versus who don't, and factors that contribute to the decision making in regards to reporting (R. E. Morgan, Oudekerk, B. A., 2019). Currently, although there is research being conducted to further understand the under-reporting of crimes to law enforcement, there are no current studies examining what potential factors are associated with the decisions of victim to not report to law enforcement.

Gap in Research

Although there is strong evidence illustrating the effectiveness of data sharing, there is a lack of evidence examining the reporting decisions and demographic factors of the individual victim through the analysis of emergency department data. With studies illustrating only a fraction of violent crimes being reported to law enforcement, additional research must be conducted to understand the related factors that contribute to the decision making of reporting or not reporting. To the best of our knowledge, there is a dearth of current studies being conducted to observe this relationship and there are limited studies analyzing the influence of chart review variables on sustaining violent injuries. Moreover, due to the limited research on this topic, research questions have been chosen in order to provide initial understanding of these associations. Thus, this thesis

aims to examine reporting decisions of violent crimes as well as identifying any associations between violent injury type and chart review data on reporting status.

Research Questions

The purpose of this thesis is to further the understanding of violent injuries through the analysis of the Cardiff Model data from Grady Memorial Hospital in Atlanta, Georgia. In examining the data set, the aim of the research is to determine the characteristics of reporting decisions regarding violent crimes to police departments by determining the association of personal demographic variables, violent injury type, and chart review data on reporting status by three location sensitivities in order to fill the research gap presented above. This study will address the following research questions:

1. How do the personal demographic characteristics differ between patients whose injury event has been reported and those that have not?
2. How is the type of violent injury associated with reporting status?
3. How can a medical chart review be utilized to understand reporting status?

Purpose of the Study

This study utilizes the Cardiff Model data set at Grady Memorial Hospital to perform secondary data analysis to improve understanding violent injuries. Furthering the understanding of the characteristics of those that report violent crimes compared to those who do not is a critical next step for researchers and practitioners to advance the field. By further understanding the influence of previous chart review variables and type of violent injuries on reporting of a violent crime, points of intervention will be identified to address

these influences. The purpose of this study is to identify the characteristics of those that report crimes versus those that do not, explore how specific types of violent injury influences reporting decisions, and the association between chart review variables and reporting violent injuries.

Significance of the Study

Utilizing the Cardiff Model, previous research has been conducted to examine the effectiveness of emergency department data in addressing and understanding violent injuries throughout the community. When the Cardiff Model was first implemented in Cardiff, Wales, there was a noted 42% reduction in violent crimes after the data sharing in comparison to other alike cities (Florence, Shepherd, Brennan, & Simon, 2014; Shepard, 2016). This reduction was exemplified due to the various interventions they implemented including increased street lighting, the switching of glass utilized at bars to decrease injuries sustained by bar fights, along with other policy and community level changes (Centers for Disease Control and Prevention, 2019a). Due to insufficient data the law enforcement utilizes, policing practices and the perceived depth of the burden of violent injuries is unreliable. The Cardiff Model provides invaluable data linkage that supports the reduction of violent injuries and crime. This reduction will be accompanied by examining the factors that affect the reporting rate of violent crimes and injuries.

The Cardiff Model has been implemented globally with three locations in the United States- Atlanta, Georgia, Milwaukee, Wisconsin, and Philadelphia, Pennsylvania. In this thesis, the Cardiff Model replication implemented in Atlanta, Georgia will be utilized to perform secondary data analysis. Early promising results have surfaced at the

Atlanta site, with 83.2% of violent incidents going unreported to local law enforcement (Wu, 2019). This secondary data analysis will build off of these results to further understand violet incident reporting and how personal demographic characteristics, chart review variables, and violent injury type may be associated with reporting status.

Although each location has utilized the collected data to inform interventions, there is a dearth of evidence examining the personal demographic characteristics of those that report injuries to law enforcement compared to those that do not. Further research is needed to better understand these demographics and other potential factors that may be related to the decision to report violent injuries. Due to the data points collected in the Cardiff Model, the model provides indispensable data that is able to examine the potential relationship between these factors and reporting status, making it a unique opportunity to gain insight into these decisions. There has been previous research conducted that has examined the various risk and protective factors for violent injuries, yet those risk factors have yet to be examined in association with reporting decisions. Employing the Cardiff Model, researchers and practitioners can further examine the influences of different factors that lead to the decision to report violent crimes.

Limitations

Due to the specialized nature of this study, there are several limitations that will affect the thesis. The limitations of this thesis are as follows:

1. This study is a self-directed, self-reported study that utilizes technology to further the questionnaire. Thus, this may not be an accurate representation of all injuries if participants do not self-report it.

2. This study was conducted at Grady Memorial Hospital in Atlanta, Georgia, which is an urban city. Thus, this study does not accurately represent violent injuries that occur in suburban and rural areas that present to Emergency Departments.
3. Data collection occurred within the Emergency Department, and only included those who sustained violent injury able to be assessed using the Information Sharing to Tackle Violence screen, thus missing the most severely injured patients. Possible inaccurate representation if individuals care for their violent injuries outside of the Emergency Department.
4. The data set only compares Emergency Department data to the DeKalb County Police Department and Atlanta Police Department; however, there are numerous police departments within the Atlanta Metro Area. Thus, there is a possibility that hospital data will not be linked to a reported crime at a different police department.

Definition of Terms

Violence

Violence, as defined by the World Health's Organizations, is "The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation (Krug, 2002)."

Self-Directed Violence

Self-directed violence can be further categorized by suicidal behavior and self-abuse (Krug, 2002).

Interpersonal Violence

Interpersonal violence can be stratified into two categories including family and intimate partner violence and community violence (Krug, 2002).

Community Violence

Community violence includes acts between two people that may not know each other and will be generally occurring within the community (Krug, 2002).

Collective Violence

Collective violence will be divided into three categories: social, political, and economic violence (Krug, 2002).

Mental Illness

Mental illness is defined as any diagnosed mental illness including depression, anxiety disorder, bipolar disorder, eating disorder, schizophrenia, post-traumatic stress disorder, obsessive compulsive disorder, attention deficit/hyperactive disorder, and dementia.

Previous Violent Injury

Previous violent injury will be defined as a violent injury that has been noted in the patients' medical chart. For the purposes of this study, it will not include any self-reported violent injuries.

CHAPTER TWO

Literature Review

In this chapter, a review of current literature will be discussed to provide additional context to the impact of violent injuries throughout the United States. Key discussion points that will be discussed are as follows: comorbidities of violent injuries, risk factors for violence victimization and perpetration, the need for data linkage, reporting of crimes, hot-spots, and the Cardiff Model.

Overview

On a global scale, injuries and violence pose a substantial burden due to the high morbidity and mortality rates. Worldwide roughly 1.3 million people die from violence each year, furthermore, it is the fourth leading cause of death. Violence also poses a large burden for those that sustain an injury but survive, making tens of thousands of people victims each year (World Health Organization, 2014). This same trend has been seen within the United States as well, with the National Crime Victimization Survey (NCVS) reporting an increase from 5.2 million violent incidents in 2017 to 6.0 million violent incidents reported in 2018 (Morgan, 2019). Additional reports in 2014 indicate roughly 180,000 people in the United States died from injuries or violence- comparable to one death every three minutes (Haegerich et al., 2014). More specifically, homicide and suicide rates have been rising significantly within the past ten years (Grossman & Choucair, 2019).

Violence impacts all realms of society; however, hospitals are given much of the burden due to the cost and immediate need for short-term and long-term treatment for violent injury victims. In 2017, violent injuries accounted for roughly 2.3 million emergency department visits (Grossman & Choucair, 2019). Within these 2.3 million visits, roughly 70.4% were due to an assault, whereas 21.4% were from self-harm, and 4.5% from sexual assault (Grossman & Choucair, 2019). More specifically, firearm injuries presented in the emergency department were 95.5% related to an assault, the remaining being self-harm victims.

It is no secret that the United States spends a significant amount on healthcare costs yearly, more than any other country in the world. America's per-capita spending is roughly double the median in comparison to United States competitors worldwide (Kellermann, 2009). In fact, in 2006 the Congressional Budget Office (CBO) predicted that by 2082, health care costs will consume 99% of the GDP. Reports state that most of the causes of death in the United States are due to behavioral or environmental factors; however, spending in the United States to address these factors is roughly 5% of the total annual spending. Economic research has indicated that, in regard to violence solely against children, costs the United States more than $120 billion dollars each year (Hillis, Mercy, & Saul, 2017). Furthermore, within the United States Hospitals and Health Systems, there was a total of $280 billion dollars spent on proactive and reactive violence response in the year 2016 (Van Den Bos, 2017).

Comorbidities of Violent Injuries

Injuries and violence account for a high number of fatalities within the United States and account for even more comorbidities. At a general standpoint, there are many psychological and physical consequences of violent victimization (Grossman & Choucair, 2019). These range from mental illness, violent injury recidivism, and substance use as comorbidities to experiencing a violent injury.

Psychological

Psychological consequences of violence are far and wide, impacting the overall quality of life and wellbeing of the individual. Ranging from alcohol and drug abuse to hyperactivity and suicidal thoughts, there are no limits to the psychological burden of these violent injuries (World Health Organization, 2014). A World Health Organization study examined the associations between childhood adversities and mental illness. In 21 countries across the global, the study aimed to explore the associations between twelve childhood adversities with the first onset of 20 mood disorders. Measuring mood disorders was possible through the usage of the DSM-IV criteria (Kessler et al., 2010). Utilizing regionally and nationally representative surveys, 51,945 adults were assessed. Within the childhood adversities, physical abuse and family violence were highly prevalent in the study population. Results indicate that with the eradication of childhood adversities, mood disorders would decrease by 22.9%, anxiety by 31.0%, and 41.6% in behavior disorders (Kessler et al., 2010). This study was conducted retrospectively and provides evidence for the need for future prospective research studies to continue the investigation of these associations long-term.

The association between interpersonal violence and comorbidities was examined through the utilized telephone in which it was concluded that overall exposure to interpersonal violence will increase the risk of post-traumatic stress disorder, major depression, and substance abuse/dependence. In a sample of 4,023 adolescents ages 12-17, 16% and 19% of boys and girls respectively, met the criteria for a diagnosis of at least one comorbidity (Kilpatrick et al., 2003). In regard to post-traumatic stress disorder and substance use, there was significantly higher risk for those that had previous witnessed violence, sexual assault, and physical violence. The same results were found in the multivariate logistic regression in regard to post-traumatic stress disorder and major depression (Kilpatrick et al., 2003). These findings provide an understanding of the comorbidities of witnessing or experiencing violence. However, the study utilized telephone interviews in Spanish or English, thus, limiting adolescents that speak other languages or that do not have access to a home phone.

Violent Injury Recidivism

Sustaining another violent injury after an initial one has been seen to be common and a great risk factor for determining violent injury risk. To examine violent reinjury, A prospective cohort study was conducted at an urban emergency department. Throughout the study there were four points of follow-up after baseline- 6, 12, 18, 24 months. During the baseline and follow-ups mental health diagnostic interviews, medical chart reviews, and measures of violence and substance use were administered to the participants (R. M. Cunningham et al., 2015). Results indicated that 36.7% of those presented at the emergency department had already experienced another violent injury, whereas only

22.4% of patients presented with their first violent injury (R. M. Cunningham et al., 2015). Furthermore, results show that female sex, assault-injury, substance use, and post-traumatic stress disorder were all predictors of violence recidivism (R. M. Cunningham et al., 2015). Because this sample of participants were drawn from substance using youth, it is important to replicate this study with different populations to generalize the results.

The significant increase in risk for re-injury after an initial violent injury has been recognized for many other studies as well. In a longitudinal assessment utilizing the Medical Expenditure Panel Survey (MEPS), over 19,000 adults that have previously experienced one injury were followed for 2 years. Injuries were measured through hospital utilization, self-reporting, or disability days used. Within this population, roughly 44% experienced another injury and presented in the emergency room. Furthermore, results found that males are 1.45 times more likely to experience additional injuries than females. At both baseline and follow-ups there was a significant correlation between injury recidivism and depression rates (Alghnam, Tinkoff, & Castillo, 2016).

Substance Use

Like recidivism of violent injuries, substance use and violent injuries have been found to be highly correlated. Through a cross-sectional study design, the association of substance use and violent injuries in patients presented at the emergency department was examined. The study utilized a questionnaire during an emergency department visit for an acute injury. Of the 320 participants, 14% reported for an acute violent injury and 53% reported a history of violence. Of those that reported an acute violence, 89% of them also reported history of violence (R. Cunningham et al., 2003). Those patients suffering from

violent injuries were more likely to report higher consumption of alcohol including more days drinking, binge drinking more frequently, and engaging with illicit drug use (R. Cunningham et al., 2003). More specifically, those patients that report illicit drug use are 6.2 times more likely to report violent injuries, whereas those patients reporting alcohol use are 2.0 times more likely to report violent injuries (R. Cunningham et al., 2003).

A prospective cohort study conducted in an emergency department found a statistically significant ($p=.03$) association between substance use and a shorter window of time before patients with violent reinjury present at the emergency department. Participant were split between two groups: assault injury patients with a history of substance use (AI group) and non-assault injury patients with a history of substance use (non-AI group). Those that have already experienced a violent injury and use substances are more likely to present at the emergency department again for another reinjury during a shorter time frame than those that do not use substances, according to that study. In the AI group, there was a 60% chance of returning to the emergency department within 48 months if they are diagnosed with post-traumatic stress disorder or substance use disorder; whereas, those in the Non-AI group are 20% likely to return to the emergency department (R. M. Cunningham et al., 2015).

Risk Factors for Violence Victimization and Perpetration

In order to link violence to other health outcomes, it is imperative to understand the proximate risk factors of violent victimization and perpetration. Applying the socio-ecological model, researchers have examined a wide variety of risk factors for both violence victimization and perpetration. Breaking down these risk factors, “social

determinants of health" and "adverse childhood experiences" have emerged to better understand how these risks have influenced either violence victimization or perpetration, or other health outcomes.

Social determinants of health are the circumstances in which one is born, lives, works, plays, and age that impact their health and wellbeing including their quality of life (U.S. Department of Health and Human Services, 2020). Social determinants of health are key in identifying ways in which both social and physical determinants influence the risk for lower health outcomes and quality of life. Additionally, adverse childhood experiences can aid in this understanding as well. Adverse childhood experiences (ACEs) are specific life circumstances that may have occurred between the ages of 0-17 that influence violent victimization or perpetration (Centers for Disease Control and Prevention, 2020). Generally speaking, both social determinants of health and ACEs have a large impact on the disparity of risk and outcomes, in regard to injuries in the United States (Haegerich et al., 2014).

Applying the 1999 Youth Risk Behavior Study, authors examined any possible association between individual level risk factors and dating violence. The survey is completely anonymous, voluntary, and self-administered during a class period. Due to the ages of the students, parental consent was obtained to include the surveys in the study data. Of the sample of over 7,000 high school females, one tenth of the women reported experiencing dating violence. A multivariate analysis revealed an association between dating violence and binge drinking (OR 1.96), sad/hopelessness (OR 2.13), and cocaine and inhalant use (OR 2.90) (Howard & Min Qi, 2003). Those females that reported at least one episode or sadness or hopelessness every day for 14 days or more, are 3.62

times more likely to report experiencing dating violence (Howard & Min Qi, 2003). Those females that participate in gun carriage are 5.29 times more likely to experience dating violence. Females that experienced other forms of violence and were treated by clinical staff were more likely to report dating violence (Howard & Min Qi, 2003).

Individual and interpersonal risk factors have been further explored through a variety of studies. A six-year longitudinal study examined over four thousand high school dropouts to investigate potential individual and interpersonal risk factors for engaging in violent activities. Violence was measured through six items to examine different type of violent injuries. Negative life events were measured by asking if separation or divorce, remarriage, death, or losing a job had occurred in their life in the past two years. The study showed those youth that had low academic profiles, lower parental involvement, and used drugs are at higher risk for being involved in violent activities (Saner & Ellickson, 1996). Those that experience parental separation or divorce, or death were more likely to experience any violence or be involved in more serious violent acts (Saner & Ellickson, 1996). Exemplifying the individual and interpersonal risk factors that may contribute to youth experiencing violence.

Furthermore, childhood risk factors that may lead to adulthood violence was examined by utilizing the Columbia County Longitudinal Study (Dubow, Huesmann, Boxer, & Smith, 2016). The sample was compromised of males ranging from 8 to 48 years old, including youth, their parents, and peers. Males were interviewed at 8, 19, 30, and 48 years old. For adulthood violence, self-reported violence, arrest records for violent offenses, and adulthood violent classification was utilized. To measure risk factors at 8 and 19 years old, aggression and family socioeconomic status were studied. Finally, for

protective factors individual and contextual factors were measured at ages 8 and 19. The authors concluded that with high aggression as children and low family socio-economic status, they have a significantly increased likelihood to experience violence as an adult (Dubow, Huesmann, Boxer, & Smith, 2016). At age 8, parents attending church more often and lower negative family interactions were both found to be protective factors of violence as an adult. However, at age 19, levels of aggression or goals for obtaining higher education were both predictive of adult violence (Dubow, Huesmann, Boxer, & Smith, 2016).

It has also been suggested that community and neighborhood factors can increase exposure to violence. One study utilized the Chicago Youth Development Study to evaluate these risk factors. The sample of 249 inner-city African America and Latino males and their caregivers were interviewed each year with questions ranging from individual, family, peer, school, and neighborhood factors. 93.6% of youth had experienced at least one type of violence within their lifetime, with over half of the youth experiencing three or more types of violence (Sheidow, Gorman-Smith, Tolan, & Henry, 2001). An analysis of covariance was performed to conclude that previous violence exposure is a significant predictor of future violence (Sheidow, Gorman-Smith, Tolan, & Henry, 2001). Additionally, those that live-in inner-city neighborhoods with functional social processes are more likely to be exposed to violence versus others (Sheidow et al., 2001). This study highlights the additional advantages of differing design studies- by using a longitudinal design study the authors were able to analyze trends or changes in data across time.

One of the challenges for researchers in this domain is the difficulty to recruit participants and obtain complete, relevant data. Thus, although research has been conducted to explore various levels of risk factors, more timely and accurate data needs to be collected in order to better understand risk factors for violence.

Need for Data Linkage

Due to the lack of reporting completed through law enforcement, it is critical that other data is utilized to provide accurate data. Johns Hopkins University has implemented data linkage for suicide prevention because of the ease and affordability of the method. By utilizing data that is already being collected to provide researchers a more accurate representation of the problem, it is relatively easy and cost effective to implement (Gharghabi, 2016). The National Violent Death Reporting System (NVDRS) system is another data linkage and collaboration effort implemented in 17 states. NVDRS has contributed to not only the data linkage of death reporting but has also provided opportunities of collaboration that were not utilized before the implementation. In fact, due to the strengthened surveillance system created through data linkage, many additional and new project opportunities have been discovered (Campbell et al., 2006).

Crime Reporting

A closer look to the literature on violence, however, reveals a number of gaps and shortcomings. Violent reporting to police departments has been noted to be decreasing in regard to violent injuries. Due to these shortcomings, the data is not complete and accurate providing a barrier to successful interventions. The National Crime

Victimization concluded that between the years of 2015 and 2018 there was a significant increase in those that did not report violent incidents. Specifically, there was an increase from 9.5 per 1,000 persons to 12.9 per 1,000 persons not reporting these incidents, all 12 years or older. Furthermore, from 1993 to 2018, violent victimization that was reported to the police had declined 71% (Morgan, 2019).

In regard to the mechanism of violent injuries, between the years of 2017 and 2018, there was a noted 15% decrease of rape or sexual assaults reported. However, in this same period, there was an observed 14% increase in reported robbery victimizations (Morgan, 2019). This exemplifies the current need to examine the possible reasons that victims do not report these incidents to police departments. These are previously unstudied because of the lack of data linkage between various public sectors, like law enforcement and health systems.

In comparison to other highly prevalent health concerns (HIV/AIDS, cancer, heart disease, etc.) there is a significant lack of understanding behind crime reporting due to the dearth of research and literature examining it (Stark, 2017). As illustrated throughout this paper, violence is a large concern globally, thus, there needs to be additional research regarding the reporting of crimes to law enforcement. The Cardiff Model provides promising results in understanding the reality of crime reporting and this thesis seeks to further understand reporting by re-examining the dataset.

Hot-Spots

Hot spots are high-density areas of a specific incident, like violent injuries, that are displayed through the use of a map in both criminal justice and public health. Hot

spots have been utilized in order to better understand crime rates in various cities throughout the world. From examining drug hot spots to better understanding motor vehicle crashes, the geography of crime has aided many police departments in improving policing. The theoretical viewpoint in which hot spots emerged from was that understanding crime rates in the context of place would aid in reducing crime rates through the use of violence prevention strategies, like target policing.

Seminal contributions have been made by the Minneapolis Police Department, being one of the first departments to research crime and place, place being clusters of blocks in neighborhoods. Over 320,000 calls were placed to the police department, to roughly 150,000 addresses and intersections within the Minneapolis area. Utilizing this data, the study concluded 3% of the city accounted for roughly 50% of their calls to law enforcement (Sherman, Gartin, & Buerger, 1989). Furthermore, all robberies were located in only 2.2% of places, rapes in 1.2% of places, and auto thefts at 7.2% of places (Sherman, Gartin, & Buerger, 1989). This type of research has now been completed in studies across the United States to further understand crime and place.

A study conducted in Jersey City examined the relationship between drug hot spots and crime or disorder problems. Utilizing already known street level drug hot-spots, Weisburd and Mazerolle studied the association between crime and disorder within these hot spots. In doing so, results concluded roughly one fifth of the total violent crime arrests were accounted for within these specific drug hot-spots (Weisburd & Mazerolle, 2000). These results signify the overlap between various crimes and clusters of blocks within different neighborhoods throughout urban areas. Furthermore, within these clusters of blocks, the key factors that explained the criminal behavior were the

community dynamics, position, and characteristics of said place (Braga, Papachristos, & Hureau, 2014).

A systematic review and meta-analysis investigated the effects of hot spot policing on crime rates. Studies with hot spot policing interventions were compared with those that had routine policing serving the area. Crimes were measured by utilizing crime incident reports, emergency calls from citizens, and arrest data. Social and physical disorder was then measured through the use of interviews, observations, and surveys. In regards to the mean effect supporting hot spot policing interventions, the results indicated a significantly significant overall mean effect ($p<.001$) (Braga, Papachristos, & Hureau, 2014). Furthermore, this study concluded that hot spot policing strategies indicated statistically significant positive mean effect sizes for violent crime, drug offense and disorder offence outcomes (Braga et al., 2014).

Cardiff Model

The Cardiff Model fills the data linkage needed between law enforcement and health systems by employing a cross-sectional data sharing agreement between the two sectors. The agreement shares anonymized data including time, location, date, and mechanism of injury. In doing so, it provides a promising system in order to complete violence data that guide interventions. First employed in Cardiff, UK, the model has seen great success in the prevention of violent injuries, citing a 36% decline in intentional violent injuries presenting in the emergency room (Quigg, Hughes, & Bellis, 2012). Previous studies have almost exclusively focused on the employment of the Cardiff Model to reduce violence overall; however, the data collected from the model provides

additional opportunity to better understand factors that may contribute to not reporting violent injuries to law enforcement. Furthermore, it provides the opportunity to explore the impact of chart review variables and type of violent injury on reporting decisions. This thesis seeks to address those gaps in research by conducting a medical chart review and analysis to better understand impacts of chart review variables and violent injury type that may contribute to reporting decisions. Another important part of research is to further confirm previous research in order to establish strong associations between variables. In terms of this thesis, it is aimed to confirm or deny past associations between chart review variables and violent injuries.

Summary

Violent injuries pose great morbidity and mortality rates throughout the nation. To conceptualize the foundational reasons violent injuries may occur, social determinants of health and adverse childhood experiences may be utilized to further understand these occurrences. Although violent injuries are a large problem, the data collection methods are ineffective when comparing them to other health problems with similar morbidity and mortality rates. The Cardiff Model presents promising results in order to develop more effective data collection system to understand the depth of prevalence violence has throughout the United States. Utilizing this model can provide researchers and practitioners both hospital and law enforcement data in order to create a more complete dataset and hotspot maps to visualize these violent injuries.

CHAPTER THREE

Methods

Statement of the Problem

This thesis sought to determine the associations between the reporting status of violent injuries to law enforcement and demographics among emergency department patients that presented at the Grady Memorial Hospital in Atlanta, Georgia. Additionally, this thesis aimed to further examine the association between reporting status and previous chart review variables, and violent injury type which included various social determinants of health. Utilizing the Cardiff Model data set, this study was designed to answer the following research questions:

1. How do the personal demographic characteristics differ between patients whose injury event has been reported and those that have not?
2. How is the type of violent injury associated with reporting status?
3. How can a medical chart review be utilized to understand reporting status?

Human Subjects Approval

This thesis study was a secondary data analysis of another study, the Cardiff Model implementation in Atlanta, Georgia. The participants of the Cardiff Model from the Atlanta study were utilized for this thesis study. Due to the nature of this study, being a retrospective chart review, there was no additional contact with participants. Additional participant chart review data was collected through an online medical chart database, Epic. Through Epic, data was collected for each of the participants from the original

study. Although the study included identifiable information to the study team, all information has been de-identified to all other persons. The Institutional Review Board (IRB) at Emory University deemed this study expedited review because it posed minimal risk to the participants. Additionally, a complete HIPPA and Consent Waiver was granted by IRB.

After IRB approval, an application to the Grady Office of Research was submitted for both financial clearance and research approval. After a review from the board, the study was approved.

Participant Recruitment Methods

Participants were identified through the Emergency Department at Grady Memorial Hospital in Atlanta, Georgia. Through the use of triage nurses, nurses attempted to screen each patient for a violent injury unless they had a life-threatening condition in which case, they were unable to screen them. In the case that a patient suffered from a violent injury, more specific data would be collected for the use of the Cardiff Model. Between the dates of November, 2015 and May, 2017, 152,151 patients were screened, 16,434 presented an injury, and of those 3,392 were intentional violent injuries. There were a total of 300 mappable violent injuries regardless of reporting status that had completed the self-reported information, with demographic information. Injuries were mappable depending on the location information provided by the patients during the hospital screen.

Procedures

<u>Study Protocol</u>

This is a retrospective study of patients that presented at the emergency department at Grady Memorial Hospital between November 2015 and May 2017. The matched data sets from the pilot study were utilized in addition to medical chart data collected through Epic Workbench System. All variables that were needed for data analyses were included in the data pull. Then, 13 data reports were generated in 30-day increments and downloaded into excel files. All excel files were merged into a main dataset and were then merged in SPSS to the matched dataset. Then, the dataset was analyzed through the use of IBM SPSS statistical software to further investigate the association between independent variables and reporting status in regard to violent injuries.

Pilot Model Protocol

The Cardiff Model is a retrospective study performed at the Grady Memorial Hospital Emergency Department from November 2015 to May 2017. Data collection was performed through the use of an injury screen questionnaire administered in the Emergency Department at Grady Memorial Hospital. The questionnaire was given to all patients presenting at the emergency department with a violent injury during the standard triage process. Three data sets were used for analysis: (1) Grady Memorial Hospital Information Sharing to Tackle Violence (ISTV) data (screening tool), (2) DeKalb County Police Department data, and (3) Atlanta Police Department uniform crime reporting data. The three data sets were matched and analyzed using IBM SPSS statistical software by study staff at the Centers of Disease Control and Prevention. The three data sets were compared by analyzing location, date, and time in both data sets to find matches of the

same incident. The matched data was measured through three different location sensitivities: 100 meters, 500 meters, and 1000 meters. Mapping was conducted by matching the location provided by the ISTV hospital screen and then using 100m, 500m, and 1000m buffers to match violent injuries with crimes reported to law enforcement that have matching criteria including date, time, and mechanism.

De-identified mapped data from the pilot were returned to Grady with indicators of records that were reported versus unreported using the statistical analysis output from R. Grady staff manually matched records back to the medical record numbers of each in order to reference their medical history, demographics, and additional injury information that will be used for analysis. The previous IRB submitted was deemed exempt because the study did not meet the definition of "research" or "clinical investigation" as set by Emory University and federal policies.

Information Sharing to Tackle Violence (ISTV) Hospital Screen Questionnaire

All patients that were admitted in the Emergency Department at Grady Memorial Hospital were eligible for the questionnaire. Although every patient was eligible for the questionnaire, the ISTV does not capture every single violently injured patient due external reasons beyond the control of hospital employees administrating the questionnaire (ie. those patients that were too traumatically injured to answer did not get screened). Depending on their specific answers to questions, some additional questions may populate to gather specific data regarding the violent injury. A one-item dichotomous variable was used to assess a potential injury a that has occurred. Patients were asked "Injury?" with possible answers of "yes" and "no." If patients answer "yes"

to the initial "injury" question (see above), additional questions would populate. A one-item dichotomous variable was used to assess head injury. Patients were asked "Was there a blunt force to the head and/or did the head move back and forward with a lot of force (like whiplash)?" possible answers were "yes" and "no." A one-item dichotomous variables was used to assess mental status. Patients were asked "Was there a change in your mental status (e.g. concussion, dazed, disoriented, or poor memory from the events around the injury) or a change in your level of consciousness (seemed "out of it", not being able to respond as you normally do)? Possible answers were "yes" and "no." A one-item dichotomous variable was used to was assess intentionality of injury by asking "was someone trying to hurt you?" The possible answers included "yes" and "no." If patients answered "yes" to the intentionality question, assault method and mechanism question would then populate for them to answer. All patients were asked to identify the date and time in which the violent injury occurred. Regarding location data, if patients answered "home" or "someone else's home," they would *not* be asked to provide an address.

Measures

Personal Demographic Characteristics

Personal demographic characteristics assessed in this study include gender, age, race, preferred language, and financial class. Gender was assessed by having patients self-report their identity. The variable was recoded to change "F" to "1" and "M" to "0." Age was measured by utilizing patient medical chart information and was calculated based on the patient's self-reported birth date. Age was recoded to transform from a

string variable to a numerical value by removing all "yrs" after their calculated age. Following this recode, age was then recoded into four categories. Ages 12-34 was recoded to "young," ages 25-40 was recoded to "adult," ages 41-56 was recoded to "middle aged adult" and ages 57-75 was recoded to "older adult."

Race was self-reported according to what the patients self-identified with. Reponses include "Black and African American," "Hispanic," "Multiracial," "Native Hawaiian and other pacific islander," "white or Caucasian," "American Indian and Alaskan Native," "Other," and "Unknown." For respondents that had identified multiple races but did not originally report "multiracial" where recoded into the "multiracial" category for the purposes of analysis. Ethnicity was collected through self-reporting from patients when registering at the emergency department. Possible answers included "Hispanic," "non-Hispanic," and "other."

Preferred language was also self-reported according to the patient's electronic medical chart. All preferred language was noted within the medical charts and collected at time of intake. Possible answers include "English," "Spanish," "Somali," "Other," and "Unknown." All missing responses were recoded into "9" and then "missing data" was set to "9" in SPSS. Financial class was assessed by asking all patients for insurance for medical procedures and/or appointments. Possible answers for financial class include "self-pay," "Medicaid," "Medicare," "Private Insurance," "Auto insurance," "uninsured," and "unknown."

Information Sharing to Tackle Violence (ISTV) Hospital Screen Measures

Assault method was assessed by asking two questions: mechanism and weapon. A one item categorical variable was used to assess mechanism of injury. Patients were asked what mechanism was used with possible answers of "punched/slapped," "kicked," "head-butted," "bitten," "pushed," or "other." There was a space for "other mechanism" to be filled in by the patient.

A one-item categorical variable was used to assess weapon usage. Patients were asked what weapon was used with possible answers of "glass," "bottle," "knife," other blade or sharp object," "any blunt object," "firearm," "explosive," "other weapon." There was a space for "other weapon" that could be filled in by the patient. Assault method was then assessed through the recoding of the two above variables into four categories: firearm, non-firearm weapon, physical, and unknown.

Injury Date was collected through a one-item ordinal variable by asking the patient to identify the date in which the injury. Injury time was also assessed through a one-item ordinal variable by asking the patient to identify and record at what time the event occurred.

Location data was assessed by utilizing a one-item categorical variable. Patients were asked where the injury occurred. The possible answers include "bar," "own home," "club," "someone else's home," "street," "workplace," "other," and "unknown." Additional location data was collected through the use of a one-item variable by asking for the address where the injury occurred. Patients were given the opportunity to include location name, street address, nearest intersection if known, city, state, and location description. Those that reported "own home" or "someone else's home" were not asked to provide additional location information due to confidentiality.

Reporting Status

Reporting status was measured by matching the hospital and law enforcement data sets. The matched data was measured through three different location sensitivities: 100 meters, 500 meters, and 1000 meters. In order to map crimes, location measures (address, street name, block, business names), time and date, and injury specifics are identified through the emergency department data and then distance is calculated to the match data to reported crimes that have closely similar location measures, time and date, and injury type (ie. firearm injury). Reporting status identifies if a violent event is known to police but does not assume that the patient themselves reported the injury.

Medical Chart Review Measures

Length of Stay

Length of stay was assessed by hours. All data points collected for complete length of stay within the emergency department were noted in hours for this variable.

Means of Arrival

Means of arrival was collected by extracting this data in the medical chart. Possible reports for this variable include “car,” “walk-in,” “police” or “ambulance.”

Acuity

Acuity of injury assess how severe the injury was and how urgent it is to address it within the emergency department. Possible reported answers could include “emergent,” “less urgent,” “non-urgent,” and “urgent.”

Injury Date and Time

Injury date and time were recorded through the electronic record, by which was collected through the original ISTV screen. Reporting for injury date and time was collected in the following format: MM/DD/YYYY using a 24-hour clock. This variable was recoded in 8-hour increments: evening (20:00-04:00), morning (04:01-12:00), afternoon (12:01-19:59)

Chief Complaint

Chief complaint was collected as a string variable to assess the primary reason for the patient to present to the emergency department for medical attention. Chief complaint was recoded into the following categories: assault, gunshot wound, psychiatric evaluation or mental health concern, drug or alcohol concern, other injury, or other.

Emergency Department Disposition

Emergency department disposition was assessed by collecting data on what the status of the patient was when leaving the emergency department. Possible answers include “discharge,” “eloped,” “admit,” “let without being seen after triage,” “AMA,” “let without being seen before triage,” “discharged to jail,” “DIC,” “move to CIS,” and “move to L/D.”

Treatment of Data

The Statistical Package for Social Science version (SPSS) version 26.0 was used for data entry and analysis. After data merging in SPSS, as explained above, data were cleaned and analyzed. Initial data analyses were conducted in the following steps:

1. Data cleaning was performed to ensure accurate and complete data. Tables were generated to exemplify the missing data throughout the dataset. When

utilizing electronic medical charts, data may be missing due to lack of data input from hospital staff (nurses, physicians, etc) or lack of relevance to the specific patient (ie. current medications). Due to inaccurate or insufficient data, variables that were included in the initial data pull and were not being utilized throughout the analyses were removed including arrival date/time, and "drugs."

2. Univariate statistics were conducted for the entire sample, the reporting group, and the non-reporting group. Personal demographic variables that were assessed included age, gender, race, ethnicity, financial class, preferred language, and zipcode. Chart review variables assessed included chief complaint, emergency department disposition, pharmacy class, medication, and length of stay. Finally, the violent injury variables assessed included mechanism of injury, acuity, location type, means of arrival, and injury date and time. The variables that were assessed include demographic
3. Due to the wide range of ages in patients presented with injuries, the original age variable d was recoded into categorical variables.

Preliminary Analyses

First, descriptive statistics were utilized in order to determine frequencies for all demographic variables for the whole sample, reporting group, and non-reporting group. These demographic variables included: age, ethnicity, race, preferred language, and financial class. Each descriptive statistic was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m.

Second, descriptive statistics were utilized in order to determine frequencies for all chart review variables for the whole sample, reporting group, and non-reporting group. These chart review variables included: chief complaint, emergency department disposition, and length of stay. Frequency tables for all five variables were generated for all three groups (whole, reporting group, non-reporting group). Each descriptive statistic was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m.

Third, descriptive statistics were utilized in order to determine frequencies for all violent injury variables for the whole sample, reporting group, and non-reporting group. These violent injury variables included: acuity, mechanism of injury, location type, means of arrival, and time of injury. Frequency tables for all five variables were generated for all three groups (whole, reporting group, non-reporting group). Each descriptive statistic was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m.

Fourth, Chi- Square tests were conducted to examine the differences among the independent variables and the outcome variable, reporting status, between the three different groups-the whole sample, reporting group, and non-reporting group. For the chi-square tests, X^2, p-value, degrees of freedom. Each Chi-Square was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m.

Fifth, bivariate analyses were conducted to test for the associations between two variables in order to describe the sample and select variables for final models at $p<.20$. To do so, simple logistic regressions were conducted to examine the association between

reporting status and violent injury type. Additional simple logistic regressions were conducted to examine the association between reporting status and chart review variables as well as between reporting status and demographic variables. For the logistic regressions, the odds ratios (OR), confidence intervals at 95% were reported, p-values and R^2 were reported. Each logistic regression was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m.

Specific Analysis by Research Questions

Below, the research questions of this study are listed along with each analysis performed:

1. How do the personal demographic characteristics differ between patients whose injury event has been reported and those that have not?

In order to describe the sample and select variables for final analysis, Chi-Square tests were utilized to deem significance of differences between demographic variables and the reporting status. The chi-square, p-values, and degrees of freedom were reported. Then, logistic regressions were conducted between proposed predictor variables (demographics) and the outcome variable (reporting status). Each test was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m. All proposed predictors that were associated with the outcome variables at $p<.20$ were included in the multivariate logistic regression model. Multivariable logistic regressions were then conducted to assess the association between the demographic variables and reporting status. For multivariable logistic regressions, adjusted odds ratios (AOR) and confidence intervals at 95% were reported. Additionally, all p-values were

reported. Each test was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m.

2. How is the type of violent injury related to reporting status?

The violent injury variables were determined for each participant including mechanism of injury, location type, means of arrival, injury date and time, acuity. Next, the reporting status for each participant was determined. Chi-square tests were conducted to determine the difference between violent injury variables and reporting status. The chi-square, p-values, and degrees of freedom were reported. After determining the significance of association between variables, a logistic regression was conducted between all violent injury variables and the outcome variable, reporting status. Each test was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m. All proposed predictors that were associated with the outcome variables at $p<.20$ were included in the multivariable logistic regression model. Multivariable logistic regressions were then conducted to assess the association between the violent injury variables and reporting status. For multivariable logistic regressions, the adjusted odds ratios (AOR) and confidence intervals at 95% were reported. Additionally, all p-values were reported. Each test was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m.

3. How can a medical chart review be utilized to understand reporting status?

Chart review data was collected through the use of the electronic medical chart, Epic. The chart review variables included in the analyses are as follows: chief complaint,

emergency department disposition, and length of stay. Chi-square tests were conducted to determine the significance of the association between chart review variables and the outcome variable, reporting status. Chi-square tests determined chi-square, and p-values. Following these tests, a logistic regression was conducted between chart review and reporting status. Each test was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m. All proposed predictors that were associated with the outcome variables at $p<.20$ were included in the multivariate logistic regression model. Multivariable logistic regressions were then conducted to assess the association between chart review variable and reporting status. For multivariable logistic regressions, the adjusted odds ratios (AOR) and confidence intervals at 95% were reported. Additionally, all p-values were reported. Each test was conducted for the three location sensitivities for the outcome variable (reporting status): 100m, 500m, and 1000m.

CHAPTER FOUR

Results

The aim of this research was to examine the association between personal demographic characteristic variables, violent injury type, chart review data on reporting status. Statistical analyses were conducted to explore the associations between these variables on the outcome, reporting status at three different location sensitivities: 100m, 500m, and 1000m. This chapter is divided in four sections. First, descriptive statistics were utilized to describe personal demographic characteristics, violent injury type, and chart review data within the sample, non-reporting group, and reporting group. Next, chi-square tests were conducted to describe the sample and test for initial associations between the independent variable and the outcome variable, reporting status at all the location sensitivities. After chi-square tests were conducted, simple logistic regressions were used to tests for bivariate associations and fit variables for the final models at $p<.20$. Lastly, multivariable logistic models were used to answer the following research questions:

1. How do the personal demographic characteristics differ between patients whose injury event has been reported and those that have not?
2. How is the type of violent injury associated with reporting status?
3. How can a medical chart review be utilized to understand reporting status?

Full Sample Personal Demographic Characteristics Descriptive Statistics

A total of 300 unique entries were included in the overall study at Grady Memorial Hospital. As described in Table 1, of these 300 entries, the mean age was 35.87

with the ranges of ages being 13-75. 75 (25.2%) of those entries were between the ages of 13-24, 122 (40.7%) were between the ages of 25-40, 74 (24.8%) were between the ages of 41-56, and 27 (9.1%) were between the ages of 57-75. However, chi-square tests concluded age was not significantly associated with reporting status at all three locations sensitivities, 100 (p=0.077), 500m (p=0.497), and 1000m (p=0.486).

Of these participants, 229 (75.3%) of them were males and 71 (23.3%) were females. Results of a chi-square test indicate that there is a significant difference in the gender, suggesting that reporting status at 100m may vary among men or women that sustain violence injuries (X^2= 4.603, df=1, p=0.032). Similarly, results conclude that at 500m, there is a significant difference in gender, signifying that reporting status at 500m may vary among men or women who sustain violent injuries (X^2=10.870, df=1, p=.001). At 1000m, there is a significant difference in gender, signifying that reporting status at 1000m may vary among men or women who sustain violent injuries (X^2=5.173, df=1, p=.023).

42 (14.0%) of patients in the dataset self-reported identifying with White or Caucasian, and 229 (76.3%) self-reported being Black or African American. 2 (0.7%) participants identified being Hawaiian American or Pacific Islander, 4 (1.3%) reported being Hispanic, 3 (1.0) reported identifying with multiple races, and 2 (0.7%) reported other. As for ethnicity, 286 (95.3%) reported being non-Hispanic, and 6 (2.0%) reported being Hispanic. Due to small cell sizes, Race was condensed to Black and African American versus Other for further analyses. However, race was not significantly associated with reporting status at 100m (p=0.478), 500m (p=0.972), and 1000m (p=0.993).

Of the 300 patients, 289 (96.3%) reported English being the preferred language, 2 (0.7%) reported Spanish as their preferred language, 1 (0.3) reported Somali as the preferred language, and 1 (0.3%) reported other for their preferred language. However, due to small cell sizes this variable was not used for any further analyses.

Out of the 300 patients, 163 (54.3%) of patients self-paid when seeking medical attention, 26 (8.7%) utilized Medicare to pay for medical attention, and 42 (14.0%) used Medicaid for health insurance purposes. 34 (11.3%) of patients were covered under private insurance, 1 (0.3%) reported using auto-insurance, and 9 (3.0%) used other payment methods to cover the medical expenses. Due to small cell sizes, financial class was condensed to self-pay versus other for further analyses. Chi-square tests suggest there is a significant difference in financial class at 500m, indicating reporting status may vary among those that have different forms of health insurance coverage (X^2=9.925, df=2, p=0.007). However, at 100m (p=0.166) and 1000m (p=0.227) there was not significant association between financial class and reporting status.

All chi-square test results can be found in Table 5: Chi-Square Results, 100m; Table 6: Chi-Square Results, 500m; and Table 7, Chi-Square Results, 1000m.

Non-Reporting Group Personal Demographic Characteristics Descriptive Statistics

As described in Table 1, based on 1000m location sensitivity (n=225), 179 (79.6%) of those that did not report their violent injury to law enforcement were men, 46 (20.4%) of them were women. Furthermore, among those that did not report 60 (26.7%) were young adult, 89 (39.6%), were adults, 57 (25.3%) were middle aged adults, and 18 (8.0%) were older adults. 31 (13.8%) of those that did not report their violent injury to

law enforcement were White or Caucasian, 171 (76.0%) were Black or African American, 4 (1.8%) were Hispanic, 1 (0.5%) were Hawaiian American or Pacific Islander, 2 (0.9%) reported identifying with more than one race, and 2 (0.9%) reported other. Furthermore, 214 (95.1%) identified being Non-Hispanic, whereas 5 (2.2%) reported being Hispanic.

In the non-reporting group, 217 (96.4%) reported their preferred language as English, 2 (0.9%) reported preferring Spanish, and 1 (0.4%) preferred Somali. In regard to financial class, among the non-reporting group, 120 (53.3%) were self-paying patients, 22 (9.8%) had Medicare as their health insurance, 29 (12.9%) were covered through Medicaid, 30 (13.3%) had private insurance, 8 (3.6%) reported their financial class as "other" and none were covered through auto-insurance.

Reporting Group Personal Demographics Descriptive Statistics

As described in Table 1, among those in the reporting group (n=75), 50 (66.7%) of them were men and 22 (23.7%) were women. In regard to age, 15 (20.0%) were young adults, 33 (44.0%) were adults, 17 (22.7%) were middle aged adults, and 9 (12.0%) were older adults. Of the 75 patients that did report their violent injury to law enforcement, 11 (14.7%) were white, 58 (77/3%) were black or African American, 1 (1.4%) reported being Hawaiian American or Pacific Islander, and 1 (1.4%) reported identifying with more than one race. 72 (96.0%) of those in the reporting group were Non-Hispanic, while 1 (1.3%) were Hispanic.

Of the 75 patients in the reporting group, 72 (96.0%) preferred English as the language spoken to them, and 1 (1.3%) preferred "other." In regard to financial class, 43

(57.3%) self-paid for medical services, 4 (5.3%) utilized Medicare, 13 (17.3%) were covered under Medicaid, 4 (5.3%) used private insurance, 1 (1.3%) used auto-insurance, and 1 (1.3%) used another form of payment.

Full Sample Violent Injury Type Descriptive Statistics

As described in Table 2, of the 300 entries, 34 (11.3%) were injury due to a firearm, 1 (0.3%) were from a non-firearm, 79 (26.3%) were from a non-firearm weapon, 159 (53.0%) were physical, and 27 (9.0%) were unknown. Results suggest that there are significant different in mechanism of violent injury and reporting status at 100m, indicating that reporting status may vary among those with different mechanism of injury (X^2=14.363, df=3, p=0.002). Results also indicate a significant difference in mechanism of injury on reporting status at 500 m (X^2=14.931, df=3, p=0.002). Furthermore, at 1000m there is a significant difference in the mechanism of injury, suggesting that reporting status at 1000m does vary among those of different mechanism for their violent injury (X^2=7.948, df=3, p=0.047).

160 (53.3%) patients reported that their violent injury occurred in at other (barber shop, other business, county jail, etc.), 100 (33.3%) reported it occurred on the street, 13 (4.3%) reported it occurred at their workplace, 9 (3.0%) reported it occurred at a club, 13 (4.3%) reported it occurred at a bar, and 1 (0.3%) did not report a location. Due to small cell sizes location of injury was condensed to “other,” “workplace, bar, or club,” and “street” for further analyses. Chi-square tests concluded location of injury was not significantly associated with reporting status at all three locations sensitivities, 100 (p=0.891), 500m (p=0.398), and 1000m (p=0.124).

For acuity type when presenting at the emergency department, 33 (7.0%) were labeled as emergent, 13 (4.3%) were immediate, 156 (52.0%) were urgent, and 77 (25.7%) were less urgent or non-urgent. At 100m, bivariate analyses indicate there are significant differences between acuity and reporting status for those that sustain a violent injury (X^2=12.900, df=3, p=0.005). Again at 500m, results indicated that this is a significant difference in acuity, suggesting that reporting status may vary among those with different acuity of their injury and reporting their injury to law enforcement (X^2=12.077, df=3, p=0.007). However, at 1000m, there were no significant associations between acuity type and reporting status (p=0.133).

In regard to the time of the injuries that were reported by patients, 81 (27.0%) occurred in the morning, 83 (27.7%) occurred in the afternoon, and 136 (45.3%) occurred in the evening or overnight. Chi-square tests concluded time of injury was not significantly associated with reporting status at all three locations sensitivities, 100m (p=0394), 500m (p=0.314), and 1000m (p=0.621).

Of the 300 patients, 22 (7.3%) arrived to the emergency department via car, 102 (34.0%) arrived via EMS, 1 (0.3%) arrived through a different mode of transportation, 47 (15.7%) were brought in by law enforcement, and 124 (41.3%) were walk ins. For further analyses, means of arrival was condensed to: police, EMS, and walk-in. There are significant different in means of arrival and reporting status at 100m, indicating that reporting status may vary among those with different means of arrival to the emergency department (X^2=18.082, df=4, p=0.001). Similarly, results show a significant difference in means of arrival and reporting status for those that sustain a violent injury (X^2=24.067, df=4, p=<.001). Finally, there is a significant difference in the means of arrival,

suggesting that reporting status at 1000m does vary among those with different means of arrival at the emergency department that sustain violence injuries (X^2=9.739, df43, p=0.045).

All chi-square test results can be found in Table 5: Chi-Square Results, 100m; Table 6: Chi-Square Results, 500m; and Table 7, Chi-Square Results, 1000m.

Non-Reporting Group Violent Injury Type Descriptive Statistics

As described in Table 2, for the non-reporting group (n=225), 22 (9.8%) of them were emergent patients, 7 (3.1%) were immediate, 118 (52.4%) of them were urgent, and 62 (27.6%) were less urgent or non-urgent. In regard to means of arrival for the non-reporting group, 19 (8.4%) were brought in by a car, 67 (29.8%) utilized EMS, 1 (0.4%) presented to the emergency department through another form of transportation, 38 (16.9%) were brought to the hospital by law enforcement, and 98 (43.6%) were walk ins.

In regard to time of injury, 64 (28.4%) of the patients reported their injury occurred in the morning, 61 (27.1%) reported it occurred in the afternoon, and 100 (44.4%) reported it occurred in the evening or overnight. Of the non-reporting group, 20 (8.9%) of patients were injured by a firearm, 1 (0.4%) were injured through a non-firearm, 56 (24.9%) were injured by a non-firearm weapon, and 125 (55.6%) had a physical alternation resulting in their injury. 69 (30.7%) of the non-reporting group reported they sustained their injury on the street, 9 (4.0%) reported it occurred at their workplace, 9 (4.0%) reported it occurred at the club, 12 (5.3%) reported it occurred at a bar, and 121 (53.8%) reported it occurred at “other.”

Reporting Group Violent Injury Type Descriptive Statistics

As described in Table 2, for the reporting group (n=75), 11 (14.7%) of them were emergent patients, 6 (8.0%) were immediate, 38 (50.7%) of them were urgent, and 15 (20.0%) were less urgent or non-urgent. In regard to means of arrival for the non-reporting group, 3 (4.0%) were brought in by a car, 35 (46.7%) utilized EMS, 9 (12.0%) were brought to the hospital by law enforcement, and 26 (34.7%) were walk ins.

In regard to time of injury, 17 (22.7%) of the patients reported their injury occurred in the morning, 22 (29.3%) reported it occurred in the afternoon, and 36 (48.0%) reported it occurred in the evening or overnight. Of the reporting group, 14 (18.7%) of patients were injured by a firearm, 23 (30.7%) were injured by a non-firearm weapon, and 34 (45.3%) had a physical alternation resulting in their injury. 31 (41.3%) of the reporting group reported they sustained their injury on the street, 4 (5.3%) reported it occurred at their workplace, 1 (1.3%) reported it occurred at a bar, and 39 (52.0%) reported it occurred at "other."

Full Sample Chart Review Descriptive Statistics

As described in Table 3, of the 300 patients in the dataset, 119 (39.7%) of them had a chief complaint of assault, 22 (7.3%) of them had a chief complaint of a gunshot wound, 3 (1.0%) had a psychiatric evaluation or mental health concern, 4 (1.3%) had a drug or alcohol concern, 29 (9.7%) had another injury, and 90 (30.0%) reported "other." For further analyses, chief complaint was condensed to: assault, gunshot wound, other, and other injury. Chi-square tests indicate that there is significant difference in the chief complaint, suggesting that reporting status may vary at the 500m location sensitivity among those with different chief complaints and reporting violence injuries (X^2=15.899,

df=4, p=0.003). However, at 100m (p=0.168) and 1000m (p=0.215) there were no significant associations between chief complaint and reporting.

In regard to emergency department disposition, 29 (9.7%) were admitted, 3 (1.0%) reported leaving against medical advice, 5 (1.%) were discharged to the jail, 2 (0.7%) reported died in clinic, 207 (69.0%) were discharged, 23 (7.7%) eloped, 11 (3.7%) were left without being seen after triage, another 11 (3.7%) left without being seen before triage, 2 (0.7%) were moved to Crisis Intervention Services , and 2 (0.7%) were moved to labor and delivery. For further analyses, emergency department disposition was condensed to: admit, discharge, and other. However, emergency department disposition was not significantly associated with reporting at 100m (p=0.940), 500m (p=0.297), or 1000m (p=0.882).

For the full sample, 135 (45.6%) of patients were in the emergency department for less than 6 hours, and 161 (54.4%) were there for over 6 hours. However, Chi-square tests concluded length of stay was not significantly associated with reporting status at all three locations sensitivities, 100m (p=0.271), 500m (p=0.341), and 1000m (p=0.203).

All chi-square test results can be found in Table 5: Chi-Square Results, 100m; Table 6: Chi-Square Results, 500m; and Table 7, Chi-Square Results, 1000m.

Non-Reporting Group Chart Review Descriptive Statistics

As described in Table 3, of the non-reporting group (n=225), 89 (39.6%) of them had a chief complaint of assault, 12 (5.3%) of them had a chief complaint of a gunshot wound, 3 (1.3%) had a psychiatric evaluation or mental health concern, 4 (1.8%) had a drug or alcohol concern, 23 (10.2%) had another injury, and 69 (30.7%) reported “other.”

In regard to emergency department disposition, 22 (9.8%) were admitted, 3 (1.3%) reported leaving against medical advice, 4 (1.8%) were discharged to the jail, 2 (0.9%) reported to die in clinic, 155 (68.9%) were discharged, 19 (8.4%) eloped, 8 (3.6%) were left without being seen after triage, another 8 (3.6%) left without being seen before triage, 1 (0.7%) were moved to Crisis Intervention Services. For the non-reporting group, 97 (43.5%) of patients were in the emergency department for less than 6 hours, and 126 (56.5%) were there for over 6 hours.

Reporting Group Chart Review Descriptive Statistics

As described in Table 3, of the reporting group (n=75), 30 (40.0%) of them had a chief complaint of assault, 10 (13.3%) of them had a chief complaint of a gunshot wound, 6 (8.0%) had another injury, and 21 (28.0%) reported "other." In regard to emergency department disposition, 7 (9.3%) were admitted, 1 (1.3%) were discharged to the jail, 52 (69.3%) were discharged, 4 (5.3%) eloped, 3 (4.0%) were left without being seen after triage, another 3 (4.0%) left without being seen before triage, 1 (1.3%) were moved to Crisis Intervention Services, and 2 (2.7%) were moved to labor and delivery. For the reporting group, 38 (52.1%) of patients were in the emergency department for less than 6 hours, and 35 (47.9%) were there for over 6 hours.

Reporting Status

Based on the location sensitivities, reporting status was confirmed. Those violent events that were known to law enforcement were coded as "reported" and those that were not were coded as "non-reported." Those violent injuries that were known to law

enforcement does not assume the person injured was the "reporter." As described in Table 4, based on 100-meter location sensitivity, 21 (7.0%) entries were reported to law enforcement, and 279 (93.0%) were not reported to law enforcement. Based on 500-meters location sensitivity, 44 (14.7%) entries were reported, and 256 (85.2%) were not reported to law enforcement. 225 (75.0%) were not reported, and 75 (25.0%) were reported based on 1000-meters.

Simple Logistic Regressions

Simple logistic regressions were utilized to examine how the personal demographic characteristics, violent injury type, and chart review variables predict reporting status at 100m, 500, and 1000m location sensitivity. The personal demographic characteristic variables utilized were race, gender, age, and financial class. Violent injury type variables included mechanism of injury, location of injury, time of injury, acuity and means of arrival. Chart review variables utilized were chief complaint, length of stay (hours), and emergency department disposition. Simple logistic regressions were utilized to select variables for the final models for these three location sensitivities. Criteria for variable selection in the final model was based above $p<.20$ for all bivariate analyses.

Location Sensitivity: 100m

As described in Table 8, at 100m location sensitivity, simple logistic regression results suggest that violent injuries involving women were significantly less likely to have been reported to police injury than men (OR=0.381, CI [0.153, 0.946], p=0.037). In regard to mechanism of injury, simple logistic regression results suggest that those

injuries sustained from a physical altercation are less likely to be reported to law enforcement than those that are sustained from a firearm (OR=0.188, CI [0.051, 0.692], p=0.012). However, those that are sustained by a non-firearm did not significantly predict reporting status at 100m.

Results indicate that those injuries that are presented at the emergency department with a chief complaint of a gunshot wound are 2.4 times more likely to be report to law enforcement oppose to those that have a chief complaint of assault (OR=2.422, CI [0.698, 8.558], p=0.170). However, chief complaint of "other" (p=0.335) or "other injury" (p=0.378) did not significantly predict reporting status. In regard to acuity, those with immediate injuries were nearly 4.5 times more likely to be reported to law enforcement injury than those with emergent injuries (OR=4.444., CI [0.835, 23.658], p=0.080). Furthermore, those with injuries were less urgent/non-urgent were less likely to be reported to law enforcement than those with emergent injuries (OR=0.267, CI [0.042, 1.677], p=0.159). However, those with urgent (p=0.787) injuries did not significantly predict reporting status.

In regard to means of arrival, those that arrive to the emergency department via "other" are less likely to have their injury be reported to law enforcement than those that arrive via EMS (OR=0.183, CI [0.031, 1.944), p=0.183). Results also indicate that those that arrive via police are less likely to have their violent injury be reported to law enforcement than those that arrive via EMS (OR=0.117, CI [0.040, 0.909], p=0.040). Those that were walk-ins to the emergency department are significantly less likely to have their violent injuries reported to law enforcement compared to those that arrive through EMS (OR=0.133, CI [0.038, 0.472], p=0.002).

However, those of young (p=0.451), middle aged adult (p=0.982), and older adult (p=0.998), financial class (p=0.639), staying in the hospital for more than 6 hours (p=0.275), and race (p=0.464) do not significantly predict reporting status. Those that sustained a violent injury at their workplace, a bar, or club (p=0.803) and on the street (p=0.735) did not significantly predict reporting status. Furthermore, those that were discharged (p=0.946) or left the emergency department in other ways (p=0.984) did not significantly predict reporting status. Finally, those that sustained a violent injury in the afternoon (p= 0.218) and evening/overnight (p=0.215), did not significantly predict reporting status.

Location Sensitivity: 500m

As described in Table 9, at 500m location sensitivity, simple logistic regression results suggest that women were significantly less likely to report a violent injury than men (OR=0.355, CI [0.172, 0.655], p<.001). Results show that those that sustain a violence injury on the street are 1.55 times more likely to report a violent injury to law enforcement than those that sustain violent injuries at other locations (barber shop, jail, grocery store, etc) (OR= 1.553, CI [0.788, 3.060], p=0.204). However, those that sustained a violent injury at their workplace, a bar, or club did not significantly predict reporting status (p=0.786). In regard to mechanism of injury, simple logistic regression results suggest that those that injuries sustained by a non-firearm related injury are less likely to be reported a violent injury to law enforcement than those that sustain an injury from a firearm (OR=0.523, CI [0.212, 1.290], p=0.159). Furthermore, injuries sustained

by an injury from a physical altercation are less likely to be reported to law enforcement than those that are sustained from a firearm (OR=0.218, CI [0.089, 0.532], p<.001).

Results indicate that those injuries that are presented at the emergency department with a chief complaint of a gunshot wound are 3.6 times more likely to be reported to law enforcement opposed to those that have a chief complaint of assault (OR=3.644, CI [1.366, 9.721], p=0.010). However, chief complaint of "other" (p=0.903) or "other injury" (p=0.449) did not significantly predict reporting status. In regard to acuity, those with urgent injuries were less likely to be reported to law enforcement compared to a those with emergent injuries (OR=0.515, CI [0.197, 1.349], p=0.177). Furthermore, those with injuries that need immediate attention are roughly 3 times more likely to be reported to law enforcement in comparison to those with emergent injuries (OR=3.184, CI [0.806, 12.568], p=0.098). However, those with less/non-urgent (p=0.278) injuries did not significantly predict reporting status.

In regard to means of arrival, those that arrive to the emergency department via "other" were less likely to have an violent injury reported to law enforcement compared to those that arrive via EMS (OR=0.417, CI [0.115, 1.515), p=0.184). Results also indicate that those that arrive via police are less likely to have a report of a violent injury to law enforcement than those that arrive via EMS (OR=0.331, CI [0.118,0.923], p=0.035). Those that were walk-ins to the emergency department are significantly less likely to be reported to law enforcement in comparison to those that arrive through EMS (OR=0.166, CI [0.69, 0.301], p<.001). Results from the simple logistic regression indicate that those that sustain a violent injury in the afternoon are 2 times more likely to have a reported incident to law enforcement compared to those that sustain one in

morning (OR=2.013, CI [0.803, 5.048], p=0.136). However, those that sustained an injury in the evening/overnight did not significantly predict reporting status (p- 0.248).

However, those of young (p=0.387), middle aged adult (p=0.178), and older adult (p=0.389), financial class (p=0.925), staying in the hospital for more than 6 hours (p=0.343), and race (p=0.899) do not significantly predict reporting status. Furthermore, those that were discharged (p=0.751) or left the emergency department in other ways (p=0.351) did not significantly predict reporting status.

Location Sensitivity: 1000m

As described in Table 9, at 1000m location sensitivity, simple logistic regression results suggest that violent incidents involving women were significantly less likely to be reported to law enforcement than those involving men (OR=0.514, CI [0.288, 0.917], p=0.024). Results show that those that sustain a violence injury at their workplace, a bar, or club, are significantly less likely to have a reported violent injury to law enforcement than those that sustain violent injuries at other locations (barber shop, jail, grocery store, etc) (OR= 0.517, CI [0.188, 1.424], p=0.202). However, those that sustained a violent injury on the street did not significantly predict reporting status (p=0.242). In regard to mechanism of injury, simple logistic regression results suggest that those that sustain a non-firearm related injury are less likely to have a reported violent injury to law enforcement than those that sustain an injury from a firearm (OR=0.576, CI [0.250, 1.331], p=0.197). Furthermore, those that sustain an injury from a physical altercation are less likely to have a reported violent injury than those that sustain one from a firearm (OR=0.389, CI [0.178, 0.849], p=0.018).

Results indicate that those injuries that present at the emergency department with a chief complaint of a gunshot wound are nearly 2.5 times more likely to be reported to law enforcement oppose to those that have a chief complaint of assault (OR=2.472, CI [0.970, 6.301], p=0.058). However, chief complaint of "other" (p=0.540) or "other injury" (p=0.612) did not significantly predict reporting status. Results show that those that are in the emergency department for more than 6 hours are less likely to have a reported violent injury to law enforcement (OR=0.709, CI [0.417, 1.205], p=0.204). In regard to acuity, those with less urgent/non-urgent injuries were less likely to have a reported violent injury to law enforcement compared to those with emergent injuries (OR=0.484, CI [0.193, 1.211], p=0.121). However, those with immediate (p=0.420) and urgent (p=0.288) injuries did not significantly report injuries.

In regard to means of arrival, those that arrive to the emergency department via "other" are less likely to be reported violent incidents to law enforcement compared to those that arrive via EMS (OR=0.287, CI [0.080, 1.033), p=0.056). Results also indicate that those that arrive via police are less likely to be reported to law enforcement than those that arrive via EMS (OR=0.453, CI [0.197,1.044], p=0.063). Those that were walk-ins to the emergency department are significantly less likely to have a reported violent injury to law enforcement in comparison to those that arrive through EMS (OR=0.508, CI [0.208, 0.921], p=0.026).

However, those of young (p=0.265), middle aged adult (p=0.526), and older adult (p=0.512), financial class (p=0.266), and race (p=0.904) do not significantly predict reporting status. Furthermore, those that were discharged (p=0.909) or left the emergency department in other ways (p=0.966) did not significantly predict reporting status. Finally,

those that sustained a violent injury in the afternoon (p= 0.407) and evening/overnight (p=0.364), did not significantly predict reporting status.

Multivariable Logistic Regression

Multivariable logistic regressions were conducted to determine the significance of the independent variables on predicting reporting status at the three location sensitivities 100m, 500m, and 100m. The variables selected for the model were as follows: location of injury, mechanism of injury, means of arrival, chief complaint, acuity, gender, and race. These were selected based on bivariate analyses at the p<.20 and theoretical understanding for the inclusion of the race variable. All results can be found in Table 10.

1. How do the personal demographic characteristics differ between patients whose injury event has been reported and those that have not?

At 100m, those young patients (p=0.913), middle aged patients (p=0.327), and older adult patients (p=0.998) were insignificant predictors of reporting status when accounting for other variables. Additionally, gender (p=0.144), and race (p=0.563) were not a significant predictor of reporting status when accounting for the other variables in the model. At 500m, violent injuries involving women were significantly less likely to be reported to law enforcement than those involving their male counterparts (AOR=0.284, CI [0.103, 0.784], p=0.015). Race was not a significant predictor of reporting status when accounting for the other variables in the model (p=0.386). Those young patients (p=0.148), middle aged patients (p=0.904), and older adult patients (p=0.426) were insignificant predictors of reporting status when accounting for other variables. At

1000m, again those violent injuries involving women were significantly less likely to be reported to law enforcement than those involving men (AOR=0.351, CI [0.158, 0.779], p=0.010). Those young patients (p=0.059), middle aged patients (p=0.877), and older adult patients (p=0.605) were insignificant predictors of reporting status when accounting for other variables. Lastly, race was not a significant predictor of reporting status when accounting for the other variables in the model (p=0.257).

2. How is the type of violent injury associated with reporting status?

At 100m, when accounting for other variables in them model, results indicate that location of injury (street) (p=0.221), location of injury (workplace, bar, or club) (p=0.679) did not significantly predict reporting status. In regard to mechanism of injury, sustaining a non-firearm injury (p=0.698) or a physical injury (p=0.427) also did not significantly predict reporting status when accounting for other variables in them model. A multivariable logistic regression shows that those that arrive by police (p=0.439) did not significant predictors of reporting status when accounting for other variables. However, those that presented to the emergency department as a walk-in were significantly less likely to have a violent injury reported to law enforcement compared to those that arrived via EMS (AOR=0.168, CI [0.030, 0.950], p=0.044). In regard to acuity, those with immediate (p=0.508), urgent (p=0.547), and less urgent/non-urgent (p=0.496) were insignificant predictors of reporting status when accounting for other variables.

At 500m, when accounting for other variables in them model, results indicate that those that sustained a violent injury on the street were nearly 2.9 times more likely to have their injury reported to law enforcement in comparison to those that sustain a violent

injury at another location (barber shop, grocery store, jail, etc) (AOR= 2.895, CI [1.100, 7.617], p=0.031). However, those that sustained a violent injury at a workplace, bar, or club (p=0.542) did not significantly predict reporting status. In regard to mechanism of injury, sustaining a non-firearm injury (p=0.801) or a physical injury (p=0.223) when accounting for other variables in them model. A multivariable logistic regression shows that arrive in the emergency department by walk-in are less likely to have their injury reported to law enforcement compared to those that arrive via EMS (AOR=0.231, CI [0.63, 0.855], p=0.028). However, those that arrive by police (p=0.757) were not significant predictors of reporting status when accounting for other variables. In regard to acuity, those with immediate (p=0.558), urgent (p=0.239), and less urgent/non-urgent (p=0.622) when accounting for other variables.

At 1000m, when accounting for other variables in them model, results indicate that location of injury (street) (p=0.222), location of injury (workplace, bar, or club) (p=0.523) did not significantly predict reporting status. In regard to mechanism of injury, sustaining a non-firearm injury (p=0.266) or a physical injury (p=0.136) when accounting for other variables in them model. A multivariable logistic regression shows that those that arrive by police (p=0.912) or were walk-ins (p=0.255) were not significant predictors of reporting status when accounting for other variables. In regard to acuity, those with immediate (p=0. 683), urgent (p=0.358), and less urgent/non-urgent (p=0.633) when accounting for other variables.

3. How can a medical chart review be utilized to understand reporting status?

At 100m, those that presented to the emergency department with a chief complaint of a gunshot wound (p=0.893), other (p=0.817), or other injury (p=0.599) were not significant predictors of reporting status, when accounting to other variables in the model. At 500m, those that presented to the emergency department with a chief complaint of a gunshot wound (p=0.725), other (p=0.584), or other injury (p=0.622) were not significant predictors of reporting status, when accounting to other variables in the model. At 1000, those that presented to the emergency department with a chief complaint of a gunshot wound (p=0.950), other (p=0.778), or other injury (p=0.905) were not significant predictors of reporting status, when accounting to other variables in the model.

Summary

Within the Cardiff Model dataset there were a total of 300 participants that presented to the emergency department with mappable violent injuries regardless of reporting status. In the overall sample, there were 229 (75.3%) males and 71 (23.3%) were females. For the outcome variable, the sample was divided into two groups, the group without associated police report and the group with associated police report, at each location sensitivity (100m, 500, 1000m). Independent variables were then selected in order to better understand how personal demographic characteristics, violent injury type, and chart review variables are both association with or predict reporting status. In order to test for associations, chi-square tests were conducted. Then, simple logistic regressions were utilized to perform bivariate analyses and select variables for the final model. Three final models were conducted at each location sensitivity with the variables gender, race, location of injury, mechanism of injury, means of arrival, and acuity include in all three

multivariable logistic regressions. The final results will be discussed below by research question.

1. How do the personal demographic characteristics differ between patients whose injury event has been reported and those that have not?

Chi-square tests conclude that there are significant associations between personal demographic characteristics and reporting status at various location sensitivities (100m, 500m, and 1000m). These associations were found between age and reporting status, and financial class and reporting status at 500m. Then at 1000m, results indicate a strong association between gender ad reporting status. Results indicate personal demographic characteristics are not significant predictors of reporting status at 100m; however, at 500m and 1000m, those violent injuries involving women were significantly less likely to be reported to law enforcement than those involving their male counterparts.

2. How is the type of violent injury associated with reporting status?

Chi-square tests indicate strong associations between violent injury type and reporting status. At all three location sensitivities (100m, 500m, 1000m) means of arrival and mechanism of injury were significantly associated with reporting status. Then at 100m and 500m, acuity was significantly associated with reporting status. Results of the multivariable logistic regressions indicate the type of violent injury can be a significant predictor of reporting status. Moreover, results show that location of injury and means of arrival, at 500m, can predict reporting status. Those that sustained a violent injury on the street or were walk-ins to the emergency department were significantly less likely to have violent injuries reported to law enforcement in comparison to those that sustained a

violent injury at other or arrived at the emergency department via EMS, respectively. However, these results were not found at 100m and 1000m.

3. How can a medical chart review be utilized to understand reporting status?

Following preliminary and primary analyses, results conclude that a medical chart review can be utilized to understand how previous medical history is associated with or can predict reporting status. Chi-square results indicate that at 500m, chief complaint was significantly associated with reporting status. However, multivariable logistic regressions conclude that chief complaint is not a strong predictor of reporting status.

Chapter 5

Discussion

Overall Summary

Violence impacts millions of people each year, as explained throughout this paper; however, from previous research we know that much of the violence goes unreported to law enforcement. Due to this, our foundational understanding of who is impacted by violence is skewed. Thus, there is a great need for research to examine who is impacted by violence in order to provide a more complete understanding of the problem, as that is the first stage in the public health approach. The Cardiff Model provides a unique opportunity to utilize emergency department data in order to further our understanding of this concept. The Cardiff Model data combines emergency department data and law enforcement data to understand violence and identify key intervention points to engage in community led programming. Thus, this thesis fills the research gap of providing an understanding to whom is impacted by violence, regardless of reporting status, and how personal demographic characteristic, violent injury type, and chart review variables associated with or can predict reporting status.

To examine these associations, the Cardiff Model dataset from Grady Memorial Hospital in Atlanta, GA was used. The dataset consisted of 300 unique patients that had sustained a violent injury, presented at the Grady Memorial Hospital Emergency Department, and were screened by the Information Sharing to Tackle Violence (ISTV) hospital screen, between May 2015 and November 2017. In addition to the Cardiff Model dataset, an additional chart review was conducted to further examine the associations

between other personal demographic characteristics, violent injury type, and chart review variables beyond what was collected in the original dataset. This thesis aims to answer the following research questions:

1. How do the personal demographic characteristics differ between patients whose injury event has been reported and those that have not?
2. How is the type of violent injury associated with reporting status?
3. How can a medical chart review be utilized to understand reporting status?

Summary of Findings

To answer the research questions, bivariate analyses were conducted through the utilization of chi-square and simple logistic regressions. After variable selection, multivariable logistic regressions were conducted to assess the effects of personal demographic characteristics, violent injury type, and chart review variables on reporting status at 100m, 500m, and 1000m.

In regard to personal demographic characteristics and reporting status, chi-square tests concluded that at 100m, no personal demographic characteristics were significantly associated with reporting status. However, at 500m, gender and financial class were both significantly associated with reporting status. Furthermore, at 1000m, gender was also associated with reporting status. Regarding violent injury type, chi-square tests conclude that at 100m, means of arrival, mechanism of injury, and acuity were all significantly associated with reporting. At 500m, mechanism of injury and acuity were both associated with reporting. Lastly, at 1000m, means or arrival and mechanism of injury were associated with reporting. Looking at chart review variables at 100m and 1000m, no

variables were found to be significantly associated with reporting a violent injury to law enforcement. However, at 500m, chief complaint was significantly associated with reporting status.

Following chi-square tests, simple logistic regressions were conducted to describe the data and complete variable section for the final models. At 100m, simple logistic regressions show that mechanism of injury, chief complaint, acuity, gender, and means of arrival were all significant at $p<.20$. At 500m, location of injury, mechanism of injury, chief complaint, injury time, acuity, gender, and means of arrival were significant at $p<.20$. At 1000m, simple logistic regressions show that location of injury, mechanism of injury, chief complaint, length of stay (hours), acuity, gender, and means of arrival were all significant at $p<20$. It was determined that location of injury, mechanism of injury, means of arrival, chief complaint, gender, and acuity were to be included in the final model. Race and age were also included due to theoretical significance.

At 100m, multivariable logistic regression results indicate there were no significant predictors on reporting status. This is consistent with our hypothesis due to the self-reporting nature of the screening and the small sample of those injuries that were matched at 100m. However, at 500m, those that sustained a violent injury on the street were more likely to have their injury be reported to law enforcement compared to those that sustained an injury at “other” (grocery store, jail, barber shop, etc) when accounting for all other variables in the model. Furthermore, at 500m, violent incidents involving women were significantly less likely to be reported to law enforcement in comparison to men, when accounting for all other variables. Additionally, when accounting for all other variables in the model, those that arrived at the emergency department by walk-ins, were

less likely to have their injury reported to law enforcement compared to those that arrived via EMS. At 1000m, the only predictor of reporting status was gender- women were again significantly less likely to report a violent injury compared to men, when accounting for all other variables. Furthermore, age was approaching significance with young adults, ages 13-24, were significantly less likely to report violent injuries compared to those aged 25-40. This is consistent with the constructs related to the Cardiff Model, where arrival to the emergency department and the location of injury is critical to the mapping and understanding of reporting violent injuries to law enforcement. Furthermore, the findings of a significant difference in reporting behaviors between genders is consistent with the socioecological models understanding that individual characteristics impact both victimization, perpetration, and now reporting decisions (Centers for Disease Control and Prevention, 2020). Previous studies have concluded that extreme violent crimes involving men are reported more than those involving women; however, studies also show that intimate violence incidents involving women are reported more than those involving men (Morgan, 2019). However, it is not clear who is reporting these incidents- both within the Cardiff Model dataset and in broader datasets throughout the United Status. Thus, it is crucial to conduct further research to explore these relationships within the Cardiff Model dataset. This is a key area that researchers and practitioners need additional understanding; knowing who is reporting incidents (parents, bystanders, victims, etc) can help guide educational programming, communication, and support for these populations. However, in regard to time of injury and mechanism, this is not consistent with the constructs of the Cardiff Model and should be further evaluated with a larger sample to confirm the trends in reporting based on

various mechanisms of injury during different times in the day (morning, afternoon, and evening). Furthermore, the socioecological model indicates the large influence of socioeconomic status and violence (Centers for Disease Control and Prevention, 2020). In regard to financial class, due to insignificant bivariate logistic regressions, financial class was not included in the final model. Furthermore, this is inconsistent with findings that low socioeconomic status influences violence victimization and may play a role in reporting violent injuries (Dubow, Huesmann, Boxer, & Smith, 2016). Thus, the results of this thesis are inconsistent with financial class. Additionally, throughout this thesis Race was found to be insignificant which is not surprising due to the population demographic Grady Memorial Hospital services. As Grady Memorial Hospital is a public safety net hospital, these results are not surprising because majority of the population Grady serves are Black or African American whom self-pay or are uninsured. However, it is critical to continue exploring these associates within different populations for further understanding of associations and predictors, as it is hypothesized that at a larger population there will be significant differences between socioeconomic class and Races.

Due to the fact that this is novel research and there is a significant gap in literature understanding the associations and predictors of reporting status in regard to personal demographic characteristics, violent injury type, and chart review variables we are unable to compare these findings to other literature. In fact, the National Crime Victimization Survey (NCVS) provides surface level assessment of reporting by type of crime (murder, rape, robbery, etc) and by gender; however, because the NCVS includes other crimes beyond violent ones, we are unable to make gender comparisons. Thus, this thesis, and

the Cardiff Model dataset, provides a supplement to the NCVS data reports and gives us an opportunity to continue to explore other predictors of reporting status.

Implications

Hospital Implications

The hospital system plays a key role in the execution of the Cardiff Model and thus, there are many implications from this thesis. To start, the findings from this thesis exemplify the critical need to continue utilizing the Cardiff Model to understand the larger trends in violence and reporting. Thus, the healthcare practitioners play a large role in sustaining the implementation of the model. Meaning, there is a great emphasis on the need to generate buy-in from these people to continue screening individuals who present at the emergency department with violent injury to further the model.

The findings from this thesis provides a deeper understanding to the disparities of those that are impacted by violence most. In doing so, this data provides an opportunity for health care systems to provide those that are most impacted by violence various resources to aid in the healing from those injuries or ways to report them to law enforcement, when necessary. Additionally, there are ample opportunities of the creation of online dashboards for both internal and external audiences in order to further communicate the data resulting from the Cardiff Model when combining emergency department and law enforcement data.

Additionally, the results from this study exemplify the need for hospitals to continually evaluate the assumptions made within the emergency department in regard to violence and violence reporting. For example, bivariate simple logistic regressions

showed that those that arrived at the emergency department by police were significantly less likely to report the violent injuries to law enforcement; however, health professionals may assume that because they arrived via police, then it was reported. This could be explained because the police department transporting the patient to the hospital may not be the arresting or reporting police department. Additionally, the final model results show that many of those that walk-in to the emergency room do not report violent injuries compared to those arriving via EMS. Therefore, this is another population of patients to engage with in order to understand those reporting decisions.

Lastly, due to the complex and intricate process of collecting and then pulling data from healthcare system, it is crucial to continue to refine these processes in order to obtain data and present it in a more efficient manner. This project has exemplified the obstacles of generating data through the use of Epic developers due to time constraints and thus, it is critical to continue to evaluate the processes of data collecting and data generating to provide researchers and practitioners data for novel research.

Public Health Implications

By utilizing the findings from this study, public health experts can further understand this behavior and the possibility to adapt current behavioral theories to understand the influences of reporting. Specifically, public health experts can continue to utilize the Cardiff Model to develop programming and further research that address underreporting to law enforcement to create a more accurate understanding of how violence impacts certain populations. Additionally, this study strengthens current literature that suggestions that the Social-Ecological model is critical to use in order to understand the various levels that impact violence victimization. By deepening

knowledge on the various risk or protective factors at each level, public health experts will be able to design and implement effective interventions to address these factors with the goal to reduce violence in communities.

This data shows the need to further expand the Cardiff Model throughout the region, state, and nationally to understand the trends of violent injury reporting, how violence impacts different populations, and how various social determinants of health can impact the risk of violence. In doing so, public health and health care systems will be able to create more complete and effective programming in order to support those that are unproportionally impacted by violence.

Law Enforcement Implications

The results from this thesis provide law enforcement a deeper understanding of whom is impacted by violence and how that differs from what they receive for those that report violent injuries. As this thesis explains, the Cardiff Model dataset shows that roughly 80-90% of violent injuries go unreported to law enforcement, thus, they do not have an accurate understanding to who is impacted by violence. Furthermore, as the Cardiff Model states, combining this data and further examining it provides ample opportunities for law enforcement to engage and collaborate with community organizations to create community-led interventions to address these disparities.

Limitations

Due to the self-directed nature of the study and the environment of which it is conducted, the dataset might not be an accurate representation of all injuries. Furthermore, this study only included those who sustained a violent injury and were able

to be assessed using the Information Sharing to Tackle Violence (ISTV) screen. Meaning, those that were severely injured and needed immediate medical attention may not have been representation within the dataset. Another data collection limitation was the utilization of Workbench to collect chart review data. Due to time constraints, data was not collected through the Epic developer and because of this, additional medical history data was not collected. A third limitation of the Cardiff Model dataset was that the hospital data was only compared and matched to the DeKalb County and Atlanta Police Departments, thus, there is a possibility was not linked to a report a crime if they reported it to a different police department within the Atlanta Metro area. Additionally, as mentioned briefly above, it is difficult to interpret the reporting status of the violent injury given that it is not known who reported the violent injury to law enforcement (ie. self-reported, bystander, healthcare provider, etc). Lastly, due to the lack of mappable injuries, the sample size for the dataset used in this thesis was small and did not provide large enough cell sizes to perform data analyses between subsets within the data.

Future Directions

This thesis provides a foundation and early understanding of how personal demographic characteristics, violent injury type, and chart review is associated with or can predict reporting status. However, additional research needs to be conducted to further understand these concepts and to either confirm or deny these same trends. Moreover, understanding the extent to who is reporting the violent injuries to law enforcement, rather than just knowing who is impacted by violence, is crucial and needs to be further evaluated within the Cardiff Model. Furthermore, additional research needs

to be conducted with larger sample sizes to understand how these associations can differ between races, genders, or those of different socioeconomic status. Regarding violent injury type, further research into the violent injury interaction (intimate partner violence, family violence, community violence, self-inflicted violence) is an area to explore to understand the associations and predictors of reporting status. In regard to chart review variables, future research could provide a deeper understanding to the extent that violent injury recidivism or other medical history factors can predict reporting status. For example, within women, are those women that are mothers more likely to report violent injures in comparison to those with no children. Additional studies need to be conducted in order to investigate whether these same trends are found in suburban or rural areas because the current dataset evaluates only those in the Atlanta Metro area. Finally, in order to protect personal information no private residence information was collected; however, additional research should be conducted to further understand if residence type (apartment, single family home, etc) is associated with reporting.

Conclusion

In conclusion, this thesis provides initial understanding of the influences of personal demographic characteristics, violent injury type, and chart review variables on if the violent injury has been reported to law enforcement. Results indicate both consistencies and inconsistences in prior understanding of these concepts; however, there are various implications and future directors that can provide us deeper understanding of reporting and possible predictors and provide additional data for evidence-based programming

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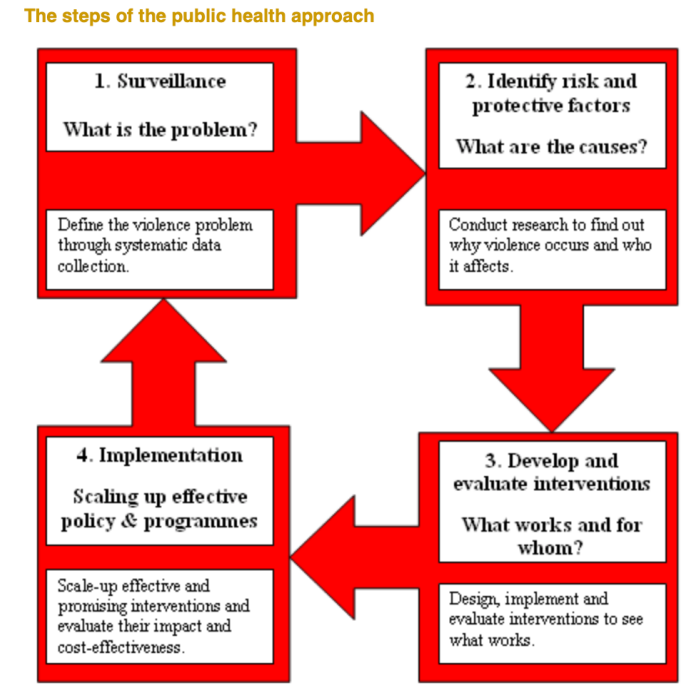

Figure 1: Public Health Approach, World Health Organization

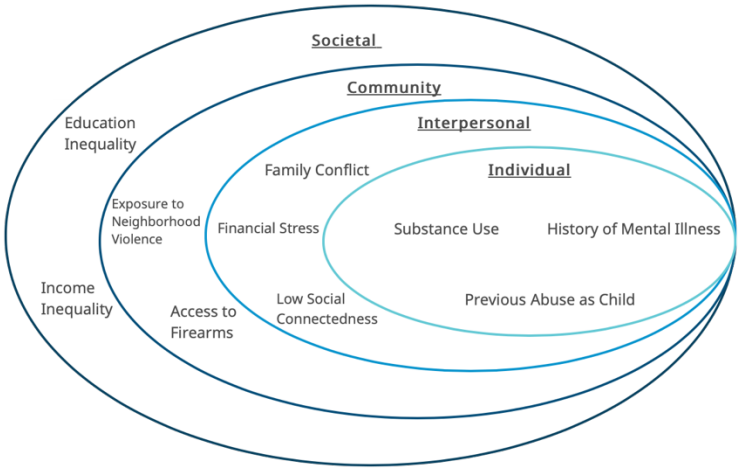

Figure 2: Adapted Socio-Ecological Model of Violence

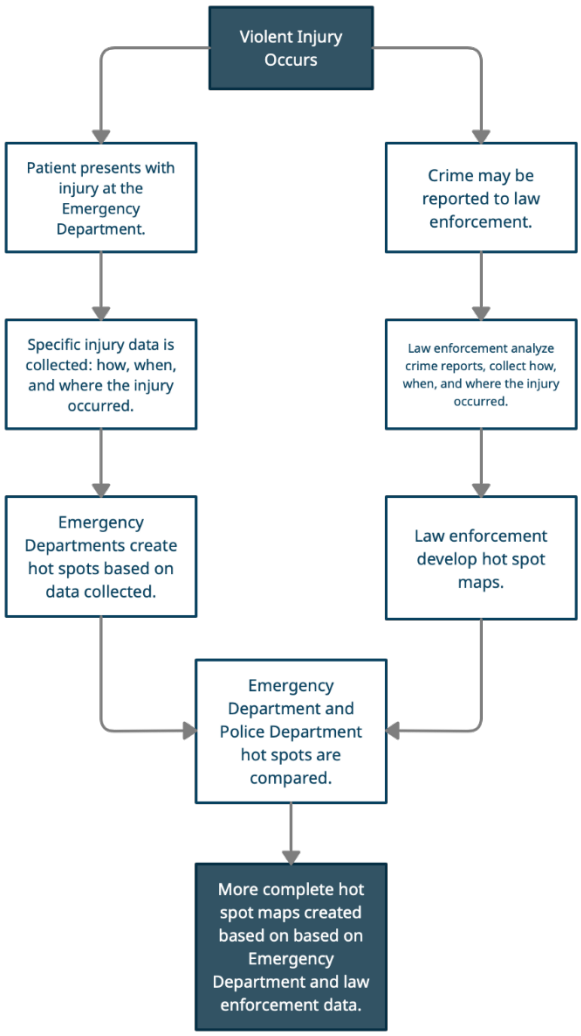

Figure 3: The Cardiff Model

Table 1.

Personal Demographics Characteristics Descriptive Statistics

Variables	Full Sample n=300	Non-Reporting Group n=225	Reporting Group n=75
	N (%)	N (%)	N
Gender			
Male	229 (75.3)	179 (79.6)	50 (66.7)
Female	71 (23.3)	46 (20.4)	25 (23.7)
Age			
Young Adult	75 (25.2)	60 (26.7)	15 (20.0)
Adult	122 (40.7)	89 (39.6)	33 (44.0)
Middle Aged Adult	74 (24.8)	57 (25.3)	17 (22.7)
Older Adult	27 (9.1)	18 (8.0)	9 (12.0)
Race*			
White	42 (14.0)	31 (13.8)	11 (14.7)
Black or African American	229 (76.3)	171 (76.0)	FMA0A
Hispanic	4 (1.3)	4 (1.8)	0 (0.0)
Hawaiian/Pacific Islander	2 (0.7)	1 (0.5)	1 (1.4)
Multiracial	3 (1.0)	2 (0.9)	1 (1.4)
Other	2 (0.7)	2 (0.9)	0 (0.0
Ethnicity**			
Non-Hispanic	286 (95.3)	214 (95.1)	72 (96.0)
Hispanic	6 (2.0)	5 (2.2)	1 (1.3)
Preferred Language***			
English	289 (96.3)	217 (96.4)	72 (96.0)
Spanish	2 (0.7)	2 (0.9)	0 (0.0)
Somali	1 (0.3)	1 (0.4)	0 (0.0)
Other	1 (0.3)	0 (0.0)	1 (1.3)
Financial Class****			
Self-Pay	163 (54.3)	120 (53.3)	43 (57.3)
Medicare	26 (8.7)	22 (9.8)	4 (5.3)
Medicaid	42 (14.0)	29 (12.9)	13 (17.3)
Private Insurance	34 (11.3)	30 (13.3)	4 (5.3)
Auto-Insurance	1 (0.3)	0 (0.0)	1 (1.3)
Other	9 (3.0)	8 (3.6)	1 (1.3)

Note: For the non-reporting and reporting group, 1000m location sensitivity was used.

* Race was collapsed to [Black or African American vs Other] after descriptive statistics due to small cell sizes.

**Preferred language was not used in further analyses due to small cell sizes.

***Ethnicity was not used for further analyses due to small cell sizes.

****Financial Class was collapsed to [Self-Pay vs Other] after descriptive statistics due to small cell sizes.

Table 2.

Violent Injury Type, Descriptive Statistics

Variables	Full Sample n=300	Non-Reporting Group n=225	Reporting Group n=75
	N (%)	N (%)	N (%)
Acuity			
Emergent	33 (7.0)	22 (9.8)	11 (14.7)
Immediate	13 (4.3)	7 (3.1)	6 (8.0)
Less Urgent/Non-Urgent	77 (25.7)	62 (27.6)	15 (20.0)
Urgent	156 (52.0)	118 (52.4)	38 (50.7)
Time of Injury			
Morning	81 (27.0)	64 (28.4)	17 (22.7)
Afternoon	83 (27.7)	61 (27.1)	22 (29.3)
Evening	136 (45.3)	100 (44.4)	36 (48.0)
Mechanism of Injury*			
Firearm	34 (11.3)	20 (8.9)	14 (18.7)
Non-Firearm	1 (0.3)	1 (0.4)	0 (0.0)
Non-Firearm Weapon	79 (26.3)	56 (24.9)	23 (30.7)
Physical	159 (53.0)	125 (55.6)	34 (45.3)
Means of Arrival			
Car	22 (7.3)	19 (8.4)	3 (4.0)
EMS	102 (34.0)	67 (29.8)	35 (46.7)
Other	1 (0.3)	1 (0.4)	0 (0.0)
Police	47 (15.7)	38 (16.9)	9 (12.0)
Walk In	124 (41.3)	98 (43.6)	26 (34.7)
Location of Injury**			
Street	100 (33.3)	69 (30.7)	31 (41.3)
Workplace	13 (4.3)	9 (4.0)	4 (5.3)
Club	9 (3.0)	9 (4.0)	0 (0.0)
Bar	13 (4.3)	12 (5.3)	1 (1.3)
Other	160 (53.3)	121 (53.8)	39 (52.0)

Note: For the non-reporting and reporting group, 1000m location sensitivity was used.

* Mechanism of Injury was collapsed to [Firearm, Non-Firearm Weapon, and Physical] after descriptive statistics due to small cell sizes.

**Location of injury was collapsed to [Street, Workplace/Bar/Club, and Other] after descriptive statistics due to small cell sizes.

Table 3.
Chart Review, Descriptive Statistics

Variables	Full Sample n=300	Non-Reporting Group n=225	Reporting Group n=75
	N (%)	N (%)	N (%)
Chief Complaint*			
Assault	119 (39.7)	89 (39.6)	30 (40.0)
Gunshot Wound	22 (7.3)	12 (5.3)	10 (13.3)
Psychiatric Evaluation or Mental Health Concern	3 (1.0)	3 (1.3)	0 (0.0)
Drug or Alcohol Concern	4 (1.3)	4 (1.8)	0 (0.0)
Other Injury	29 (9.7)	23 (10.2)	6 (8.0)
Other	90 (30.0)	69 (30.7)	21 (28.0)
Emergency Department Disposition**			
Admit	29 (9.7)	22 (9.8)	7 (9.3)
AMA	3 (1.0)	3 (1.3)	0 (0.0)
D/C to Jail	5 (1.7)	4 (1.8)	1 (1.3)
Died in Clinic	2 (0.7)	2 (0.9)	0 (0.0)
Discharge	207 (69.0)	155 (68.9)	52 (69.3)
Eloped	23 (7.7)	19 (8.4)	4 (5.3)
Left Without Being Seen After Triage	11 (3.7)	8 (3.6)	3 (4.0)
Left Without Being Seen Before Triage	11 (3.7)	8 (3.6)	3 (4.0)
Move to Crisis Intervention Services	2 (0.7)	1 (0.4)	1 (1.3)
Send to Labor and Delivery	2 (0.7)	0 (0.0)	2 (2.7)
Length of Stay, Hours			
0-6 Hours	135 (45.6)	97 (43.5)	38 (52.1)
6-42 Hours	161 (54.4)	126 (56.5)	35 (47.9)

Note: For the non-reporting and reporting group, 1000m location sensitivity was used.
* Chief Complaint was collapsed to [Assault, Gunshot Wound, and Other] after descriptive statistics due to small cell sizes.
**Emergency Department Disposition was collapsed to [Admit, Discharge, and Other] after descriptive statistics due to small cell sizes.

Table 4.

Reporting Status Descriptive Statistics

Variables	Location Sensitivity 100m	Location Sensitivity 500m	Location Sensitivity 1000m
	N (%)	N (%)	N (%)
Reporting Status			
Reporting Group	21 (7.0)	44 (14.7)	75 (25.0)
Non-Reporting Group	279 (93.0)	256 (85.3)	225 (75.0)

Table 5.

Chi- Square Results, 100m

Variables	X^2	Degrees of Freedom	P-Value
Chief Complaint	6.454	4	0.168
Emergency Department Disposition	0.401	3	0.940
Length of Stay, Hours	1.212	1	0.271
Age	8.441	4	0.077
Gender	4.603	1	0.032
Race	1.478	2	0.478
Financial Class	3.591	2	0.166
Means of Arrival	18.082	4	**0.001**
Mechanism of Injury	14.363	3	**0.002**
Location of Injury	0.623	3	0.891
Acuity	12.900	3	**0.005**
Time of Injury	1.861	2	0.394

Table 6.

Chi-Square Results, 500m

Variables	X^2	Degrees of Freedom	P-Value
Chief Complaint	15.899	4	**0.003**
Emergency Department Disposition	3.687	3	0.297
Length of Stay, Hours	0.905	1	0.341
Age	2.381	3	0.497
Gender	10.870	1	**0.001**
Race	0.058	2	0.972
Financial Class	9.925	2	**0.007**
Means of Arrival	24.067	4	**<.001**
Mechanism of Injury	14.931	3	**0.002**
Location of Injury	2.957	3	0.398
Acuity	12.077	3	**0.007**
Time of Injury	2.319	2	0.314

Table 7.

Chi-Square Results, 1000m

Variables	X^2	Degrees of Freedom	P-Value
Chief Complaint	5.790	4	0.215
Emergency Department Disposition	0.664	3	0.882
Length of Stay, Hours	1.623	1	0.203
Age	2.442	3	0.486
Gender	5.173	1	**0.023**
Race	0.015	2	0.993
Financial Class	2.969	2	0.227
Means of Arrival	9.739	4	**0.045**
Mechanism of Injury	7.948	3	**0.047**
Location of Injury	5.763	3	0.124
Acuity	5.596	3	0.133
Time of Injury	0.953	2	0.621

Table 8.

Simple Logistic Regression Results at 100m

Variable (Ref)	OR (95% CI)	P-Value
Personal Demographic Variables		
Race (Other)	0.673 (0.233, 1.941)	0.464
Financial Class (Other)	0.782 (0.281, 2.180)	0.639
Gender (Female)	0.381 (0.153, 0.949)	**0.037**
Age (Adult)		
Young Adult	0.631 (0.191, 2.089)	0.451
Middle Aged Adult	0.988 (0.344, 2.841)	0.982
Older Adult	-	0.998
Violent Injury Type Variables		
Means of Arrival (EMS)		
Police	0.117 (0.015, 0.909)	**0.040**
Walk-In	0.150 (0.049, 0.464)	**0.001**
Location of Injury (Other)		
Street	1.178 (0.457, 3.037)	0.735
Workplace/Bar/Club	0.821 (0.174, 3.880)	0.803
Mechanism of Injury (Firearm)		
Non-Firearm	0.925 (0.295, 2.899)	0.893
Physical	0.188 (0.051, 0.692)	**0.012**
Injury Time (Morning)		
Afternoon	2.395 (0.597, 9.604)	0.218
Evening/Overnight	2.288 (0.619, 8.459)	0.215
Acuity (Emergent)		
Immediate	4.444 (0.835, 23.658)	**0.080**
Less Urgent/Non-Urgent	0.267 (0.042, 1.677)	**0.159**
Urgent	0.833 (0.222, 3.135)	0.787
Chart Review Variables		
Chief Complaint (Assault)		
Gunshot Wound	2.422 (0.698, 8.558)	**0.170**
Other	0.592 (0.195, 1.795)	0.355
Other Injury	0.389 (0.048, 3.170)	0.378
Length of Stay (Over 6 hours)	0.607 (0.248, 1.487)	0.275
ED Disposition (Admit)		
Discharge	1.055 (0.229, 4.868)	0.946
Other	0.982 (0.169, 5.700)	0.984

Table 9.

Simple Logistic Regression Results at 500m

Variable (Ref)	OR (95% CI)	P-Value
Personal Demographic Characteristic Variables		
Race (Other)	0.947 (0.410, 2.188)	0.899
Financial Class (Other)	0.966 (0.469, 1.992)	0.925
Gender (Female)	0.355 (0.172, 0.655)	**<.001**
Age (Adult)		
Young Adult	0.699 (0.311, 1.572)	0.387
Middle Aged Adult	0.551 (0.232, 1.311)	0.178
Older Adult	0.568 (0.157, 2.056)	0.389
Violent Injury Type Variables		
Means of Arrival (EMS)		
Police	0.331 (0.118, 0.923)	**0.035**
Walk-In	0.203 (0.093, 0.442)	**<.001**
Injury Time (Morning)		
Afternoon	2.013 (0.803, 5.048)	**0.136**
Evening/Overnight	1.666 (0.701, 3.960)	0.248
Acuity (Emergent)		
Immediate	3.184 (0.806, 12.568)	**0.098**
Less Urgent/Non-Urgent	0.554 (0.191, 1.611)	0.278
Urgent	0.515 (0.197, 1.349)	**0.177**
Location of Injury (Other)		
Street	1.553 (0.788, 3.060)	**0.204**
Workplace/Bar/Club	0.854 (0.274, 2.665)	0.786
Mechanism of Injury (Firearm)		
Non-Firearm	0.523 (0.212, 1.290)	**0.159**
Physical	0.218 (0.089, 0.532)	**<.001**
Chart Review Variables		
Chief Complaint (Assault)		
Gunshot Wound	3.644 (1.366, 9.721)	**0.010**
Other	0.473 (0.197, 1.134)	0.903
Other Injury	0.607 (.167, 2.210)	0.449
Length of Stay (Over 6 hours)	0.729 (0.379, 1.401)	0.343
ED Disposition (Admit)		
Discharge	0.845 (0.300, 2.383)	0.751
Other	0.543 (0.151, 1.956)	0.351

Table 10.

Simple Logistic Regressions Results at 1000m

Variable (Ref)	OR (95% CI)	P-Value
Personal Demographic Characteristic Variables		
Race, (Other)	1.044 (0.522, 2.087)	0.904
Financial Class (Self-Pay)	0.721 (0.405, 1.283)	0.266
Gender, (Female)	0.514 (0.288, 0.917)	**0.024**
Age (Adult)		
Young Adult	0.674 (0.337, 1.348)	0.265
Middle Aged Adult	0.804 (0.410, 1.577)	0.526
Older Adult	1.348 (0.551, 3.298)	0.512
Violent Injury Type Variables		
Means of Arrival (EMS)		
Police	0.453 (0.197, 1.044)	**0.063**
Walk-In	0.407 (0.264, 0.837)	**0.010**
Acuity (Emergent)		
Immediate	1.714 (0.463, 6.346)	0.420
Less Urgent/Non-Urgent	0.484 (0.193, 1.211)	**0.121**
Urgent	0.644 (0.286, 1.449)	0.288
Injury Time (Morning)		
Afternoon	1.358 (0.59, 2.799)	0.407
Evening/Overnight	1.355 (0.703, 2.613)	0.364
Location of Injury (Other)		
Street	1.349 (0.799, 2.432)	0.242
Workplace/Bar/Club	0.517 (0.188, 1.424)	**0.202**
Mechanism of Injury		
Non-Firearm	0.576 (0.250, 1.331)	**0.197**
Physical	0.389 (0.178, 0.849)	**0.018**
Chart Review Variables		
Chief Complaint (Assault)		
Gunshot Wound	2.472 (0.970, 6.301)	**0.058**
Other	0.820 (0.434, 1.549)	0.540
Other Injury	0.774 (0.288, 2.081)	0.612
ED Disposition (Admit)		
Discharge	1.054 (0.426, 2.611)	0.909
Other	0.978 (0.345, 2.768)	0.966
Length of Stay (Over 6 hours)	0.709 (0.417, 1.205)	**0.204**

Table 11.

Multivariable Logistic Regressions at 100m, 500m, and 1000m

Variable (Ref)	Location Sensitivity: 100m		Location Sensitivity: 500m		Location Sensitivity: 1000m	
	AOR (95% CI)	P-Value	AOR (95% CI)	P-Value	AOR (95% CI)	P-Value
Gender (Female)	0.381 (0.105, 1.389)	0.144	0.284 (0.103, 0.784)	**0.015**	0.351 (0.158, 0.779)	**0.010**
Race (Other)	1.556 (0.348, 6.959)	0.563	1.443 (0.446, 4.673)	0.540	1.403 (0.586, 3.356)	0.447
Age (Adult)						
Young Adult	0.925 (0.230, 3.727)	0.913	0.450 (0.152, 1.329)	0.148	0.420 (0.171, 1.034)	0.059
Middle Aged Adult	2.034 (0.492, 8.401)	0.327	1.073 (0.341, 3.379)	0.904	0.932 (0.385, 2.260)	0.877
Older Adult	-	0.998	0.400 (0.042, 3.820)	0.426	1.364 (0.421, 4.421)	0.605
Location of Injury (Other)						
Street	2.142 (0.632, 7.257)	0.221	2.895 (1.100, 7.617)	**0.031**	1.587 (0.756, 3.333)	0.222
Workplace, Bar, or Club	1.515 (0.212, 10.805)	0.679	1.574 (0.366, 6.758)	0.542	0.682 (0.211, 2.207)	0.523
Mechanism of Injury (Firearm)						
Non-Firearm	1.606 (0.147, 17.575)	0.698	0.800 (0.141, 4.547)	0.801	0.438 (0.102, 1.877)	0.266
Physical	0.344 (0.025, 4.796)	0.427	0.321 (0.051, 2.001)	0.223	0.331 (0.077, 1.417)	0.136
Means of Arrival (EMS)						
Police	0.396 (0.038, 4.134)	0.439	0.800 (0.196, 3.273)	0.757	1.063 (0.361, 3.132)	0.912
Walk-In	0.168 (0.030, 0.950)	**0.044**	0.231 (0.63, 0.855)	**0.028**	0.587 (0.235, 1.469)	0.255
Chief Complaint (Assault)						
Gunshot Wound	0.833 (0.058, 11.944)	0.893	1.445 (0.186, 11.196)	0.725	0.945 (0.162, 5.516)	0.950
Other	1.192 (0.269, 5.279)	0.817	0.725 (0.230, 2.289)	0.584	0.833 (0.373, 2.093)	0.778
Other Injury	1.956 (0.160, 23.863)	0.599	0.643 (0.111, 3.719)	0.622	0.929 (0.277, 3.117)	0.905
Acuity (Emergent)						
Immediate	1.966 (0.265, 14.566)	0.508	1.680 (0.296, 9.536)	0.558	1.411 (0.269, 7.399)	0.683
Urgent	05.77 (0.096, 3.467)	0.547	0.442 (0.113, 1.722)	0.239	0.588 (0.190, 1.825)	0.358
Less Urgent/Non-Urgent	0.427 (0.037, 4.944)	0.496	1.372 (0.267, 7.058)	0.705	0.729 (0.198, 2.678)	0.633