The Rational Choice Is the Easiest One

The Effect of Sex on Weapons Used in Homicide

by

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ABSTRACT

The purpose of this study is to examine how sex influences the physical demand of weapons used in homicide. The study focuses on two research questions using data from Newark, New Jersey: (1) Does sex influence the use of a weapon that is more or less physically demanding to commit homicide? and (2) Does the sex dyad of the offender and victim influence using a weapon that is more or less physically demanding? The descriptive analysis shows significant relationships between the sex dyad of the offender and victim in homicide and the level of physical demand used to perpetrate homicide. The logistic multinomial regression analysis shows suspect sex and suspect and victim sex dyads significantly predict the physical demand of the weapons used to perpetrate homicide compared to those who utilized weapons of low physical demand. The results support the need to challenge traditional perspectives regarding the role of sex in criminal decision-making and seek to integrate more intersectional and gendered explanations into neoclassical theories of criminal behavior. Theoretical implications and future avenues of research are also discussed.

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TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

Homicide is a complex event involving many factors resulting from the
perpetrator's "rational choices" (Tedeschi & Felson, 1994). In homicide research broadly,
scholars have used rational choice theory to lay the foundation for explaining offender
decision-making (Pizarro et al., 2021), including how offenders choose their weapons.
Currently, firearms are the leading weapon used to commit homicides (Buggs & Zeoli,
2022; Zeoli et al., 2015). Scholars have investigated specific situational factors that affect
the use of particular weapons in homicide and have found that age and victim-offender
relationships influence the weapon used by homicide perpetrators (Fox & Allen, 2014;
Gonnella, 2021). Pelletier and colleagues (2021) investigated how motive and
premeditation influence weapons used in homicide and found significant differences
between homicide types and weapon usage related to motive. While these scholars have
begun to fill in the gaps surrounding our understanding of weapon usage in homicide,
there is still more to discover, particularly the role of sex in offender weapon usage.

Scholars have found that the sex of both the offender and the victim is related to
weapon usage in homicide, along with the availability of weapons during the homicide.
Men are more likely to use guns and sharp weapons, and women are more likely to
weaponize objects at hand, though what these weapons are was not clearly defined
(Catanesi et al., 2011). In light of these findings, there is reason to believe sex may
influence weapon usage in homicide depending on homicide type. Chan and Li (2020)
conducted a study in China investigating weapon usage among sexual homicide

1

offenders, and they demonstrated a sex difference in the selection. The primary weapon used by male sexual homicide offenders were close-contact methods, including hands and feet, asphyxiation, strangulation, drowning, and sharp or blunt weapons. However, other scholars have found that female sexual homicide offenders use more firearms in their killings than men (Chan, 2018). Given the mixed results of the current research on this topic, the effect of sex on weapon usage in homicide remains understudied and unclear (Szalewski et al., 2019).

In this study, I seek to increase the knowledge base in this area by examining two questions. The first question focuses on the specific effects sex has on weapon usage in homicide and asks, *"Does sex influence the use of a weapon that is more or less physically demanding to commit homicide?"* The second question focuses on sex dyad differences in physical demand in weapon usage and asks, *"Does the sex dyad of the offender and victim influence using a weapon that is more or less physically demanding?"* Answering these questions will clarify the uncertainty of sex's role in the current body of research, and is essential to help inform homicide prevention programs. This study will contribute to the homicide literature by examining the influence of sex on weapon usage and differentiating the situational factors related to weapon usage in homicide perpetration. This could pave the path for future weapon usage comparison studies in homicide literature. This study will begin by reviewing the literature on sex differences in different homicide types, and known sex differences in weapon usage within other homicides. After the literature review, the theoretical frameworks that explain sex differences in homicide and weapon usage are presented. This is followed by

the current focus of the study. After describing the source of the data, a clear description

of the methods and the findings will be presented, followed by a discussion and

conclusion of the results. Implications and recommendations for future research are

discussed.

CHAPTER 2

REVIEW OF THE LITERATURE

One of the first works in the academic literature investigating homicide trends is the seminal study *Patterns in Criminal Homicide* by Marvin Wolfgang in 1957. His findings gave context to the many situational factors that precede lethal violence and affect the likelihood of homicide perpetration. He found that most of the time, offenders of homicide had criminal records, with between one or two prior offenses at the time of the homicide event. This was more commonly present when the offender was African American. Wolfgang (1957) also found that most homicide events are intraracially (i.e., victims and offenders of the same race), with African American and Latinx individuals comprising the majority of victims and offenders.

The age demographics of victims and offenders of homicide events were somewhat similar, with offenders between the ages of 20 to 29 and victims aging between 25 to 35. The victim-offender relationship in homicide was shown to play a role in homicide perpetration and victimization, as victims were likely to be killed by someone they had a relationship with prior to the homicide incident (Wolfgang, 1957). Alcohol and substance abuse were also likely present during homicide events. Regarding weapon usage in homicide events, Wolfgang (1957) found that firearms were the most common means of committing homicide. While these findings originated in the late 1950s, many of these trends in homicide research continue to manifest today in recent studies. Men are still more likely than women to commit a homicide, and homicide events tend to be male on male or male on female (Alvarez & Bachman, 2019; Cooper &

Smith, 2011; Fox & Fridel, 2017). African Americans and Latinx peoples continue to be disproportionately overrepresented represented as both homicide offenders and victims in homicide events (Alvarez & Bachman, 2014; Cooper & Smith, 2011). Homicides continue to mostly be intraracial and to occur in public areas rather than more isolated locations (Alvarez & Bachman, 2014; Cooper & Smith, 2011). Alcohol use also continues to precede the incidents (Alvarez & Bachman, 2014). Some scholars have found that the most frequent age range of homicide offenders falls between 18 mid to late 20s, while victims are aged between 20 and mid-30s (Alvarez & Bachman, 2014; Cooper & Smith, 2011). An international study found similar findings among homicide victims, with most victims aged 20 to 39 (Guerrero-Velasco et al., 2021). Most victims and offenders know each other at the time of the homicide, and victim-offender relationship continues to play a role in weapon usage, motive, and demographic characteristics of offender and victim (Cao et al., 2008; Decker, 1993; Decker, 1996; Fox & Allen, 2014; Pelletier & Pizarro, 2019).

Empirical studies have continued to support that the most frequently used weapon in homicide events is a firearm (Alvarez & Bachman, 2014; Catanesi et al., 2011; Cooper & Smith, 2012; Pelletier & Pizarro, 2019; Pizarro, 2008; Zeoli et al., 2015). This finding has also been echoed internationally as Guerrero-Velasco and colleagues (2021) found that 85% of homicide cases involved using a firearm. While firearms are the primary weapon used among homicide offenders, scholars have found differences in weapon usage based on sex, but the findings are mixed. For example, Pelletier and Pizarro (2019) found that males are 80% less likely to use a knife/blunt object when carrying out

murders compared to females. However, Catanesi and colleagues (2011) found that males are more likely to use firearms or knives than females during a homicide event. They further posit that women are more likely to use a weapon that is easily accessible in the moment preceding homicide (Catanesi et al., 2011). Pelletier and Pizarro (2019) expand on this by demonstrating that motive significantly influences how homicide offenders choose their weapons.

This section has detailed some of the most common trends in homicide events. This review started with the work of Wolfgang's seminal study in 1957 that widened the scope of homicide studies. This work was then supported and built upon through recent scholarships that confirmed significant findings posited by Wolfgang. Important findings include firearms being the most frequently used weapon in homicide, males being the majority of homicide offenders and victims, a known relationship between offender and victims, and the role motive has in determining weapon usage. The following section will detail sex differences in homicide trends more broadly.

Sex Differences in Homicide Trends

As discussed in the outset, much of what scholars have studied regarding general homicide trends and patterns originates from the work of Marvin Wolfgang. This included sex-related differences between offenders and victims of homicide events. Wolfgang's study indicated that, in comparison to males, females were less likely to commit homicide. Furthermore, when females were victimized, their death was most likely the result of a beating by a male. The sex of the offender and victim also influenced where homicide events occurred. Wolfgang found that females were most frequently

killed in bedrooms and that the offender was also more often male. However, homicides, in general, occur more regularly in public areas than in private rooms. Regarding the prior criminal records of homicide victims, female victims tended not to have one, while male victims did. The majority of homicide tends to be a male-on-male event or male-on-female event.

Though men make up a majority of homicide offenders, it is still essential to note sex differences in trends and patterns in homicide. Recent scholarship has gathered great details on sex differences in homicide trends. Fox and Fridel (2017) investigated sex differences in patterns and trends in U.S. homicide from 1976 to 2015. They found that over the past four decades, males make up 90% of homicide offenders and 81% of victims (Fox & Fridel, 2017). While this is still the case, the sex combination of the offender and victim causes variation in the make-up of offenders and victim dynamics. This variation in offender and victim make-up is attributed to other known situational factors in homicide, such as weapon usage, age, race, and the relationship between the victim and offender (Fox & Fridel, 2017).

Female offenders commit homicide at the middle age of their life more so than men who tend to be younger than 25. Indeed, men under 25 years of age make up half of all male killers (Fox & Fridel, 2017). Only 35% of female killers are aged 25 and younger. The age of homicide victims closely corresponded with the offender's age, but females were disproportionately children, middle-aged, or elderly compared to males (Fox & Fridel, 2017). The role of race in sex differences is especially pronounced, with most male offenders and victims being Black, while female offenders and victims White

(Fox & Fridel, 2017). The relationship between the offender and victim results suggested that a majority of male victims of homicide were acquaintances of the offender, while female victims were mostly intimate partners (Fox & Fridel, 2017). The same results were found when the sex of the victims and offenders were swapped.

Some of the most considerable gender differences are related to the weapon used in the homicide event (Fox & Fridel, 2017). Unsurprisingly firearms were the weapon used most among homicide offenders regardless of sex, with males using firearms 70% of the time and females using them 47% between 1976 and 2015 (Fox & Fridel, 2017). However, women were found to commit homicide with knives and other means more often than men. A total of 40% of homicides that involve drugs, poison, drowning, or asphyxiation are perpetrated by women. However, this considers various homicide types, such as child homicide, for which women are mostly responsible (Fox & Fridel, 2017). The investigation of sex differences in homicide trends has also received attention in other countries. Scholars in Korea have recently investigated sex differences in violent crimes, specifically in homicide, and significant differences were found between the characteristics of offenders and victims by sex (Sea et al., 2018). Sea and colleagues (2018) found that male offenders killed more female victims than men, whereas female offenders were more likely to kill male victims than females. Female offenders were more likely to be married than male offenders, and over two-thirds of male offenders had a criminal history compared to one-third of female offenders having a criminal history.

There are significant differences in homicide location based on offender sex. Male offenders kill more frequently in places familiar to their victims, such as the workplace,

residence, or lounge, than females. Female offenders kill more frequently in locations associated with the victim and themselves, such as work or home environments (Sea et al., 2018). Men are more likely to kill their victims with their hands, bring weapons to the crime scene, and commit homicide in a dark place compared to women (Sea et al., 2018). Although they are more likely to kill other men, they are overrepresented in the perpetration of femicide (Sea et al., 2018). Females are more frequently killed by family members such as intimate partners, children, and parents, while men are most often killed by friends and colleagues (Sea et al., 2018).

Sex Differences in Weapon Usage in Homicide

Sex differences in weapon usage during homicide have been investigated, dating back to Wolfgang's 1957 study. The sex differentials were primarily related to stabbings and beatings. Two-fifths of males and one-third of females died from stabbings compared to other methods of homicide. Just as there were some sex differences in victim killing processes, there was a significant difference in offender methods of killing. Wolfgang reported that nearly 64% of female offenders, or four times as much, stabbed their victims to death, while only 3% of female offenders killed their victims by beatings compared to males. In contrast, only 23% of female victim homicides were caused by beatings. In other words, male offenders beat their victims to death nine to ten times more often than female offenders do. More recent work continues to find sex differences in homicide weapon usage.

A study that examined homicide trends in Western Norway from 1985 to 2009 found that women were killed by strangulation more often than men, while men were

killed by blunt objects, more often than women (Kristoffersen et al., 2014). They also found that when males were killed by strangulation, it was often through the use of "ligature" or wire-like objects (Kristoffersen et al., 2014, p. 4). The authors explained these sex differences in weapon usage by relying on the physical effort it takes to lethally and manually kill someone. They explain that an adult male is often physically stronger than a woman and it could take less physical effort or demand to commit homicide in this way (Kristoffersen et al., 2014). Another recent study that investigated sex differences compared the homicides of male and female offenders in Spain. The findings suggested victims were more likely to be killed by asphyxia if the offender was female and by firearm if the offender was male (Santos-Hermosos et al., 2021).

Domestic Homicide

Domestic homicide is defined as "the killing that occurs within the confines of the family, whether the partners are married or not" (Websdale, 1999, p. 4). Within this broad form of homicide are subtypes, which most commonly include intimate partner homicide and familicide. Intimate partner homicide is the most common type of domestic homicide and is the only homicide category where women make up the majority of victims (Vatnar et al., 2021). Unlike other homicide types, intimate partner homicides are often the culmination of previous abuse in the household (DeJong et al., 2011). The motive is gendered according to research, as female offenders are more likely to be acting in response to compromised safety, and males are more likely to engage in these acts as a form of proprietariness and sexual jealousy (DeJong et al., 2011; Websdale, 1999).

Most female offenses occur within the privacy of their homes and are thought to be caused by self-defense and fits of extreme depression (Pizarro et al., 2008); however, females as offenders in domestic homicide are also present in cases of child homicide and familicide. Familicide is defined as the killing of a spouse and one or more children in origin but has expanded to include both current or by-law family members (Karlsson et al., 2021). In a recent literature review by Karlsson and colleagues (2021), the findings suggested that a majority of familicide offenders were male, had a history of domestic violence perpetration, and almost half were unemployed. Victims of familicide were most likely female, married to the offender, or biological children of the offender (Karlsson et al., 2021).

There is a multitude of weapons used in the commission of domestic homicide. Though the most common weapon used are firearms, followed by more personal means such as strangulation and other forms of direct contact methods. Campbell and colleagues (2007) found that males are more likely to beat their victims to death and were slightly more likely to use a firearm compared to females (Campbell et al., 2007). While this is one form of direct contact homicide, strangulation also has a long history of being a precedent to this homicide type. Research has shown that there are significant differences in homicidal asphyxia patterns between the sexes, with some investigations on strangulation deaths finding a higher number of female victims compared to males, and others determining a clear male majority among victims (Suffla et al., 2008).

While this is the case in some homicide studies, domestic violence studies indicate a clear gendered phenomenon in non-fatal strangulation that increases the risk of

femicide (Messing et al., 2022), and homicides involving same-sex couples. Messing and colleagues (2021) found that compared to opposite-sex couples, same-sex couples had less documentation of strangulation incidents. Furthermore, same-sex female couples report more minor injuries while more severe injuries were reported by same-sex male couples.

Sexual Homicide

Another area in homicide research that has focused on sex differences is the study of sexual homicide. This is not to be confused with domestic homicide, which does at times fall under this classification and differs by victim-offender relationship status. Sexual homicide is a hybrid offense combining two different crimes, a sexual assault and a homicide (Stefanska et al., 2020). Clinicians and scholars have developed an eight-item checklist to guide them in the decision-making process to properly connect the sexual element and killing of sexual homicide into better classifications. Examples in the list include stalking behaviors, use of restraints, post-mortem sexual activity, the presence of biting, and sexually related disinhibitors (Stefanska et al., 2020). This crime is a low base rate phenomenon as about 1% of the 5% of total homicides reported annually fall under sexual classification, which may be partly due to inconsistencies in definition (Chan et al., 2019).

Chan and colleagues (2019) were the to examine sex differences in sexual homicide. The weapon usage categories in their study included personal weapons (hands or feet, strangulation), contact weapons (blunt object), edged weapons (variety of knives), and firearms. In addition to weapon categories describing physical weapons, the authors

also classified the different weapons as physically more or less demanding. Their

findings indicated that male sexual homicide offenders (44%) predominately used

personal weapons in homicide events, and female sexual homicide offenders (63%) used

more firearms in killing their victims (Chan et al., 2019). Relative to female offenders,

male offenders used personal (44% vs. 7%) and contact (13% vs. 4%) weapons during

the sexual homicide event. However, females used more firearms than males to kill their

victims (63% vs. 14%). In addition, there was a significant difference between the sex of

offenders and the physical demand for the weapon used in a homicide. Weapons that

were physically more demanding were used majorly by males (57% vs. 11%), and those

less physically demanding were primarily used by females (89% vs. 43%) (Chan et al.,

2019). When comparing sexual to non-sexual homicides, offenders tend to use "up-close"

or "intimate" methods to take the lives of their victims (Chan et al., 2019). The most

common methods used to kill victims of sexual homicide include tactics such as

strangulation, beating with bare hands, and asphyxiation. The second most used weapon

types in sexual homicide are edged and contact weapons such as knives and bats. These

findings have been echoed across other studies focusing on sexual homicide but primarily

on male homicide offenders (Chan, 2015; Chan, 2018; Chan & Li, 2020).

CHAPTER 3

THEORETICAL FRAMEWORK

Rational Choice Theory

Rational Choice Theory posits that various micro and macro characteristics play a substantive role in understanding why an individual commits a criminal act. Decision-making is a conscious thought process that differs by the cognitive mechanisms by which information about the world is processed by individuals (Cornish & Clarke, 1985). People do not always make the most "rational" decisions and often employ shortcuts that process information. Differences in these processes could also be seen when decisions are group-based and not individual. All of these factors are worth considering when trying to explain and understand criminal behavior. Economist and political scientist Herbert Simon coined the term bounded rationality as a way to explain how people make decisions in the real world. This concept posits that rather than optimization, decision-making is based on choosing a possible outcome that satisfies and will suffice an individual's needs (Clarke, 1983). For that reason, rationality should be defined broadly. Criminals may not always make optimal decisions, but that does not mean that these choices do not make sense to the offender and represent their best interests in optimizing favorable outcomes at the time of the crime. This variability is also influenced by two key points in the rational choice model, criminal involvement and the criminal event.

Criminal involvement refers to the decision to become involved in crime while the criminal event deals with the decision to commit a criminal act. Criminal involvement recognizes an individual's willingness to commit a crime in order to satisfy needs under

14

the right circumstances (Cornish & Clarke, 1985). In conjunction with this mindset, an opportunity to commit that crime may come unexpectedly and the offender may choose to react to that chance event. These two decision points are not mutually exclusive as criminals may have come to the decision of committing a crime and then randomly encounter an opportunity to do so. The criminal event is more focused on the decision to commit specific crimes. For example, a criminal may decide to perpetrate homicide but they also consider the best way for them to go about it. This is based on factors such as previous experiences, individual perceptions, and characteristic features of how they process information (Cornish & Clarke, 1985).

Once both criminal involvement and events have been considered, the continuance or desistance of criminal activity is more clearly understood. Continuance in crime is generally a result of positive reinforcement and so offending increases until it reaches an optimum level. Desistance follows more adverse experiences during offending and changes in micro or macro circumstances such as marriage, sex, occupation, changes in policing, etc. (Cornish & Clarke, 1985). When studying offending in homicide, the rational choice framework recognizes the need to develop a situational lens to crime prevention that addresses criminal decision points instead of offenders themselves.

The rational choice framework helps explain trends in offender homicide weapon usage, as weapons are a way to influence desired outcomes in crime while taking into consideration appropriate micro and macro characteristics of the offender. Certain weapons allow opportunities for victims to overpower offenders, so offenders need to select weapons that offset that possible disadvantage. Firearms are often the weapon most

15

used for this reason, but it depends on situational circumstances. Pizarro and colleagues (2021) found that premeditation and motivation are robust covariates of firearm use. When considering rational choice theory, these findings suggest that firearms are used as tools to gain compliance and facilitate the commission of a crime as they allow offenders to kill quickly and minimize risk to their physical person (Pizarro et al., 2021).

While this is the case, other less commonly used weapons are also used to facilitate the commission of the crime. This is also explained in the rational choice framework as it details that rationality is subjective and looks different in each unique circumstance. For example, a domestic homicide where a sharp object was in close proximity might be the "rational" option for an offender to use to commit homicide. Individual factors such as age, race, victim-offender relationship, and premeditation have been found to be important covariates of firearm usage, but there is not as much certainty among less commonly used weapons (Pizarro et al., 2021). Specifically, there is not much mention of how sex might influence the weapon usage of homicide offenders. Though other situational theories have attempted to address this situation, one in particular that relates to the sex characteristic of the offender and victims is the physical strength hypothesis.

The Physical Strength Hypothesis

The "physical strength hypothesis" (PSH) can also explain variations in weapon usage to commit a homicide. The PSH posits that when there are significant discrepancies in size and strength between offender and victim, the former will use superior weaponry to overcome structural imbalances (Heide, 1993; Shon, 2010). Some of the earliest

inquiry in this line of research dates back to Wolfgang's (1957) seminal study, where he posits that the use of a firearm in homicide might be explained as a means to offset an offender's limited physical power. This hypothesis is made explicit in parricide research to explain weapon use differences in adult and juvenile homicide offenders. Adults and males are often physically stronger than juveniles and females (Chan et al., 2019; Chopin & Beauregard, 2021). Chan and colleagues (2019) point out that offenders who are physically stronger and more capable of overcoming their victims' resistance are likely to use weapons that require more physical strength to complete their homicidal acts (e.g., personal and contact weapons). Conversely, offenders whose physique is comparatively weaker than their victims may need to resort to the use of weapons that require less physical strength (e.g., edged weapons and firearms) in killing their victim (Chan et al., 2019).

Shon and colleagues (2007) found that when female perpetrators killed a father or stepfather, the most commonly used weapon was a firearm. However, this changed when the victim was the mother or stepmother of the female offender, where the most widely used weapons were intimate contact methods (Shon et al., 2007). Based on these findings, sex might be thought of as a determining factor in assessing capable guardianship and opportunity for crime. This ties into situational theories of crime, such as rational choice and routine activities theory.

CHAPTER 4

THE CURRENT STUDY

In this study, I seek to increase knowledge in the area of homicide offender weapon usage by examining the factors that lead to decision-making. This study also seeks to offer explanations for sex variation in homicide offender weapon usage by offender and victim sex dynamics. The first research question that this study seeks to answer is, *"Does sex influence the use of a weapon that is more or less physically demanding to commit homicide?"* The second research question that this study seeks to answer is, *"Does the sex dyad of the offender and victim influence using a weapon that is more or less physically demanding?"* The studies presented earlier have made it clear that sex has an influence on the selection of a weapon in homicide. Females and males use different weapons in similar homicide situations (Campbell et al., 2007; Chan et al., 2019). However, there is very little known about how sex influences weapon usage with regard to the physical demand of the weapon used to commit homicide. By answering these questions, we can further understand how sex influences weapon selection in homicide with regard to its physical demand. Based on prior research (e.g., Chan et al., 2019), two hypotheses are tested.

1. Male homicide offenders will use more physically demanding weapons to carry out homicide compared to female homicide offenders.

2. The sex dyad of the offender and victim will influence the level of physical demand for the weapons used in a homicide.

Site Description

The study will be using homicide data from Newark, New Jersey. Newark is a midsize, northeastern city located in the state of New Jersey. It is the home of approximately 307,220 people with approximately 50% of residents being female as of 2020. Approximately 49% of residents are of African American origin, while 37.6% of residents are of Hispanic or Latinx origin (U.S. Bureau of the Census, 2020). The median income (in dollars) of residents in Newark is between $37,476. Homicides in Newark steadily increased from 58 incidents in 1997 to 112 in 2013. The incidence rate for homicide went from 21.7 in 1997 to 40.3 in 2013 per 100,000 people in the population. However, the incidence rates of homicide have begun to steadily decrease from 95 incidents in 2014 to 57 in 2019.

The incidence rate for homicide went from 34 in 2014 to 20.1 in 2019 per 100,000 people in the population. Previous explanations for the high homicide rates have been attributed to Newark's subculture of violence that is prevalent in the city (Pizarro & McGloin, 2006), specifically the availability of guns and drug markets. As of 2020, Approximately 32.5% of the population was foreign-born and 26.3% are below the poverty line. Of those who make up the civilian labor force, 57.8% are female. The owner-occupied housing unit rate in Newark is currently 23.5% (U.S. Bureau of the Census, 2020).

CHAPTER 5

METHODOLOGY

Data

This study employs the Newark Homicide Dataset as the primary data source for this study (see Pelletier & Pizarro, 2019; Pizarro & McGloin, 2006; Pizarro, 2008). The Newark Homicide Dataset originated from the anti-violence effort the Greater Newark Safer Cities Initiative, and has been curated since then by one of the original data collectors, Dr. Jesenia Pizarro. This data has been used in other homicide studies (see Pelletier & Pizarro, 2019; Pizarro & McGloin, 2006; Pizarro, 2008). While previous studies using this data have utilized the 1990s and early to late 2000s in analysis, this study will be adding homicide data from the 2010s; specifically, all homicides from 1997 to 2019 are employed in this study.

The Newark Homicide Dataset consists of homicide investigation files collected from the Newark Police Department (NPD). The homicide incident, victim(s), and suspect(s) are described in great detail within these files. Homicide incident information included a record of the date, time, address, premise, motive, the weapon used, and victim-offender relationship. Regarding the victim(s) and suspect(s), these files include demographic information, employment status, gang affiliation, and past criminal history. In order to ensure these data were collected in a consistent manner, a collection protocol and instrument were implemented. While collecting these data, researchers created a summary narrative of each homicide incident that details the circumstances leading up to the homicide. This process provided contextual information on the victim(s) and

suspect(s) that would then be coded such as motive and other previously related factors and events that led to occurrence of the homicide incident. The units of analysis in this study is the homicide incident, and given the research questions, only single offender and single victim homicide cases were examined.[1] From 1997 to 2019, there were 827 single offender and single victim homicide incidents. Of these, eighty-nine incidents were removed from the analysis due to missing and or unknown information in key variables of interest. The final number of homicide cases used in the study is seven-hundred and thirty-eight (n=738).

<center>*--Insert Table 1 here—*</center>

Measures

Dependent Variable

The dependent variable is the physical demand of the weapon used to commit homicide. Physical demand is defined as the amount of physical exertion needed to be used in order to commit homicide with a particular weapon. This definition is previously adapted from Chan and colleagues (2019) and their use of the physical demand of a weapon used in a homicide, which was more or less demanding. The physical demand of the weapon used to commit homicide was disaggregated into the following categories: the reference category low (coded as 1), moderate (coded as 2), and high (coded as 3) (coding).[2] The low category comprised of weapons considered to have low physical

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[1] homicide events, given that understanding and measuring physical demand across multiple offenders and suspect dynamics would not be feasible.

[2] The physical demands of the weapon used in the homicide were not disaggregated into smaller groups due to the small number of observations that would be in each group.

demand: firearms, poison, arson, etc, based on pre-existing uses of these groupings in empirical study (Chan et al. 2019; Pelletier & Pizarro, 2019). The low category consists of a total of 533 observations (72.22%) and was numerically coded as one. The moderate category consists of weapons considered to have moderate physical demand: wrench, bat, pipe, screwdriver, knife, pen, rock, brick, golf club, etc., based on pre-existing uses of these groupings in empirical study (Chan et al. 2019; Pelletier & Pizarro, 2019). The moderate category consists of a total of 153 observations (20.73%) and was numerically coded as two. The high category includes weapons considered to have high physical demand: rope, wire, hands and feet, strangulation/asphyxia, drowning, etc, (Chan et al. 2019; Pelletier & Pizarro, 2019). The high category consists of a total of 52 observations (7.05%) and was numerically coded as three.

Independent Variables

In this study, sex is investigated in three ways: suspect sex, victim sex, and the suspect-victim sex dyad. Based on prior research that suggests differences in weapon usage between the sexes (e.g., Fox & Fridel, 2017; Sea et al., 2018; Wolfgang, 1957), the main independent variables for this study are the sex of the victim and offender (0 = Male, 1 = Female). The homicide sex dyad variable has four categories: male suspect on male victim (coded as 1), male suspect on female suspect (coded as 2), female suspect on male victim (coded as 3), and female suspect on female victim (coded as 4). Sex typologies were employed over other typologies such as victim-offender relationship, age, and motive due to the nature of the research questions. Approximately 94.85% of all homicides have a male suspect, while 5.15% have a female suspect. Approximately

22

85.09% of victims were male, while 14.91% were females. Approximately 81.30% of all homicides involved a male suspect and male victim, while 13.5% involved a male suspect and a female victim, 3.79% involved a female suspect and male victim, and 1.36% involved a female suspect and female victim.

Control Variables

Seven control variables are included in the model: suspect age, victim age, suspect race, victim race, suspect gang membership, victim gang membership, and homicide motive. As age increases, one is significantly more likely to be involved in acquaintance and family homicide and less likely to be involved in stranger homicide according to Cao and colleagues (2008), but findings are mixed. Pelletier and Pizzaro (2019) found that motive, race, and gang membership are also significant predictors of homicide weapon usage. These control variables have been validated in previous empirical inquiries to have theoretical and statistical relevance to homicide events (Fox & Allen, 2014; Pelletier & Pizarro, 2019).

The average age of the suspects was 27.3 years old and the average age of the victims was 30.9 years old. Suspect and victim race were coded as Black (numerically coded as 0) or Non-Black (numerically coded as 1). The suspect was Black in 87.67% of the observations while 12.33% were members of other races, such as White, Latinx, etc. The victim was Black in 84.42% of the observations while the other 15.58% were members of Non-Black. Suspect and victim gang membership status was coded as No (numerically coded as 0) or Yes (numerically coded as 1). The suspect was not a member of a gang in 61.38% of the observations while the remaining 38.62% were members of a

gang. The victim was a member of a gang in 26.15% of the observations while the remaining 73.85% were not members of a gang.

Homicide motive was disaggregated into five motive categories of homicide: domestic, drug and gang, dispute and revenge, robbery, and other. Domestic motives are defined as incidents resulting from child abuse; spousal abuse; disputes between intimates over their relationship and/or breakups; revenge over infidelities, disputes between people that lived within the same residence over domestic matters; and disputes between family members over family matters (numerically coded as 1). A little under 15% of the observations in this study had a domestic motive (14.36%). Drug/Gang motives are defined as homicides that occurred as a result of sales or distribution of narcotics and/or other illegal drugs and/or is directly related to furthering the economic, social, or territorial interests of a gang (numerically coded as 2). A total of 23.71% of observations were classified as having a drug/gang motive.

Dispute/Revenge motives are defined as incidents resulting from an argument (not related to domestic, drugs, or gang reasons) or physical altercation that escalates to lethal violence and/or occurred as a result of the victim or offender wanting to get even for a past incident (not related to domestic, drugs, or gang reasons). Dispute/Revenge motives were numerically coded as 3 and made up 44.58% of homicide motives. Robbery motives are defined as homicide resulting from a non-drug related incident where the perpetrator attempted or took money or other material possessions from the victim by using force (numerically coded as 4). A total of8.13% of the observations were coded as motivated by robbery. Other motives are defined as homicides with a known motive that does not fit

into any of the existing categories (numerically coded as 5). Examples of other motives include, officer shootings, accidents, mental illness, and self-defense, and make up 9.21% of motives were classified as other.

<div align="center">*--Insert Table 2 here--*</div>

Analyses

The analytic strategies used in this study include a series of chi-square tests of independence, coupled with Cramer's V measures of association, as well as multinomial logistic regression models. A chi-square test was run to determine whether two categorical variables – an independent variable coupled with the physical demand of the weapon – are dependent on one another. If the chi-square test of independence is significant, then the distribution of the two variables is not independent. Chi-square tests were run due to the data being categorically structured. Cramer's V are measures of association that tell us how strong the relationship is between the two categorical variables. Cramer's V will be interpreted as weak (0-0.29), moderate (0.3-0.59), and strong (0.6-1) and will show the strength of the association between the two variables.

The multinomial logistic models were used to determine what variables make weapon usage unique by sex statistically when compared to all other categories of physical demand. Thus, the multinomial logistic models are used to answer the first and second research questions: does sex influence the level of physical demand associated with a weapon in homicides? Similarly, does the sex dyad of the offender and victim influence using a weapon that is more or less physically demanding? Two multinomial models were run with one containing suspect and victim sex variables separate while the

other included sex dyads. These multinomial logistic regression models are appropriate analytic methods to use in this study given the categorical nature of the dependent variable. An ordered logit was considered given the "ordered" nature of the dependent variable but did not pass the proportional odds assumption, which would make this method invalid. Previous research has employed this analytic strategy in trying to determine the probability of one outcome relative to its reference category in the context of homicide (Pelletier & Pizarro, 2019).

CHAPTER 6

FINDINGS

This section discusses the results of the analyses. The first section discusses the

cross-tabulations and chi-square results. The second section discusses the results of the

multinomial logistic regressions conducted to answer the first and second research

questions. Table 2 lists the descriptive statistics for each of the variables in the analyses

along with the chi-square results and their significance. Tables 3 and 4 list the results of

the multinomial logistic models by physical demand, including the co-efficient, standard

error, and odds ratio for each of the variables in the model.

Bivariate Results

Descriptive statistics for all the variables used in the analyses are displayed in

Table 2. Each of the variables had a significant, dependent relationship with physical

demand, however, there are some noteworthy patterns. There is a significant relationship

between suspect sex and physical demand of the weapon used to commit homicide ($\chi^2 =$

62.14; p < 0.001). While this relationship is significant, it is a weak one. The Cramer's V

is 0.29, which shows there is a borderline moderate relationship between a homicide

suspect's sex and physical demand of the weapon used to commit homicide. The

relationship between victim sex and physical demand of the weapon used to commit

homicide was also significant ($\chi^2 = 69.06$; p < 0.001) but the strength of the relationship

was moderate. The Cramer's V is 0.30, which shows that there is a moderate relationship

between a homicide victim's sex and the physical demand of a weapon used to commit

homicide. There is a significant relationship between the sex dyad of a homicide suspect

27

and victim and the physical demand of a weapon used to commit homicide ($\chi^2 =$ 131.34; p < 0.001). The Cramer's V is 0.30, which shows there is a moderate relationship between the sex dyad of a homicide suspect and victim and the physical demand of a weapon used to commit homicide.

There is a significant relationship between a homicide suspect's gang membership status and the physical demand of a weapon used to commit homicide ($\chi^2 = 89.96$; p < 0.001). The Cramer's V is 0.35, which shows that there is a moderate relationship between suspect gang membership. While this is the case for suspect gang membership, we see different results for victim gang membership in terms of relationship strength. There is a significant relationship between victim gang membership and the physical demand of a weapon used to commit homicide ($\chi^2 = 52.14$; p < 0.001). The Cramer's V is 0.27, which shows that there is a weak relationship between a homicide victim's gang membership status and the physical demand of a weapon used to commit homicide.

There is a significant relationship between homicide motive and the physical demand of a weapon used to commit homicide ($\chi^2 = 150.41$; p < 0.001). The Cramer's V is 0.32, which shows that there is a moderate relationship between homicide motive and the physical demand of a weapon used to commit homicide. This is not surprising given that previous study has established a relationship between homicide motive and overall weapon usage (Pelletier & Pizarro, 2019). There is a significant relationship between suspect age and the physical demand of a weapon used to commit homicide ($\chi^2 = 254.90$; p < 0.001). The Cramer's V is 0.42, which shows that there is a moderate relationship between the age of a homicide suspect and the physical demand of a weapon

used to commit homicide. There is a significant relationship between victim age and the physical demand of a weapon used to commit homicide ($\chi^2 = 331.80$; $p < 0.001$). The Cramer's V is 0.47, which shows that there is a moderate relationship between the age of a homicide suspect and the physical demand of a weapon used to commit homicide.

Multinomial Logistic Models

The results of the multinomial analyses are displayed in Table 3 and 4 are two distinct models. The first model includes the independent variables of homicide suspect and victim sex, while the second model includes the sex dyad as its independent variable. Aside from the independent variables, all other variables in the models are identical. From the categories of physical demand of weapon used to perpetrate homicide, the low category was used as the base outcome in both models.

Multinomial Model 1

The reference category for this model is low physical demand. The model reported a constant coefficient of (.547) for moderate physical demand and (-14.800) for high physical demand, which suggests that net of controls, on average, moderately demanding weapons were more likely to be used than low demand weapons, and high demand weapons were on average less likely to be used than low demand weapons. In this model, suspect sex significantly predicted the physical demand of the weapons used to perpetrate homicide. More specifically, compared to those who utilized weapons of low physical demand, men have a lower log odds ($\beta = -1.37$; $p < 0.05$) than women of using a moderately demanding weapon. The relationship between sex and the use of a high demand weapon, relative to a low demand weapon, is not statistically significant.

The age of the suspect and victim significantly predicted the physical demand of the weapons used to perpetrate homicide. Compared to homicides where a weapon of low physical demand was used to perpetrate homicide, each additional year increase in suspect age is associated with a 0.03 increase in the log odds of using moderately demanding weapons ($p<0.05$), holding all other variables in the model constant. Additionally, compared to homicides where a weapon of low physical demand was used to perpetrate homicide, each additional year increase in victim age is associated with a 0.03 increase in the log odds of using moderately demanding weapons ($p<0.05$) and a 0.04 increase in the log odds of using high demanding weapons ($p<0.05$), holding all other variables in the model constant.

The race of the victim significantly predicted the physical demand of the weapons used to perpetrate homicide. Compared to incidents that involved weapons of low physical demand, victims who are Non-Black have higher log odds ($\beta = 1.21; p < 0.05$) than Black victims of homicides of being killed with a high demanding weapon, holding all other variables in the model constant. Suspect and victim gang membership significantly predicted the physical demand of the weapons used to perpetrate homicide. Compared to those who utilized weapons of low physical demand, homicide suspects that are gang members have lower log odds ($\beta = -1.10; p < 0.05$) than suspects who are not gang members of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicide suspects that are gang members have lower log odds ($\beta = -1.33; p < 0.05$) than suspects who are not gang members of using high demanding

weapons, holding all other variables in the model constant. Compared to incidents that involved weapons of low physical demand, homicide victims that are gang members have lower log odds ($\beta = -0.97$; $p < 0.05$) than victims who are not gang members of being killed with a moderately demanding weapon, holding all other variables in the model constant.

Lastly, homicide motive significantly predicted the physical demand of the weapons used to perpetrate homicide. Compared to those who utilized weapons of low physical demand, homicides where the motive is drug/gang related have lower log odds ($\beta = -2.40$; $p < 0.05$) than domestic-related homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicides where the motive is drug/gang related have lower log odds ($\beta = -3.03$; $p < 0.05$) than domestic-related homicides of using a high demanding weapon, holding all other variables in the model constant.

Compared to those who utilized weapons of low physical demand, homicides where the motive is dispute/revenge related have lower log odds ($\beta = -1.33$; $p < 0.05$) than domestic-related homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicides where the motive is dispute/revenge related have lower log odds ($\beta = -1.67$; $p < 0.05$) than domestic-related homicides of using a high demanding weapon, holding all other variables in the model constant. Compared to those who utilized weapons of low physical demand, homicides where the

motive is robbery related have lower log odds ($\beta = -2.09; p < 0.05$) than domestic-related homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicides where the motive is robbery related have lower log odds ($\beta = -2.47; p < 0.05$) than domestic-related homicides of using a high demanding weapon, holding all other variables in the model constant.

Compared to those who utilized weapons of low physical demand, homicides where the motive is other related have lower log odds ($\beta = -1.57; p < 0.05$) than domestic-related homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicides where the motive is other related have lower log odds ($\beta = -2.25; p < 0.05$) than domestic-related homicides of using a high demanding weapon, holding all other variables in the model constant.

--Insert Table 3 here--

Multinomial Model 2

The reference category for this model is low physical demand. In this model, the sex dyad variable used the male suspect on male victim dyad as the reference category. The model reported a constant coefficient of (-1.35) for moderate physical demand and (-2.04) for high physical demand relative to low physical demand, which suggests that net of controls, the average homicide involved less weapons of moderate or high physical demand compared to low physically demanding weapons.

32

In this model, the homicide incident sex dyad significantly predicted the physical demand of the weapons used to perpetrate homicide. More specifically, compared to those who utilized weapons of low physical demand, female suspect and male victim homicides have higher log odds ($\beta = 1.26; p < 0.05$) than male suspect and male victim homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, female suspect and female victim homicides have higher log odds ($\beta = 2.13; p < 0.05$) than male suspect and male victim homicides of using a moderately demanding weapon, holding all other variables in the model constant. Homicide events involving a female suspect and a male victim or a female suspect and female victim have higher log odds of using a moderately physically demanding weapon compared to a low physically demanding weapon than in homicides involving a male suspect and male victim. The relationship between sex dyad and the use of a high demand weapon, relative to a low demand weapon, is not statistically significant.

The age of the suspect and victim significantly predicted the physical demand of the weapons used to perpetrate homicide. Compared to homicides where a weapon of low physical demand was used to perpetrate homicide, each additional year increase in suspect age is associated with a 0.03 increase in the log odds of using moderately demanding weapons (p<0.05), holding all other variables in the model constant. Additionally, compared to homicides where a weapon of low physical demand was used to perpetrate homicide, each additional year increase in victim age is associated with a 0.03 increase in the log odds of using moderately demanding weapons (p<0.05) and a

0.04 increase in the log odds of using high demanding weapons (p<0.05), holding all other variables in the model constant.

Similar to model one, the race of the victim significantly predicted the physical demand of the weapons used to perpetrate homicide. Compared to incidents that involved weapons of low physical demand, victims who are Non-Black have higher log odds ($\beta =$ 1.21; $p < 0.05$) than Black victims of homicides of being killed with a high demanding weapon, holding all other variables in the model constant. Similar to model 1, suspect and victim gang membership significantly predicted the physical demand of the weapons used to perpetrate homicide. Compared to those who utilized weapons of low physical demand, homicide suspects that are gang members have lower log odds ($\beta = -1.11$; $p <$ 0.05) than suspects who are not gang members of using a moderately demanding weapon, holding all other variables in the model constant.

Additionally, compared to those who utilized weapons of low physical demand, homicide suspects that are gang members have lower log odds ($\beta = -1.33$; $p <$ 0.05) than suspects who are not gang members of using high demanding weapons, holding all other variables in the model constant. Compared to incidents that involved weapons of low physical demand, homicide victims that are gang members have lower log odds ($\beta = -0.97$; $p < 0.05$) than victims who are not gang members of being killed with a moderately demanding weapon, holding all other variables in the model constant. Lastly, homicide motive significantly predicted the physical demand of the weapons used to perpetrate homicide. Compared to those who utilized weapons of low physical demand, homicides where the motive is drug/gang related have lower log odds ($\beta =$

−2.42; $p < 0.05$) than domestic-related homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicides where the motive is drug/gang related have lower log odds ($\beta = -3.05; p < 0.05$) than domestic-related homicides of using a high demanding weapon, holding all other variables in the model constant.

Compared to those who utilized weapons of low physical demand, homicides where the motive is dispute/revenge related have lower log odds ($\beta = -1.37; p < 0.05$) than domestic-related homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicides where the motive is dispute/revenge related have lower log odds ($\beta = -1.68; p < 0.05$) than domestic-related homicides of using a high demanding weapon, holding all other variables in the model constant. Compared to those who utilized weapons of low physical demand, homicides where the motive is robbery related have lower log odds ($\beta = -2.12; p < 0.05$) than domestic-related homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicides where the motive is robbery related have lower log odds ($\beta = -2.49; p < 0.05$) than domestic-related homicides of using a high demanding weapon, holding all other variables in the model constant.

Compared to those who utilized weapons of low physical demand, homicides where the motive is other related have lower log odds ($\beta = -1.59; p < 0.05$) than

domestic-related homicides of using a moderately demanding weapon, holding all other variables in the model constant. Additionally, compared to those who utilized weapons of low physical demand, homicides where the motive is other related have lower log odds ($\beta = -2.26; p < 0.05$) than domestic-related homicides of using a high demanding weapon, holding all other variables in the model constant.

--Insert Table 4 here--

CHAPTER 7

DISCUSSION

The focus of the present study was to address the following two research questions: Does sex influence the use of a weapon that is more or less physically demanding to commit homicide; and, does the sex dyad of the offender and victim influence using a weapon that is more or less physically demanding? The first multinomial regression identified how sex influenced the physical demand of a weapon used to perpetrate homicide. Regarding suspect sex, being male was significantly associated with a lower log odds in the use of moderately demanding weapons to perpetrate homicide compared to those who used a weapon of low physical demand. These do not results demonstrate support for hypothesis one. The first hypothesis for this study was that male homicide offenders will use more physically demanding weapons to carry out homicide compared to female homicide offenders.

The second multinomial regression identified how the sex dyad of the offender and victim influenced the physical demand of the weapons used to perpetrate homicide. Compared to when the sex dyad was male suspect on male victim and the physical demand of the weapon used to perpetrate homicide was low, sex dyads with female suspects and male or female victims were significantly different. These sex dyads displayed a higher log odds in the usage of a moderate weapon being used to perpetrate homicide compared to male suspect on male victim homicides. These results do demonstrate support for hypothesis two. The second hypothesis for this study was that the sex dyad of the offender and victim will influence the level of physical demand for the

37

weapons used in a homicide. Though not all of the sex dyads yielded significance across physical demand categories, those in the moderate category did. Specifically with regard to sex dyads incidents with a female suspect. Prior research on female homicide offenders in specific homicide types has communicated the lack of physical strength used to commit homicide against adult male victims in comparison to male offenders (Chan et al., 2019).

The findings from this study build on homicide research, rational choice theory, and the physical strength hypothesis in several ways. This study reaffirms the findings of previous research in terms of what weapons are most commonly used based on sex of offender and victim. Further, this study demonstrates that the individual sex of the offender and sex dyad of the homicide incident may play a role in the selection of the weapon used in the homicide incident, though further research in this area is need. In terms of rational choice theory, this study demonstrates the theory's ability to adopt a gendered lens on homicide explanation and additional theory integration. Although researchers have examined offender decision making, these works are often male-centric and do not fully encapsulate how these decisions may differ significantly by sex. In order to better understand these phenomena, rational choice theory needs to be investigated more broadly in female-centric situations, especially with regard to weapon usage in homicide.

The physical strength hypothesis helps supplement rational choice theory by explaining sex differences in homicide weapon usage. This theory has been applied to specific types of homicide, including parricide and sexual homicide, to explain sex

differences in weapon usage (Chan et al., 2019; Chan & Heide, 2008; Heide, 1993).

When there are significant discrepancies in size and strength between offender and

victim, the former will use superior weaponry to overcome structural imbalances. In other

words, what is going to maximize the pleasure and minimize the pain offenders

potentially experience? This goes right along the lines of what Cornish and Clark (1985)

discuss in the rational choice framework regarding criminal involvement. In criminal

involvement, offenders consider the appropriate circumstances in which they would

engage in crime. In this case, suspects could consider the sex dynamic of their target and

themselves. The physical strength hypothesis complements the blueprints of rational

choice by offering specific explanations for weapon variation in homicide from a

gendered lens.

The physical strength hypothesis can also complement recent findings regarding

motive and weapon usage in homicide. For example, in a domestic homicide,

strangulation is a known risk factor for inflicting death on a victim (Campbell et al.,

2003). This finding is most frequent in homicide events where males are suspects and

females are the victim and is a gendered phenomenon. While this is true for domestic

homicide, these dynamics may change in homicides with alternative sex characteristics.

In this study, results indicated that female suspects use significantly less moderately

demanding weapons against male and female suspects compared to males who used low

demanding weapons against male victims. This suggests that in a domestic homicide

situation, hands (i.e., strangulation) would not be a weapon used by a female offender.

The physical strength hypothesis offers a complementary explanation for this difference

in weapon usage decision-making. Though more research should be done to better understand how well these theories blend together, they seem constructively compatible based on the current study.

In terms of policy implications, this study has some indirect implications. The more about homicide that scholars and agencies know, the better they are equipped to develop proper prevention programs and practices. Understanding how sex influences homicide weapon usage in this manner might broaden the scope of how law enforcement agencies investigate homicide. This presents the opportunity for training workshops and scenarios to be developed that inform law enforcement about which trends are seen in these incident dynamics and what to look for during investigations. Regarding sex dyads, homicide prevention efforts can use this information in risk assessment instruments for intimate partner homicide. As it stands now the Danger Assessment, which is a lethality risk assessment tool, does not ask about the sex dyad of the victim offender relationships and asks questions within it from a male suspect and female victim perspective (Messing et al., 2021). Adding this information can inform future policy regarding risk assessment among those of the LGBTQ+ populations which have been historically understudied compared to intimate relationship norms.

Lastly, policy can be implemented to better understand the physical demand of weapons used to commit homicide, specifically among firearms. In homicide literature, scholars have investigated covariates to firearm usage but have not investigated if the physical demand of utilized to operate the firearm had any influence on choosing that model to perpetrate homicide (Buggs & Zeoli, 2022; Pizarro et al., 2019).

This study has a number of limitations to consider. The results should be interpreted with caution as the demographics of the sample used do not leave room for much generalizability. First and foremost, of the 738 observations, 700 suspects were male and 38 were female. This could imply that the findings in this study are unique to the population and not very generalizable when discussing sex and its effects on homicide. Future studies should run these analyses with samples or populations that have more female offenders within them. As for Newark, New Jersey women are not committing more homicides. Second, there were not many observations with female suspects in the sex dyad variable. Female suspects made up 38 of the 738 observations and it brings questions to the interpretations of model two in the results. Results might be different if more female suspects were in the female suspect on male or female victim dyads. Future research should seek to include sex dyad reporting in their data collection.

Third, the unit of analysis was single suspect and single victim incidents. The dataset contained many cases where there were multiple offenders and victims but for the purposes of this study were excluded due to not having an adequate way to measure physical demand of weapon usage across multiple offenders and victim dynamics. Future studies should investigate these questions where there are multiple offenders and victims. Fourth, there is no empirically sound way to measure the physical demand of a weapon used to inflict homicide. This study created categories of low, moderate, and high physical demand loosely adapted from Chan and colleagues (2019) that place weapons based on physical demand into more or less demanding categories. Since there is no established way to measure the physical demand of a weapon in prior research, construct

41

validity is a concern. Future research should seek to establish a measure for the physical demand of weapons used in a homicide. Fifth, these data were collected by police officers and that introduces many confounding factors to consider. Implicit bias in data recording by officers may have occurred, resulting in reporting practice that is inconsistent. This contamination of the data would call their generalizability and reliability into question.

Lastly, though age is controlled for in the analysis of this study, it is not taken into account within the theoretical framework. The PSH posits that when there are significant discrepancies in size and strength between offender and victim, the former will use superior weaponry to overcome structural imbalances (Heide, 1993; Shon, 2010). While the present study utilizes this framework to explain sex differences in weapon usage, age could be another source of explanation since physical strength would vary with age alone. Specifically, weapon usage could vary when the suspect or victim of a homicide is a child versus an able-bodied adult. Future research should seek to investigate these variables independently and interactively to determine their effect on homicide weapon usage.

In conclusion, this study has added to the literature by beginning to fill the void on the sex of offenders and the sex dyads of suspect and victims influences the physical demand of the weapon used to perpetrate homicide. After a review of the literature, this study answered two research questions through statistical analysis: Does sex influence the use of a weapon that is more or less physically demanding to commit homicide? Does the sex dyad of the offender and victim influence using a weapon that is more or less physically demanding? The findings shows that there was a significant difference by suspect sex on the physical demand of the weapons used to perpetrate homicide and that

the sex dyad of the offender and victim does influence the level of physical demand for the weapons used in a homicide.

Future research should seek to address several things. First, scholars should seek to determine if these findings vary when there is an interaction between sex dyads and different homicide types. This will lend strength to the generalizability of the findings. Another avenue of future research is to investigate sex dyads or triads beyond one suspect and one victim homicide cases. This could bring clarity to how group dynamics of the suspect(s) and victim(s) influence homicide weapon usage. Lastly, future research should seek to establish an empirically validated measure of the physical demand for a weapon. Firearms might be a good area to begin this endeavor, but ideally, a measure that is more generalizable would be prioritized.

When compared to other crimes, homicide is a rare event. When the offender is female, the nature of the homicide becomes even more unique. This study has demonstrated the need to continue investigating gendered perspectives in the study of homicide until it leads to a more holistic understanding of the events. This study moves prevention research forward as it offers new explanations for what constitutes the "rational" offender and what situational decisions they make regarding criminal behavior.

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APPENDIX A

DESCRIPTIVE TABLE

Table 1. *Descriptive Table*		Physical Demand of Weapon				
	Total	Low	Moderate	High	Chi-Square	Cramér's V
	N(%)	N(%)	N(%)	N(%)		
Demand Categories	738	533	153	52		
Suspect Sex					62.14***	0.29
Female	38 (5.15)	11 (28.95)	27 (71.05)	0 (0.00)		
Male	700 (94.85)	522 (74.57)	126 (18.00)	52 (7.53)		
Victim Sex					69.06***	0.31
Female	110 (14.91)	44 (40.00)	46 (41.82)	20 (18.18)		
Male	628 (85.09)	489 (77.87)	107 (17.04)	32 (5.10)		
Sex Dyads					131.34***	0.30
MaleS on MaleV	600 (81.30)	481 (80.17)	87 (14.50)	32 (5.33)		
MaleS on FemaleV	100 (13.55)	41 (41.00)	39 (39.00)	20 (20.00)		
FemaleS on MaleV	28 (3.79)	8 (28.57)	20 (71.43)	0 (0.00)		
FemaleS on FemaleV	10 (1.36)	3 (30.00)	7 (4.35)	0 (0.00)		
Suspect Race					21.71***	0.17
Black	647 (87.67)	482 (74.50)	129 (19.94)	36 (5.56)		
Other	91 (12.33)	51 (56.06)	24 (26.37)	16 (17.58)		
Victim Race					37.59***	0.23
Black	623 (84.42)	468 (75.12)	126 (20.22)	29 (4.65)		
Non-Black	115 (15.58)	65 (56.52)	27 (23.48)	23 (20.00)		
Suspect Gang Membership					89.96***	0.35
No	453 (61.38)	271 (59.82)	135 (29.80)	47 (10.38)		
Yes	285 (38.62)	262 (91.93)	18 (6.32)	5 (1.75)		
Victim Gang Membership					52.14***	0.27
No	545 (73.85)	355 (65.14)	142 (26.06)	48 (8.81)		
Yes	193 (26.15)	178 (92.23)	11 (5.70)	4 (2.07)		
Motive					150.41***	0.32
Domestic	106 (14.36)	28 (26.42)	58 (54.72)	20 (18.87)		
Drugs and Gang	175 (23.71)	162 (92.57)	10 (5.71)	3 (1.71)		
Escalating Dispute and Revenge	329 (44.58)	242 (73.56)	65 (19.76)	22 (6.69)		
Robbery	60 (8.13)	47 (78.33)	9 (15.00)	4 (6.67)		
Other	68 (9.21)	54 (79.41)	11 (16.18)	3 (4.41)		
	Mean					
Age						
Victim	30.86					
Suspect	27.30					
	*$p<.05$; ** $p<.01$; *** $p<.001$*					

APPENDIX B

VARIABLE CODING SCHEMA

Table 2. *Variable Coding Schema*	
Dependent Variables Physical Demand of Weapon Used	*What is the physical demand of the weapon that was used to commit the homicide?*
	1 = Low; 2 = Moderate; 3 = High
Independent Variables	
S/V Sex Dyad	*What was the sex dyad between the victim and offender in the homicide?*
	1 = MaleS on MaleV; 2 = MaleS on FemaleV; 3 = FemaleS on MaleV; 4 = FemaleS on FemaleV
S/V Sex	*What was the suspect/victim's sex?*
	0 = Female; 1 = Male
Control Variables	
S/V Race	*What was the suspect/victim's race?*
	0 = Black; 1 = Non-Black
S/V Gang Member	*Was the suspect/victim a gang member?*
	0 = No; 1 = Yes
S/V Age	*How old was the suspect/victim at time of homicide?*
	Continuous
Motive	*What was the motive for the homicide?*
	1 = Domestic; 2 = Drug/Gang; 3 = Dispute/Revenge; 4 = Robbery 5 = Other

APPENDIX C

MULTINOMIAL LOGISTIC REGRESSION BY INDIVIDUAL SEX

Table 3. Multinomial Logistic Reg Predicting Physical Demand of Weapon Used by Individual Sex		
VARIABLES	Moderate	High
Suspect Sex	-1.374*	13.357
	(0.433)	(477.03)
Victim Sex	-0.536	-0.612
	(0.291)	(0.416)
Suspect Race	0.135	-0.180
	(0.435)	(0.531)
Victim Race	-0.159	1.213*
	(0.405)	(0.478)
Suspect Age	0.030*	0.011
	(0.012)	(0.017)
Victim Age	0.029*	0.037*
	(0.009)	(0.013)
Suspect Gang Membership	-1.099*	-1.331*
	(0.295)	(0.516)
Victim Gang Membership	-0.972*	-0.570
	(0.369)	(0.585)
Drug/Gang	-2.395*	-3.031*
	(0.453)	(0.725)
Dispute/Revenge	-1.334*	-1.667*
	(0.323)	(0.455)
Robbery	-2.086*	-2.471*
	(0.544)	(0.756)
Other	-1.568*	-2.252*
	(0.457)	(0.727)
Constant	0.547	-14.796
	(0.570)	(477.03)
Observations	738	738
Standard errors in parentheses		
* p<0.05, ** p<0.01		

APPENDIX D

MULTINOMIAL LOGISTIC REGRESSION BY SEX DYAD

Table 4. Multinomial Logistic Reg Predicting Physical
Demand of Weapon Used by Sex Dyad

VARIABLES	Moderate	High
Suspect Race	0.128	-0.184
	(0.435)	(0.531)
Victim Race	-0.163	1.210*
	(0.405)	(0.478)
Suspect Age	0.030*	0.011
	(0.012)	(0.017)
Victim Age	0.029*	0.037*
	(0.009)	(0.013)
Suspect Gang Membership	-1.107*	-1.333*
	(0.296)	(0.516)
Victim Gang Membership	-0.970*	-0.571
	(0.368)	(0.585)
Drug/Gang	-2.423*	-3.046*
	(0.459)	(0.727)
Dispute/Revenge	-1.365*	-1.683*
	(0.333)	(0.457)
Robbery	-2.116*	-2.488*
	(0.549)	(0.757)
Other	-1.589*	-2.264*
	(0.460)	(0.728)
MaleS on FemaleV	0.491	0.589
	(0.314)	(0.420)
FemaleS on MaleV	1.256*	-14.519
	(0.521)	(966.847)
FemaleS on FemaleV	2.129*	-13.588
	(0.766)	(1,478.644)
Constant	-1.346*	-2.042*
	(0.470)	(0.655)
Observations	738	738

Standard errors in parentheses
* p<0.05, ** p<0.01