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Assessing Relationship Type, Weapon Use, Weapon Type, and Injury in Sexual Assault Kit Backlog Data

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ASSESSING RELATIONSHIP TYPE, WEAPON USE, WEAPON TYPE, AND INJURY IN SEXUAL ASSAULT KIT BACKLOG DATA

by

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Dedication

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Abstract

This paper explores the familial and stranger relationship dynamics between victims and suspects/offenders in sexual assault cases. It assesses the likelihood of weapon use and identifies the specific types of weapons involved. This analysis addresses gaps in existing research by examining the relationship between weapon type, weapon use, and relationship type. The study focuses on three key aspects: (1) the types of weapons used during an assault, (2) the nature of victim-suspect/offender relationships, and (3) the presence of any injuries. By analyzing these data, the research aims to identify trends in weapon use and determine whether certain relationships correlate with a higher risk of weapon involvement. Additionally, it will evaluate the impact of weapon use on injury severity and victim outcomes. Findings from this study can inform prevention strategies, victim support services, and policy development to enhance responses to sexual assault cases.

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Introduction

Sexual violence takes many forms, each carrying profound and lasting effects on survivors while presenting complex challenges for the criminal justice system. Sexual assault is an umbrella term that covers several different acts of sexual violence against another person by a perpetrator. According to Rainn (Rape, Abuse & Incest National Network) sexual assault includes the following: attempted rape, fondling or unwanted touching, forcing a victim to perform sexual acts, such as oral sex or penetrating the perpetrator's body, and/or penetration of the victim's body, also known as rape (Rainn, 2024). Sexual violence persists as a widespread and deeply concerning societal issue, affecting individuals across diverse demographics. Sexual assault is a national issue where 1 in 5 women have a likelihood of experiencing rape while 1 in 2 women will experience any type of unwanted physical contact or sexual assault in their lifetime (OVC SANE, n.d). While men are much less likely to experience the previously mentioned scenario, it is not an impossibility. The SAK backlog highlights a critical failure in the criminal justice system, where thousands of untested kits have caused significant delays in investigations. This backlog obstructs suspect identification, increases the risk of reoffending, and denies survivors timely justice (Hanson, 2022). The failure to process these kits efficiently also weakens the effectiveness of CODIS in linking offenders to crimes (Lovell et al., 2017). A key factor adding to the challenges within the criminal justice system's response to sexual violence is the backlog of SAKs, which significantly delays justice for survivors and impedes offender accountability (Nadolny et al., 2024). Furthermore, assessments of police departments' sexual assault units have revealed significant organizational and resource challenges that contribute to these delays, including gaps in investigative procedures and victim services (Strom et al., 2018).

When a survivor reports a sexual assault, forensic evidence plays a crucial role in identifying the suspect/offender and supporting the investigation. A SAK exam (Campbell et al., 2017). While SAK exams can aid

in identifying perpetrators, they can also be a traumatic experience for survivors. The input of this information into CODIS facilitates the identification of the perpetrator/offender through their DNA. One of the primary reasons for the backlog of SAKs was the absence of CODIS at the time, as it is a system that utilizes DNA collected from a SAK to identify offenders. The backlog of SAKs stems from additional numerous factors, including forensic labs' preference for testing only 'perfect' kits, which involve stranger assaults, biases among law enforcement and forensic personnel, and limited resources, funding, and staffing (Campbell et al., 2022). Additionally, challenges such as crime labs struggling to meet testing demands, improper storage conditions degrading DNA evidence, and thousands of untested kits discovered in inadequate facilities have further delayed forensic testing, prolonging case resolutions and undermining justice for survivors (Tofte, 2013; as cited in Campbell et al., 2017; Campbell et al., 2015; Dash et al., 2018).

The backlog of sexual assault kits (SAKs) is a national issue, between the years 2015-2023, 34 states here in America received funding from the SAK Initiative (SAKI Grant Sites, 2025). According to Strom and colleagues (2020), there were a minimum of 15 out of the 50 states in the US that had an extensive SAK backlog. The accumulation of untested SAKs has led to heightened public concern, prompting activists, advocates, and community members to demand systemic reforms in police and forensic laboratories to ensure the thorough testing and analysis of these backlogged kits in pursuit of justice and closure for the victim (Quinlan, 2020). As one of one of many major cities across the nation Memphis, TN discovered approximately 12,800 untested SAKs in various locations around the city in 2012. These cases ranged from 1970s to 2012 (McCutcheon and Stewart, 2024).

Sexual Assault Kit Database

The SAK backlog and the best practice standards from SAKI detail how creating a new database and tracking these data, emphasizing their critical importance. Despite their importance, these variables are often underexamined in broader research on sexual violence and sexual assault, leaving gaps in understanding offender behavior and survivor experiences. These data are not often available for analysis. While weapon type, weapon use, and relationship type are not commonly used as measures for the timeframe in question, this data is available in the National Incident-Based Reporting System (NIBRS), though with less detail than the SAK database. However, the limited scope of NIBRS highlights the need for a more detailed analysis of these factors, as they may influence investigative outcomes and justice efforts (BJS, 2022).

The need for a comprehensive and detailed analysis of sexual assault data is further emphasized by the challenges surrounding the availability and tracking of key variables such as weapon type, weapon use, and relationship type, which are often underexamined in broader sexual violence research (Dowd, 2020). Analyzing these data from Memphis can offer valuable insight into sexual assault crimes, particularly among a vulnerable population, survivors who have yet to obtain justice. Given the existence of this database, it is crucial to explore whether there is a correlation between the type of weapon used during an assault and the relationship type between the victim and the suspect/offender. These connections remain largely unexplored in existing literature, underscoring the need for focused research to determine their impact on case progression and legal outcomes. This data is usually not collected in detail for other types of sex crimes.

Traumatic events, such as sexual assaults, are violent experiences that no one should have to endure. However, these experiences can become even more distressing when the victim and the offender have a prior relationship or when the victim's life is threatened with a weapon. Research has shown that case outcomes are generally influenced by the victim-offender relationship, with

non-stranger assaults often being less likely to result in prosecution due to biases in legal decision-making (Spohn and Holleran, 2001). Additionally, weapon use in sexual assaults not only increases the risk of serious injury but it also affects case attrition, as cases involving weapons may be more likely to proceed due to the presence of tangible physical evidence (Hoffman et al., 2024). To better predict and prevent future assaults involving weapons, these data must be examined in depth. Specifically, understanding which weapons are more likely to be used in certain victim-offender relationships can provide valuable insights for researchers, law enforcement, victim advocates, forensic analysts, and policymakers. Improved notification and re-engagement strategies for survivors, particularly in cases involving weapon use, are essential to increasing case progression and reducing attrition (Schwartz, 2022). By analyzing these patterns, law enforcement can refine investigative strategies, victim advocates can offer more tailored support services, and policymakers can develop more effective prevention initiatives. Weapon type and weapon use are both critical to interpreting crime in the Memphis area, as they contribute to a deeper understanding of the lethality of different weapons and their impact on victim-offender dynamics.

This study explores the concept of relationship type, defining its role and importance in understanding sexual assaults, while highlighting that previous literature often focuses on only a limited range of relational dynamics (Lionaz et al., 2019). This researcher will also discuss the types of weapons previously investigated in prior literature and whether injuries are obtained during an assault, as well as exploring the types of injuries that occur during an assault both from weapons and from the suspect/offender. This analysis will first review existing literature on the victim-offender relational dynamics, weapon use, weapon type, and if an injury was obtained to establish a foundation for understanding these critical factors (Mourtgos et al., 2021). The research will then utilize data from the Memphis SAK backlog to analyze how weapon type, weapon use,

and victim-offender relationship intersect in reported assaults. By examining these variables, this study aims to identify patterns that could inform future investigative practices and contribute to a more comprehensive understanding of sexual violence.

Literature Review

This research will be expressing the importance of understanding the connection between relationship type and weapon use, as well as the specific type of weapon used during sexual assault. Also, tying in rational choice theory and the typology of rapists to highlight the uniqueness of each sexual assault case, as the intricacies within are more specific than the broad terms of "intra" and "extra" familial.

Relationship Type and Sexual Assault

This analysis will explore the types of relationships: familial, stranger, and friend/acquaintance along with their correlation to weapon use, weapon type, and injury. The familial category includes individuals related to the victim by either blood or marriage. The stranger category refers to individuals who had no prior interaction with the victim before the assault or those who were only loosely connected, such as a friend of a friend. The friend/acquaintance category includes authority figures, classmates, co-workers, neighbors, or roommates of the victim. Prior relationships between the victims and the suspect/offender build up expectations and layers of protections for the offender by the justice system, society, and even by the victim. Reluctance to report any victimization can be due to victim blaming, perception by victims that they will not be believed and/or the justice system is ineffective, perceptions that some experienced events are not serious enough, and fear of future attacks after reporting (Felson and Paré, 2005, p. 598-599). Victim blaming has been seen in our media and within our society for a long time, as it is the act of placing blame or criticism on the victim for the situation that

occurred, typically the sexual assault (Suvarna et al., 2020). Victim blaming is often influenced by the relational dynamics between the victim and the suspect/offender, as well as by pervasive misconceptions, such as the flawed notion that a victim's clothing or appearance justifies the perpetrator's actions. This contributes to the widespread fear of retaliation that victims may experience when considering reporting a sexual assault. The fear of retaliation is particularly prevalent when the suspect/offender and the victim live together or when the suspect/offender has access to the victim's home. Understanding the degree of intimacy within the relationship provides critical insight into the complexities of sexual assault cases. For example, cases involving familial relationships are less likely to be prosecuted but tend to be more violent (Felson & Paré, 2005, p. 599).

Bal and colleagues (2004) categorize familial relationship as intra-familial, meaning the victim and suspect/offender are related by blood or by marriage. A stranger relationship is classified as an extra-familial relationship, which highlights the bond that the victim and suspect/offender share whether as friends, coaches, neighbors, teachers, and more (Loinaz et al., 2019). Prior research lacks clarity in distinguishing between the familial and the stranger relationships, particularly in how these categories are operationalized. These labels are broad and at times useful, but often not specific enough to cover the complexities of these relationships. The use of "intra-familial" and "extra-familial" are not as descriptive, as these labels imply an inclusive definition that does not accurately reflect the victim's immediate or extended family. While previous literature extensively examines childhood sexual abuse, this focus, though essential, often overlooks a wide range of other forms of sexual assault that warrant recognition and investigation within scholarly discourse (Loinaz et al., 2019).

The classification of relationship type in sexual assault research has historically varied,

often depending on the available data and the specific framework used by the researchers. Prior studies have examined broad categories, such as intra-familial versus extra-familial abuse (Bal et al., 2004; Russell, 1983) or stranger versus acquaintance assaults (Koss and Dinero, 1988). These categories oversimplify the complexities of the relationships between the victim and the suspect/offender. Felson and Paré (2005) notes how nonstranger assaults, particularly those involving intimate partners or acquaintances, are less likely to be reported, which has further contributed to the gaps in research and in policy responses. The accessibility of data influences the conclusions drawn in sexual assault and sexual violence research; for instance, while some datasets provide granular details on relationship dynamics, others rely on general classifications that obscure key differences. The dataset utilized in this analysis presents a unique opportunity to analyze relationship type with a level of specificity that many researchers may not have access to, allowing for a more nuanced understanding of how relational dynamics influence victimization, reporting behaviors, and case outcomes. Given these distinctions, a new coding scheme for relationship type is crucial to more accurately reflect the nature of the victim-offender relationship. This will also ensure future research and policy interventions are grounded in comprehensive, complete, and precise data.

Weapon Use and Sexual Assault

One significant limitation of existing research is the lack of research on the specific types of weapons employed during sexual assaults, particularly in relation to the injuries inflicted during these incidents. Weapon is defined in several different ways throughout the legal systems, but a common description would be a tool that is created or adapted to cause physical harm (Brennan and Moore, 2009). Much of the previous literature on sexual assault tends to concentrate on issues such as Intimate Partner Violence, Domestic Violence, and the nature of injuries typically obtained during the assault which are typically obtained by the suspect/offender themselves.

However, recognizing the use of weapons during sexual assaults as a frequent occurrence represents a crucial shift in focus within the fields of criminology and criminal justice. Current literature on weapon use fails to differentiate between the carrying of weapons and violently using weapons in an array of scenarios (Brennan and Moore, 2009).

In urban areas like Memphis, where weapon-related violence is particularly prevalent, a more comprehensive examination of weapon use in sexual assault cases is warranted (Hoffman et al., 2024). Investigating the frequency and severity of weapon involvement in these crimes is essential to better understanding the risks posed to individuals in abusive relationships. The presence of weapons can significantly alter the dynamics of sexual assault often escalating the violence and increasing the likelihood of severe injury and death (Sacco, 2022). Additionally, gaining insight into the lethality of commonly used weapons can inform law enforcement strategies aimed at preventing further criminal activity and enhancing public safety (Dowd, 2020).

The type of weapon used during a sexual assault is deeply specific and influenced by a multitude of factors, including the relational dynamic between the victim and the suspect/offender. Research indicates that the type of weapon used can vary depending on the offender's prior experiences, relationship with the victim, and the situational context of the assault. For instance, stranger assaults are more likely to involve weapons like firearms and knives, which are often used to intimidate or garner control of the victim, whereas assaults within the familial or intimate relationships might involve more readily accessible objects, such as blunt objects or other household items (Dawson and Goodwill, 2013; Leclerc and Cale, 2015). The lethality of the weapon used plays an integral role in the severity of the assault, with firearms and knives being associated with higher rates of severe injury and fatalities (Brennan and Moore, 2009). This

suggests that the choice of weapon is not arbitrary, but a calculated decision influenced by both the offender's goals and the level of control and/or violence they wish to exert over the victim. The presence of weapons is not just a predictor of physical harm; it also has psychological implications for the victim, who may experience heightened fear and helplessness when faced with a weapon (Reid and Beauregard, 2017).

The relational dynamic between the victim and the suspect/offender strongly impacts weapon selection and the outcome of the assault. In cases involving intimate partners or familial relationships, where trust or familiarity is present, the choice of weapon may be less lethal, reflecting the offender's ability to exert control without necessarily escalating to fatal violence (Felson and Paré, 2005; Sorenson, 2017). However, when the victim and the offender are strangers, the weapon choice is often more lethal, with firearms and knives being commonly used to enforce compliance and increase the likelihood of completing the assault (Dawson and Goodwill, 2013; Leclerc and Cale, 2015). In such cases, the victim is often less able to resist, which increases the risk of severe injury or death. The level of violence also correlates with the intimacy and history of the relationship: assaults by strangers are typically more violent, and the use of weapons in these situations is often linked to the offender's intent to overpower and dominate the victim quickly (Reid and Beauregard, 2017). In contrast, assaults within familiar relationships may not only involve different weapon types but also a different dynamic of power, where the familiarity and trust between the victim and offender could influence the level of violence employed (Felson and Paré, 2005). Ultimately, the lethality of the weapon is intimately tied to both the offender's intentions and the nature of their relationship with the victim, which shapes the trajectory and outcomes of the assault.

Understanding weapon use in sexual assaults requires careful consideration of the

relational context between the victim and offender. The choice of weapon, whether it be a firearm, knife, or blunt object, not only reflects the severity of the violence but also points to the psychological and social dynamics at play during the sexual assault. In cases of stranger assaults, weapons tend to be more lethal, indicating the perpetrator's intent to quickly incapacitate the victim and increase control over the situation (Dawson and Goodwill, 2013; Reid and Beauregard, 2017). However, assaults within familial relationships may involve less lethal weapons but still have an impact on the victim's vulnerability and the nature of the assault. These relational dynamics, combined with weapon choice, are necessary for understanding the complexity of sexual violence and its outcomes, emphasizing the need for more nuanced research and responses from both law enforcement and victim support systems (Felson and Paré, 2005; Leclerc and Cale, 2015).

Association between Weapon Type, Relationship Type, and Injuries in Sexual Assault

The variables of weapon type and weapon use are integral to understanding the relational dynamics between victims and suspects/offenders. However, previous research often neglects to examine these variables in tandem, despite their interconnections (Felson and Paré, 2005). When a weapon is employed during a sexual assault, the suspect/offender typically seeks to induce fear and assert dominance to secure compliance from the victim (Leclerc and Cale, 2015). The specific type of weapon used, along with the degree of fear it elicits, varies depending on factors such as the identity of the individual wielding the weapon and their relationship to the victim (Schwartz, 2022). Studies indicate that weapons are not only used as tools of coercion but also influence the likelihood of physical injury (Bachman et al., 2002; Reid and Beauregard, 2017). Bachman and colleagues (2002) found that self-protective behaviors could either escalate or mitigate injury risks, depending on the circumstances of the assault. Incorporating the variable of relationship type further illustrates the interconnectedness of these factors, revealing how the dynamic between the

victim and offender may influence both the nature of the assault and the weapon's role (Ventus et al., 2017).

The role of weapons in sexual violence extends beyond mere physical coercion; it also affects psychological trauma and post-assault reporting behavior. Bennan and More (2009) emphasize that the presence of a weapon greatly impacts victim responses, often leading to heightened compliance due to fear of escalation. Moreover, the dynamics of weapon use vary based on whether the offender is an intimate partner or stranger. Koss and Dinero (1988) suggest that acquaintance rape scenarios may involve fewer weapons than stranger assaults, yet the psychological manipulation in these cases can be equally coercive.

This study aims to address the existing gap in the literature by analyzing the types of weapons used, and whether any injuries were inflicted during the assault, and the relational dynamics between the victim and the offenders in the sexual assault backlog dataset (Spohn and Holleran, 2001). By examining these variables, the research aims to enhance the understanding of how the nature of the relationship between the victim and the offender may influence the likelihood and intensity of weapon use during an assault, specifically within the Memphis and Shelby County areas (Bachman et al., 2002; Felson and Paré, 2005). Given the complexity of these relationships, it is essential that future research systematically examines these variables together, as the potential for vast analytical approaches, ranging from psychological to sociological perspectives, could yield a more comprehensive understanding of sexual assault dynamics (Leclerc and Cale, 2015). The backlog of the untested SAKs, as discussed by Quinlan (2020), underscores systemic challenges in addressing sexual violence cases, making it more imperative to explore the weapon-related dynamics in such assaults to inform policy and prevention strategies (Lovell et al., 2017).

Building on this analysis, examining the physical injuries sustained by the survivor/victim provides further insight into the role of weapons in shaping the nature and severity of the sexual assault (Riggs et al., 2000). Identifying the injuries a survivor/victim sustained during a sexual assault can give police and researchers a better understanding of how the incident played out, particularly in relation to weapon use and the tactics of coercion used by the suspect/offender (Bachman et al., 2002). The types of injury that may have occurred are gunshot wounds, stabbing wounds, head wounds/traumas, genital abrasions, tears, bruising, facial bruising, cuts, and more (Riggs et al., 2000). Understanding the types of injuries sustained during a sexual assault necessitates an examination of the weapons that were used during the incident (Palmer et al., 2004). Specifically, genital injuries, such as abrasions and tears, are commonly observed in cases involving violent sexual assaults, and the type of weapon used can directly influence these outcomes (Palmer et al., 2004).

Injuries can be caused by types of penetration or by type of weapon used during the assault, discovering the difference in type of injury can give law enforcement and researchers a better understanding of what types of weapons are being used most often and which ones are causing most harm. Injury to the genital areas can appear on both male and female victims (Palmer et al., 2004). These types of injuries come from types of penetration by genitals or foreign objects. In the figure below, it was categorized if the victim was injured during the attack with ‘yes’, ‘no’, and ‘unknown’. Determining whether a victim sustained any injuries within the dataset was found to be difficult, this is due to the incomplete sections of data.

Rational Choice Theory and The Typology of Rapists

Criminal psychologists and criminologists have developed typologies of rapists to categorize offenders based on their motivations, behaviors, and methods of assault (Simons,

2015). The typology of rapists offers a structured framework for understanding offender motivations, behavioral patterns, and victim-offender relationships, which are crucial for both investigating and rehabilitative approaches. According to the Office of Sex Offender Sentencing, Monitoring, Apprehending, Registering, and Tracking (SMART), rapists can be classified based on their degree of aggression, motivation, and the relational context of their offenses (Simons, 2015). One of the most recognized classifications differentiates between power-motivated rapists, anger-driven offenders, and sadistic offenders, each then demonstrating distinct interactional patterns with their victims. These classifications play a crucial role in determining the types of weapons used and the nature of the victim-offender relationship, further highlighting the calculated nature of sexual assaults.

Power-motivated rapists often exploit pre-existing relationships, whether they are based in an intimate, familial, or acquaintanceship nature, specifically using coercion rather than excessive violence to assert dominance over their victims. This typology aligns with offenders who may choose weapons that exert control without necessarily causing harm, such as knives, to reinforce their dominance while maintaining their victim's compliance (Beauregard et al., 2017). By contrast, anger-driven rapists, who typically attack strangers or casual acquaintances, act impulsively with heightened aggression, making them more likely to use weapons that inflict severe harm, such as blunt objects or firearms (Berger, 2000). Sadistic rapists, who derive pleasure from the suffering of their victims, often engage in prolonged assaults and use weapons not only as tools of control but also as instruments of torture, reinforcing the psychological and physical torment they inflict (Simons, 2015).

The typology of rapists provides insight into offender motivations, while Rational Choice Theory explains how these individuals make calculated decisions before and during an assault.

Different types of rapists, such as power-motivated or opportunistic offenders, may use weapons strategically to ensure victim compliance, minimize resistance, or heighten control (Simons, 2015). By applying Rational Choice Theory, it becomes clear that weapon use in sexual assaults is often a deliberate choice based on perceived risks, victim vulnerability, their previous relationship to the victim, and the offender's desired outcome. For example, an offender in a domestic violence situation may avoid using a weapon to reduce the likelihood of leaving forensic evidence, whereas a stranger rapist may rely on a firearm or knife to quickly subdue a victim in a public setting (Bachman et al., 1992). This demonstrates how rational decision-making influences not only the choice of weapon but also the level of force used and the overall strategy of assault.

Rational Choice Theory suggests that offenders make calculated decisions based on the perceived risks, rewards, and situational factors before committing a crime. In the context of sexual assault, this theory argues that offenders weigh the potential consequences, victim resistance, and likelihood of apprehension when selecting targets and methods of attack. Bachman and colleagues (1992) suggest that sexual offenders engage in a cost-benefit analysis, considering deterrence factors such as legal punishment and victim response. Similarly, Beauregard and colleagues (2007) apply Rational Choice Theory to serial sex offenders, demonstrating how they strategically plan assaults by selecting vulnerable victims and minimizing detection risk. This further suggests that offenders adjust their hunting process based on prior experiences, refining their methods to avoid capture. Additionally, they highlight how offenders may choose weapons that maximize compliance while limiting evidence, further reflecting the calculated nature of these crimes. Weapon use is an extension of this calculation, as offenders may use weapons to control victims, reduce resistance, or intimidate without escalating force unnecessarily (Gul, 2009). Pratt (2008) specifically highlights how crime control policies based on Rational Choice Theory aim to

increase deterrence, but Hayward (2007) critiques its limitations, arguing that cultural and emotional factors may override purely rational decision- making in violent crimes.

The relationship between rapist typology and weapon use illustrates how different rapists engage in risk-reward evaluation when selecting weapons and methods of attack. Power-reassurance rapists, for example, may avoid weapons, instead relying on psychological manipulation to gain compliance from their victims. In contrast, anger-driven rapists may impulsively resort to objects within their environment to inflict harm (Beauregard et al., 2007). Sadistic rapists may deliberately choose weapons that prolong suffering, thus, to continue to reinforce the psychological gratification (Simons, 2015). Rational choice theory, which underpins many crime control strategies, suggests that offenders engage in a cost-benefit analysis, weighing the potential rewards against the perceived risks of apprehension (Pratt, 2008). However, some scholars argue that this framework overlooks both cultural and emotional influences (Hayward, 2007). By integrating these offender typologies with rational choice theory, this analysis offers valuable insights into how sexual assault offenders make weapon-related decisions, taking into account their motivations, the nature of their relationship with the victim, and broader criminological theories.

Overview and Gaps in Literature

Analyzing the backlog of sexual assault kit (SAK) data provides an opportunity to examine detailed information regarding the types of weapons used, the nature of weapon-inflicted and assault-related injuries, and the relationship dynamics between victims and offenders. Research indicates that in cases of sexual assault, victims frequently sustain injuries caused by weapons employed during the incidents. The Department of Justice states that around half of all rape/sexual assault victims were uninjured by unarmed offenders. However, three

quarters of victims who were attacked by armed victims were injured (2003). The weapons used during these assaults are typically different types of firearms. However, not all injuries from these assaults are suffered from weapons but rather the assault itself. I hypothesize that 1) a familial relationship dynamic is correlated with a decreased likelihood of weapon use and 2) a stranger relationship dynamic is associated with an increased prevalence of weapon use.

Methodology

The current analysis uses a quantitative approach with the SAK data. The data was coded by Memphis Police Department (MPD) personnel and other organizations who were involved in the process of finding and logging all missing cases of the Sexual Assault Kit backlog. The effort to digitize all physical copies of the sexual assault kits required substantial resources and time. MPDs' analysts in the sex crimes unit entered data into several Microsoft Access files. All variables were then transferred and recoded in STATA 17 and Microsoft Excel by this author. This data consists of reports related to individual cases and any information pertaining to the SAK backlog. The total number of variables in the entire dataset are 144, these variables are wide ranging. This includes descriptive statistics about the victim and the suspect/offender, unique numbers to link each SAK to its case, specific information about the time and location of the incident, listed suspects, case notes from the officer on scene, District Attorney (DA) notes and decisions, and other important information pertaining to each case. For this analysis, only four variables were used, relationship type, weapon type, weapon use, and injury.

Variables

Each of the cases within the database were given unique identifiers to its corresponding SAK, which makes linking the case and the investigation easier. The database then underwent meticulous recoding for analytical purposes. This recoding consisted of examining and creating

new subcategories within the dataset to further breakdown the variable relationship type. For recoding these data for this study, the focus is on the four main categories: family, friend/acquaintance, stranger, and unknown. Within the dataset, some of the relationship types were explicitly stated so each of the four categories were broken down into nine different subtypes. These subtypes all come from information already within the dataset. This analysis will examine a total of four variables; relationship type, weapon used, weapon type, and injury type and how these variables relate to each other. The present study examines a vigorous sample (N=10,052) of cases between 1976 to the backlog's discovery, 2012.

When standardized data is utilized nationally, such as the backlog of SAK data, it is essential to implement consistent terminology when coding. This standardization ensures that all individuals engaging with these data can accurately interpret and analyze them to extract the most comprehensive insights.

Relationship type in this dataset, coded in a detailed but unorganized manner, has been recoded into two different columns to make it easier to understand. The first column includes the overall categories of 'Family', 'Friend/Acquaintance', 'Stranger', 'Missing', and 'Unknown'. The second column is the subcategories; there are an indefinite amount to specifically name; meaning, each category could have as few as 3 subcategories (stranger) or as many as nine (family). Recoding it this way makes it easier to interpret and to follow along with the data. It will also make it easier for those who will use this dataset to fully understand the complexities of relationship type and how there cannot be only two main categories without causing confusion. Though this system of recoding is far from perfect, it allows for the opportunity for this recoding to become a universal language. These specific recodings of relationship type are crucial when dealing with this type of data because the relationship types are more complex than being deemed

"intra" and "extra" familial.

Victim and CODIS Hit Suspect Race

The dataset represents the racial and sex demographics of both the victims and the CODIS-hit suspects identified within the backlogged SAKs from the Memphis area. As shown in Table 1 this data highlights that a majority of victims in these cases are female (95%), with a small percentage being male (5%). In contrast, nearly all suspects identified through CODIS hits are male (99%), with female suspects accounting for only (0.2%) of cases. Regarding racial demographics, individuals coded as Black constitute for the largest proportion of both victims (79%) and CODIS-hit suspects (92%), while individuals coded as White represent a small proportion at (19%) and (16%). The 'Other, Unknown/Missing' category accounts for only (1%) of both victims and CODIS-hit suspects. This data strictly reflects the cases with the SAK backlog and should not be generalized beyond this specific dataset. The overrepresentation of certain demographic groups, particularly Black victims and suspects may be influenced by a range of systemic, social, and reporting factors unique to the areas of Memphis and Shelby County. Understanding these variables specifically within the SAK backlog is imperative for contextualizing patterns of sexual assault and sexual violence, law enforcement practices, and broader societal influences on case processing and DNA evidence identification.

Table 1.

Variable	Victim	CODIS Hit Suspect
Black	79%	92%
White	19%	6%
Other, Unknown/Missing	1%	1%
Female	95%	0.2%
Male	5%	99%

Relationship Type

The investigators originally coded these data for tracking the cases and not focusing on the analysis. For these reasons, much time and effort were needed to repurpose the database for this analysis. Exploring these variables, specifically relationship and weapon type, allows for an expansion of knowledge within the realm of understanding the connection between the types of relations and weapons used during sexual assaults here in Memphis, Tennessee. For this study, there are four categories (not including the missing cases) that are developed for the different types of relationships between the suspect/offender and the victim. In order of frequency of occurrence for the backlog in Memphis, the categories of types of relationships are featured in the table below.

These variables are recoded to ensure the categories are easy to follow and understand the patterns within it. There are certain standards that must be met for a suspect/offender to be placed into a category. Other relationship types could be where neither the victim nor the suspect/offender knows each other (stranger), another could be where they share mutual friends, but they do not know each other well (known to close friend/acquaintance). A relationship

between the victim and the suspect/offender could also overlap with another relationship they already share. An example of that could be where they have a familial relationship but also could have previously been intimate, is one such example. Each category has a subset of labels of the types of "relationship" or lack thereof, to be placed into this category of familial relationship would have to be current/former spouse, current/former boyfriend/girlfriend, parent/step/grand/foster, aunt/uncle, niece/nephew/cousin, sibling/step/in-law/foster, current/former intimate partner, and child/grandchild. To fall under the stranger category the relationship would be portrayed as a blind date, online, or common friend/acquaintance. The total number of cases that are categorized into Family is (n=2,171). Within this paper, only three of these categories will be explored; family, stranger, and friend/acquaintance.

The totals of each type of relationship are seen in the figure below. All three categories total to (n=9,411) cases with a specified relationship type between the victim and the suspect/offender. The rest of the cases are either unspecified or where the data was not logged was (n=226).

Table 2.

Relationship Types	
Type	**Count**
Familial	2171
Stranger	3539
Friend/Acquaintance	3701
Unknown	416

Table 3 explores the relationship between the victim's race and relationship type in the SAK backlog. The dataset categorizes victims into racial groups, namely Asian, Unknown, Hispanic, Missing, White, and Black, while also classifying the victim-offender relationship into five distinct categories: Family, Friend/Acquaintance, Stranger, Missing, and Unknown. The frequency and percentage distributions within each category provide insight into patterns of

victimization across racial groups.

The results shown in Table 3 indicate that in familial homicides, Black victims constitute the highest proportion (78.2%), followed by White victims (16.6%), while Hispanic (1.0%), Asian (0.0%), and Unknown (0.4%) victims account for significantly smaller proportions. Similarly, in cases where the offender was a friend or acquaintance, Black victims again represent the majority (77.0%), with White victims comprising 18.8 percent, and Hispanic, Asian, and Unknown victims each representing less than 1% of cases. A comparable trend is observed in sexual assaults involving strangers, where Black victims makeup 77.1% of cases, followed by White victims at 18.1%. The dataset also includes cases where the relationship is recorded as Missing or Unknown. Within these categories, Black victims continue to form the largest proportion (75.7% and 72.8%, respectively), with White victims following at 16.4 percent and 18.6 percent. Hispanic victims in these categories are present at slightly higher percentages than in other categories, at 1.8% and 2.4% respectively.

This data suggests a strong association between race and victim-offender relationships, with Black victims being overrepresented across all relationship categories. White victims consistently form the second-largest group, while Hispanic, Asian, and Unknown victims exhibit substantially lower representation. These findings indicate potential racial disparities in victim-offender interactions that warrant further investigation into socioeconomic, demographic, and systemic factors contributing to these trends. These data are significant based on χ^2 (20, 10052) = 69.636, $p < .001$, highlighting the disproportionate representation of Black victims across different relational contexts.

Table 3.

Relationship Type	Asian	Unknown	Hispanic	Missing	White	Black	Total
Family	1 (0.0%)	9 (0.4%)	21 (1.0%)	81 (3.7%)	361 (16.6%)	1698 (78.2%)	2171 (100%)
Friend/Acquaintance	10 (0.3%)	13 (0.4%)	16 (0.4%)	118 (3.2%)	694 (18.8%)	2850 (77.0%)	3701 (100%)
Stranger	9 (0.3%)	13 (0.4%)	62 (1.8%)	86 (2.4%)	639 (18.1%)	2730 (77.1%)	3539 (100%)
Missing	0 (0.0%)	0 (0.0%)	4 (1.8%)	14 (6.2%)	37 (16.4%)	171 (75.7%)	226 (100%)
Unknown	1 (0.2%)	1 (0.2%)	10 (2.4%)	24 (5.8%)	77 (18.6%)	302 (72.8%)	415 (100%)

Table 4 displays how each relationship type was then broken down into several subtypes. The subtypes of the relationship types are listed and counted in the following three figures below, the total is (n=2,132). There are (n=39) cases where the familial relationship type was not specified, meaning that no detailed information was given regarding the victim-offender relationship. This is primarily due to the challenges posed by underreporting and the presence of incomplete data. Within this dataset, there are (n=4059) cases where the victim was under the age of 18 years old. The subtype 'Multiple' means the relationship between the victim and suspect/offender are connected in more than one relationship. An example of this would be a victim and suspect/offender having both relations 'Stepsibling' and a 'Current/former boyfriend/girlfriend'.

Table 4.

Familial Relationship Subtypes			
Subtype	**Count**	**Subtype**	**Count**
Current/Former Intimate Partner	971	Current/Former Boyfriend/Girlfriend	102
Parent/Step/Grand/Foster	346	Current/Former Spouse	72
Niece/Nephew/Cousin	276	Multiple	15
Sibling/In-Law/Half/Step/Foster	173	Child/Grandchild/Foster	5
Aunt/Uncle	172		

The stranger relationship was broken down into three categories; blind date (n=1), online (n=1), and common friend/acquaintance (n=4), these total (n=6). This leaves the rest of the (n=3,533) cases of stranger relationships to be categorized as unspecified. When investigating this relationship within the dataset, it was found that the relationship between victim and the suspect/offender was never stated or was simply stated as a true stranger relationship where neither individual knew each other prior to the incident.

The friend/acquaintance relationship type was broken down into seven subcategories, Table 5 only shows five, the other two had less than 10 cases each so they were not included in the graphic. Cell mate contained (n=3) cases and current/former Pimp contained (n=5) cases. The subtype 'Authority' includes instructors, clergy, employers, coaches, and more. The subtype 'Known to Close Friend/Acquaintance' includes parent's intimate, sibling's intimate, grandparent's intimate, and more. There were (n=665) cases with a specific subtype of relationship. There were (n=3,036) cases where no subtype was specific.

Table 5.

Friend/Acquaintance Relationship Subtypes	
Subtype	**Count**
Caregiver/Babysitter	11
Authority	27
Classmate/Co-Worker (former)	80
Neighbor/Roommate	204
Known to Close Friend/Acquaintance	335

Weapon Used and Type

The data within this set was recoded to gather a better understanding of what types of weapons are used during sexual assaults in the Midsouth. The original coding of 'Weapon Used' was coded by the officers and investigators assigned to this data and it was coded in terms of 0s and 1s. Zero meaning that no weapon was used during the assault and one meaning that there was

a weapon used during the assault. In the figure below, the count of 'No' is (n=6505) and 'Yes' is (n=3547), the total number of cases is 10,052.

Table 6.

Weapon Used	
Yes/No	**Count**
Yes	3547
No	6505

The original coding of 'Weapon Type' has different variations of 'gun', 'knife', 'ice pick', 'extension cord', 'hands and feet', 'machete', 'screwdriver', 'physical force', 'shotgun', and more. To make this coding easier to interpret and to understand the patterns, it was recoded into eight categories. Three categories were then chosen to investigate, these include 'firearm', 'personal weapon', and 'weapon of laceration'. Each new category holds both specified and unspecified items that correspond with the label of the group of weapons. Table 7 below shows the total of each of the three categories is (n=3,438) which leaves (n=6,614) cases to either be classified as a different type of weapon or that no weapon was used during the assault.

Table 7.

Weapon Type and Count			
Weapon of Laceration	**Count**	**Firearm**	**Count**
Scissors	11	Pistol	14
Box Cutter	25	Handgun	22
Knife	805	Gun	1335

Table 7 displays both 'Firearm' and 'Weapon of Laceration' along with the count of how many times a certain item was used within an assault. There were a total of ten sub types of weapons used, however since five of the types of weapons were less than 10, they did not make

the chart. These weapons were BB Guns (n=2), broken glass (n=3), pocket knives (n=4), Revolvers (n=7), and razors (n=9). However, these two categories are not the only weapons being examined in this analysis, the other category of weapons is 'Personal Weapon' that totals to (n=1246). There is no subtype for this category, this is because everything was previously labeled as 'physical force', 'hands/feet', and 'physical'.

Victim Injury

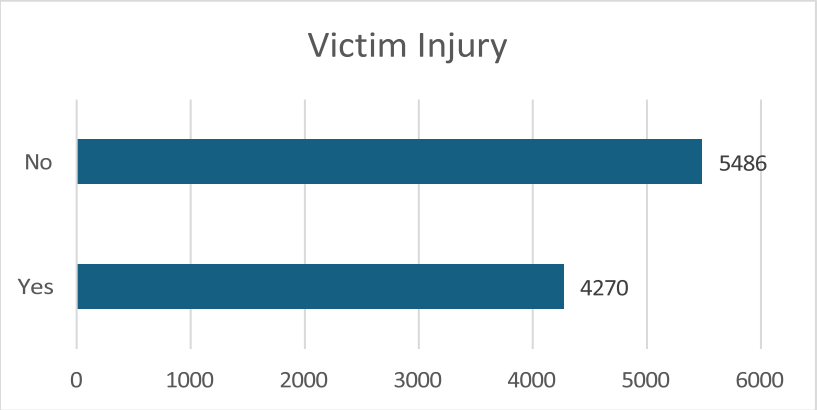

Figure 1.

In Figure 1, the count of whether the victim was injured during the assault. This data was coded as 'yes' if the victims obtained any injuries during the sexual assault, and 'no' if the victim was not injured during the assault. Victims who reported they were not injured totaled to (n=5486) cases, while victims who reported they were injured were (n=4270). This means that there were (n=296) cases where injuries were either not reported or were not input into the initial investigative report.

Investigating injury data can help law enforcement gather a better understanding of the use of weapons, the amount of danger the weapons possess and how sexual assault injuries vary. Knowing this means there is room for programs and policies to be put into place regarding weapons and their availability throughout the city of Memphis.

Analytical Strategy

Below are the five categories of relationship types that can be seen between the victim and the suspect/offender; this table shows the numbers of whether a weapon was used or not. This data was recoded in SPSS to make it easier for the system to understand the general categories and the subcategories, 'Family' was coded as 1, 'Friend/Acquaintance' was coded as 2, 'Stranger' as 3, 'Missing' as 4, and 'Unknown' as 5. The category 'Missing' contains all the cases where there was no distinction of the relational type between the suspect/offender and the victim. The category 'Unknown' contains the cases where whomever filled out the report labeled the relationship between the victim and the suspect/offender as 'unknown'.

Results

Table 8 shows the correlation between the count of relationship types and the count of whether a weapon was used during a sexual assault. The percent of familial relationship cases where a weapon was not used was 67.9, which means that over half of the cases where the relationship was labeled as family there was no weapon used during the assault. This leaves about 32 percent of cases where the familial relationship reported that a weapon was used. The friend/acquaintance relationship percent of cases where there was no weapon used was 58.7, while 41.3 percent of the friend/acquaintance relationship used a weapon during the incident. 69.2 percent of the stranger relationship cases had no weapon used during the assault and 30.8 percent where a weapon was used. The categories 'Missing' and 'Unknown' are included in the table because they are critical components in the understanding of the relational dynamics between the victim and the suspect/offender and how information is easily lost or unobtained in times of crisis. These findings are statistically significant based on χ^2 (4, 10052) = 123.93, p <.001, demonstrating a clear relationship between weapon use and the type of relationship between the victim and offender.

Table 8.

Relationship Type	Count of Weapon Not Used	Count of Weapon Used	Total
Family	1474 (67.9%)	697 (32.1%)	2171 (100%)
Friend/Acquaintance	2172 (58.7%)	1529 (41.3%)	3701 (100%)
Stranger	2448 (69.2%)	1091 (30.8%)	3539 (100%)
Missing	155 (68.9%)	71 (31.4%)	226 (100%)
Unknown	316 (76.1%)	99 (23.9%)	415 (100%)

Table 8 shows a chart of the counts of 'Weapon Used' and 'Relationship Recode'. In the table above, the categories of the relationship types were separated into 5 numbers and those are the categories listed below. This chart demonstrates that within the 'Friend/Acquaintance' more weapons were used in a sexual assault. This does not support the ideas within the hypothesis that weapons are used more in a 'Stranger' relationship. Within this chart, we see that weapons were not used the most within the 'Stranger' relationship, which also does not support the other hypothesis that the 'Familial' relationship used no weapons during an assault. Below is Figure 2, shows the numbers of weapon used and weapon not used within each specific relationship type side by side in order to give a better understanding of Table 8.

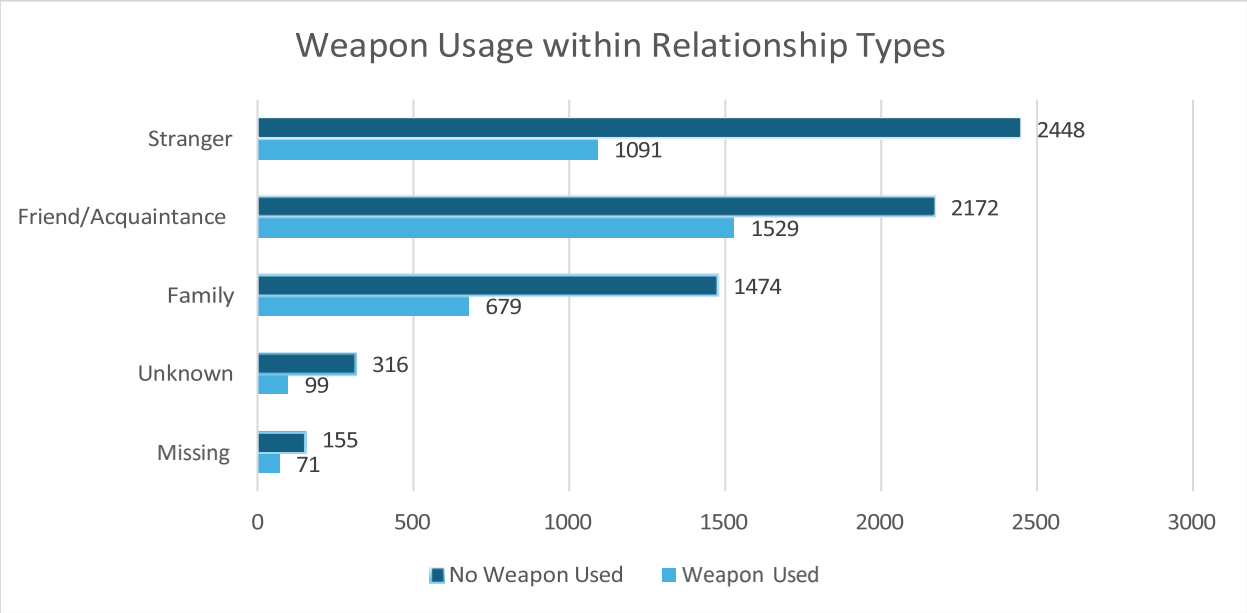

Figure 2.

Table 9 illustrates both subtypes of the familial relationship type and the count of whether a weapon was used or not during a sexual assault. 'Current/Former Intimate Partner' is the largest subtype with a total of 1073 cases total, where 66.7 percent of cases reported no weapon was used, and 33.3 percent of cases reported a weapon was used during the assault. 'Parents/Step/Grand/Foster' is the second largest subtype with 346 total cases. In 67.9 percent of cases, no weapon was reported, while 32.4% of cases involved the use of a weapon during the incident. The subcategory 'Niece/Nephew/Cousin' has a total of 276 cases and 71.7 percent reported no weapon was used. A weapon was used in 26.6 percent of these cases. The subcategory 'Sibling/In-Law/Half/Step' has a total of 173 cases. A weapon was not used in 73.4 percent of the cases and a weapon was used in 26.6 percent of the cases. 'Aunt/Uncle' has a total of 172 cases; 69.8 percent reported no weapon was used and 30.2 percent reported that a weapon was used during the assault. Within this subcategory there were 35.5 percent of cases reported where a weapon was used during an assault. The subtype 'Current/Former Spouse' has a total of

72 cases, and 49.1 percent reported no weapon use during an assault, while 35.5 percent reported a weapon was used during an assault. The subcategory 'Child/Grandchild/Foster' has a total 5 cases, 20 percent reported no weapon used, and 80 percent reported that a weapon was used during an assault. This subtype is not shown in the table since there are less than 10 cases total, this ensures consistency across all tables and charts. The last subtype category is 'Multiple', there are 15 cases total. 60 percent reported no weapon was used during an assault and 40 percent reported that a weapon was used during an assault. Table 9 demonstrates, although the category of the 'familial' relationship has a lower amount of weapons used than both 'stranger' and 'friend/acquaintance', weapon use is seemingly more prevalent in relationships where violence in the home might also be taking place.

Table 9.

Subtype of Familial Relationship	**Count of Weapon Not Used**	**Count of Weapon Used**	**Total**
Current/Former Intimate Partner	716 (66.7%)	357 (33.3%)	1073 (100%)
Current/Former Spouse	43 (49.1%)	29 (22.9%)	72 (100%)
Parents/Step/Grand/Foster	234 (67.6%)	112 (32.4%)	346 (100%)
Aunt/Uncle	120 (69.8%)	52 (30.2%)	172 (100%)
Sibling/In-Law/Half/Step	127 (73.4%)	46 (26.6%)	173 (100%)
Niece/Nephew/Cousin	198 (71.7%)	78 (28.3%)	276 (100%)
Multiple	9 (60%)	6 (40%)	15 (100%)

Below, Table 10 shows the subtypes for the 'Friend/Acquaintance' relationship type. The 'Authority' relationship type had a total of 27 cases where 59.3 percent of cases showed no weapon was used during an assault, while 40.7 percent showed that a weapon was used during the assault. The 'Caregiver/Babysitter' subtype had a total of 11 cases, with 72.7 percent of cases displayed no weapon was used and 27.3 percent reported a weapon was used. The subtype 'Cellmate' had a total of 3 cases, 66.7 percent reported no weapon was used during the assault and

33.3 percent reported that a weapon was used during an assault. The subtype 'Current/Former Pimp' had a total of 5 cases, 60 percent displayed no weapon use, while 40 percent reported weapon use during an assault. The two subtypes 'Cellmate' and 'Current/Former Pimp' are not included in the table since there are less than 10 cases total, this is to have consistency and accuracy across these tables. The subtype 'Current/Former Classmate/Co-Worker' had a total of 80 cases, about 71 percent reported there was no weapon used during the assault and about 28 percent reported a weapon was used during an assault.

There was a total of 204 cases in the 'Neighbor/Roommate' subtype. 37.2 percent reported a weapon was used during an assault, while 61.8 percent reported there was no weapon used during the assault. The largest subtype of this category is 'Known to Close Friend/Acquaintance' which had a total of 335 cases. 65.1 percent reported no weapon was used and 34.9 percent reported that a weapon was used during an assault.

Table 10.

Subtype of Friend/Acquaintance Relationship	**Count of Weapon Not Used**	**Count of Weapon Used**	**Total**
Authority	16 (59.3%)	11 (40.7%)	27 (100%)
Caregiver/Babysitter	8 (72.7%)	3 (27.3%)	11 (100%)
Current/Former Classmate/Co-Worker	57 (71.3%)	23 (28.7%)	80 (100%)
Neighbor/Roommate	126 (61.8%)	78 (38.2%)	204 (100%)
Known to Close Friend/Acquaintance	218 (65.1%)	117 (34.9%)	335 (100%)

Discussion

The analysis of the Sexual Assault Kit (SAK) backlog data has provided a substantial opportunity to investigate the relational dynamics between victims and suspects/offenders, a crucial aspect often underexplored in the existing literature. By examining the type of weapon

used and the presence of weapon use during sexual assaults in relation to the victim and the suspect/offender relationship, this study offers a deeper understanding of how these variables interact in incidents of sexual violence. Understanding the role that weapon type plays in the dynamics of sexual assault, particularly in relation to the victim-offender connection, is essential for developing more effective prevention strategies. The relationship between the victim and the suspect/offender may influence the nature of the assault, including the likelihood of weapon use, which has important implications for both policy and intervention efforts. As such, further research into these relational factors and their impact on weapon usage is necessary to build a more comprehensive framework for addressing and preventing sexual violence. This study's findings highlight the importance of examining these factors in a localized context, with specific attention to the Memphis area, where relational dynamics appear to have a significant bearing on weapon-related assaults.

The SAK backlog data further revealed that a variety of weapon types were used during these assaults, with firearms, weapons of laceration, and personal weapons being the most frequently employed in the Memphis area. These findings highlight the need for a nuanced approach when analyzing sexual assaults, as different weapons may evoke varying levels of fear, compliance, and victim resistance, depending on the relational context. The identification of these three primary weapon categories provides valuable insight into how specific weapons may be linked to certain types of victim-offender relationships, and how such knowledge can inform both prevention efforts and criminal justice practices. By focusing on the specific context of Memphis, this research offers an opportunity to understand how local dynamics and cultural factors may influence the use of weapons in sexual assault cases. This study encourages further exploration into the role of relationship type and weapon use, recommending that a more comprehensive analyses should be conducted to illuminate the complex and multifaceted nature of sexual violence

and sexual assault. Future research should aim to integrate these relational and weapon-related factors to develop more targeted interventions and preventative measures, contributing to a broader understanding of the mechanisms underlying sexual assault and its prevention.

The findings of this study highlight the complex interconnections between weapon use, relationship type, and injury outcomes in sexual assaults, reinforcing the necessity of a more complete understanding of these variables within criminal justice research. The SAK backlog has long hindered investigations, delaying justice for survivors and impeding efforts to hold offenders accountable (Campbell et al., 2017). However, by analyzing these data, this research underscores key patterns regarding how sexual assaults unfold, particularly in relation to the typology of offenders and their decision-making processes. Findings indicate that the choice of weapon in an assault is not random but rather a calculated decision influenced by the offender's relationship with the victim and their perceived risk of apprehension (Reid & Beauregard, 2017). This aligns with rational choice theory, which suggests that offenders weigh the risks and benefits of their actions before committing a crime (Cornish & Clarke, 1986). Specifically, offenders who use weapons in sexual assaults often do so to gain compliance, assert dominance, and mitigate resistance, particularly in cases involving strangers or weaker social ties (Dawson & Goodwill, 2013; Leclerc & Cale, 2015).

The typology of rapists, particularly those identified in the literature as opportunistic, power-reassurance, power-assertive, and sadistic offenders, also provides a theoretical lens through which to interpret the findings (Simons, 2015). Opportunistic offenders, driven by situational factors, may be less likely to use weapons, particularly in acquaintance or intimate partner assaults where coercion and manipulation are more effective than overt force (Koss & Dinero, 1988). However, power-assertive offenders, who seek to dominate and control their

victims, may be more inclined to use weapons to enforce submission, particularly in stranger assaults where physical intimidation is necessary to overcome victim resistance (Felson and Paré, 2005). The presence of weapons in these cases is not only an instrument of physical control but also a psychological tool, instilling fear to prevent the victim from seeking help or reporting the assault (Sorenson, 2017). This distinction is crucial, as it highlights how weapon use varies by offender type, which in turn affects the level of violence and injury sustained by victims (Reid and Beauregard, 2017).

Furthermore, rational choice theory helps contextualize the offender's decision-making process regarding weapon selection and victim targeting. This theory posits that offenders make calculated choices to minimize the likelihood of detection and maximize the probability of completing their assault (Cornish and Clarke, 1986). This is particularly evident in the way weapons are used differently depending on the victim-offender relationship. For example, in cases where the victim and offender have a prior relationship, the offender may rely on coercion rather than overt force, knowing that social and psychological barriers may prevent the victim from reporting (Felson and Paré, 2005). Conversely, in stranger assaults, offenders may be more likely to use weapons to quickly subdue victims and reduce the risk of escape or intervention (Dawson and Goodwill, 2013). This pattern reinforces the importance of analyzing weapon use within the context of victim-offender dynamics, as it provides insight into offender motivations and behaviors that are not captured in traditional crime statistics alone. Friend/Acquaintance relationship types typically fall under the Power-reassurance type of rapist, which are known for not using weapons often. Contrast to previous knowledge, the findings within the data drawn from this analysis, rapists who fall into the friend/acquaintance category are more likely to use a weapon to subdue their victims.

These findings also emphasize the importance of considering how weapon use and relationship type influence case outcomes. Research has shown that cases involving weapons, particularly firearms, are more likely to result in serious injuries or fatalities, which can impact both the victim's willingness to report and law enforcement's likelihood of prioritizing the case (Brennan and Moore, 2009; Sorenson, 2017). Additionally, the legal system often treats stranger rapes with greater urgency and legitimacy compared to assaults involving known offenders, reinforcing biases that shape investigative and prosecutorial decisions (Alderden et al., 2021). These disparities highlight the need for improved investigative frameworks that account for the complexities of weapon use and relationship dynamics, ensuring that all survivors receive equitable treatment within the justice system.

The findings of this study also reinforce the need for a more comprehensive approach to understanding sexual violence, one that integrates offender typologies, rational choice theory, and empirical data from sexual assault kits. The backlog of untested kits represents a critical gap in justice, but it also provides an opportunity to analyze patterns that might otherwise go unnoticed. By incorporating theoretical frameworks into this analysis, this study offers a deeper understanding of how offenders make decisions, how weapon use impacts assault severity, and how victim-offender relationships shape both the crime itself and its aftermath. Future research should continue to explore these dynamics, particularly in jurisdictions with different backlog processing approaches, to further refine our understanding of sexual assault patterns and improve policy responses.

Limitations and Future Directions

This study's focus on the Memphis area and its reliance on the SAK backlog data presents several limitations. First, the geographic scope restricts the findings to a localized context, which

may not be applicable to other regions with different social, cultural, or legal dynamics. The relational factors influencing weapon use in sexual assault cases could vary greatly across different areas, and future studies should expand the analysis to multiple regions, both nationally and internationally, to explore how geographic and cultural differences impact weapon use in sexual assaults. The SAK backlog, which includes untested kits, presents a challenge in terms of timeliness and relevance. The backlog causes significant delays in investigations, which can impact the overall findings, as critical evidence such as weapon types and victim-offender relationships may not be fully captured or processed in a timely manner (Campbell et al., 2017). Future research should aim to explore how these delays affect case outcomes and justice for survivors. Incorporating data from a variety of jurisdictions with differing approaches to SAK testing would further illuminate potential discrepancies in how weapon-related assaults are handled and processed in the justice system (Lovell et al., 2017). There are two general areas of limitations within the current analysis, methodologically and substantively.

Methodological Limitations

One key limitation of this study is the geographic scope, as the data analyzed is specific to the Memphis Sexual Assault Kit (SAK) backlog. While these findings provide valuable insight into the relationships between relationship type, weapon use, weapon type, and injury, they may not be fully representative of patterns across the entire state of Tennessee. Differences in law enforcement practices, forensic processing, and victim reporting behaviors across counties could impact how these variables interact. Future research should expand the scope to compare SAK backlog backlog data from other Tennessee counties to determine whether similar trends emerge. A broader statewide analysis would help assess whether the patterns observed in Shelby County are unique to this jurisdiction or reflection of statewide trends, ultimately providing a more comprehensive understanding of sexual assault case characteristics across Tennessee.

A significant limitation in this analysis is the presence of gaps in the dataset, particularly in relation to incomplete or missing information in the original paperwork. These gaps can arise for a multitude of reasons, such as insufficient documentation by the original officers or procedural inconsistencies. This issue is amplified by the fact that the data has been transferred between several different systems over the years, beginning with manual entries in STATA 17 by various individuals. These multiple data migrations can lead to loss or misplacement of specific details, which can affect the accuracy and completeness of the data, particularly regarding weapon use and the classification of victim-offender relationships. These inconsistencies highlight the challenges of using historical data for analysis and the importance of ensuring accurate and complete documentation during initial investigations. Future research would benefit from examining how these data gaps impact the findings and exploring strategies to improve the consistency and completeness of data collected by law enforcement agencies (Campbell et al., 2017). Furthermore, future studies should investigate methods for better integrating and standardizing data across different systems to reduce the risk of incomplete or inconsistent data.

Another limitation of this study is the use of a proxy measure to analyze the relationship between weapon use, weapon type, relationship type, and injury in sexual assault cases within the Memphis SAK backlog. A comprehensive understanding of these factors would include firsthand accounts from offenders themselves to provide insight into their decision-making processes, motivations, and the use of force during the assaults. However, due to the nature of this research and what data was made available to us within the dataset, direct offender narratives were unavailable, and this study relied exclusively on case file data. This dataset includes law enforcement reports, forensic records, and coded variables, to examine these patterns. While these records provide valuable information, they are inherently limited in capturing offender intent, situational context, and psychological reasoning behind the why, weapon use, and injury infliction.

Future research should investigate victim deaths during sexual assaults, as the lethality of weapons used in these crimes is often overlooked. While studies frequently examine weapon presence in sexual violence cases, limited attention has been given to how specific weapon types contribute to fatal outcomes. Additionally, the role of relationship dynamics between the victim and perpetrator in weapon use and lethality remains underexplored. Understanding how weapon use, weapon type, and relationship type intersect in cases of fatal sexual violence is crucial for improving investigative strategies, risk assessments, and policy interventions aimed at preventing these severe outcomes.

Future research could address this limitation by incorporating mixed methods or qualitative approaches, such as offender interviews, or survey-based research with convicted sexual offenders, to gain deeper insight into their perspectives on weapon use and victim injury. Additionally, integrating investigative narratives, sentencing transcripts, or probation/parole reports could also provide a more complete understanding of these dynamics. A qualitative component would allow researchers to explore why certain offenders choose to use weapons, how they perceive victim resistance, and whether their previous/current relationship to the victim has any influence on their behavior and their choices. While this study's reliance on proxy measures was a necessary methodological choice, future research using direct offender data could help further develop more effective intervention, prevention, and risk assessment strategies for cases of sexual violence and sexual assault.

Substantive Limitations

Additionally, the categorization of victim-offender relationships in this study, while valuable, may oversimplify the complexity of these interpersonal dynamics. For example, classifying relationships as "acquaintances" or "family" might not fully capture the varying

degrees of emotional manipulation or coercion that influence weapon use during the assault. Research has shown that in cases where the offender and victim have a pre-existing relationship, psychological manipulation and coercion can play a significant role in the victim's compliance, potentially reducing the need for weapons (Koss and Dinero, 1988). Studies that refine these relationship classifications, potentially distinguishing between different levels of acquaintance or familial ties, could provide more precise insights into how these dynamics shape weapon-related assaults. Additionally, a more in-depth analysis of how race, gender, and other sociodemographic factors interact with weapon use and relationship types could provide a more nuanced understanding of these factors' intersectional impacts (Reid and Beauregard, 2017; Felson and Paré, 2005). This approach could help researchers and law enforcement better understand the relational and situational factors that impact the use of firearms, laceration tools, or personal weapons, as seen in the Memphis data. An intersectional analysis would address gaps in the literature regarding how different demographic variables influence weapon use, aligning with previous studies that suggest a need for a broader approach in sexual violence research (Dawson and Goodwill, 2013).

Future research should prioritize expanding the scope of data collection to include more comprehensive records on weapon use, injury outcomes, and victim-offender relationship dynamics. Given the varied ways that weapons are employed in sexual assaults based on the relational context, such as the use of firearms in stranger assaults versus psychological coercion in familial or intimate partner cases, researchers should explore these patterns across broader populations (Beauregard et al., 2007; Dawson and Goodwill, 2013). Integrating offender typologies, such as power-assertive or opportunistic offenders, could help refine the understanding of how weapon use varies according to offender motivations and the perceived risks of apprehension (Reid and Beauregard, 2017). Additionally, a longitudinal analysis of how

weapon use and relationship type influence case progression and survivor outcomes over time would provide valuable insights into the long-term impacts of these factors. This could also inform law enforcement practices, highlighting areas where interventions and prevention strategies could be most effectively targeted, especially in cases where relational dynamics play a key role in weapon-related assaults (Sorenson, 2017). By broadening the scope and integrating offender typologies with victim-offender relational dynamics, future research could offer more comprehensive strategies for addressing and preventing sexual violence.

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