15

HOMICIDE AND CRIMINAL CAREERS

An Empirical Study on Serial Murderers

Gian Maria Campedelli and Maria R. D'Orsogna

Introduction

Serial murderers continue to fascinate the American public. Countless hours of news reports, true-crime documentaries and even biopics have turned some of the perpetrators into household names, with distinctive modus operandi. Why these figures and their actions continue to garner so much attention, sometimes decades after the facts, has become the focus of socio-cultural investigation itself (Dietz, 1986; Vicary & Fraley, 2010; Harrison & Frederick, 2022). Theories include the human evolutionary instinct to recognize and avoid danger, resulting in morbid curiosity and protective vigilance, and commodification of the genre by the entertainment industry and the 24-hour news cycle (Scrivner, 2021; Harrison, 2023). Despite the highly charged emotions they elicit, multiple homicides perpetuated by a single person in different spatio-temporal settings are rare occurrences; some studies estimate the number of murders committed by serial killers to be 1% of the total (Fox & Levin, 1999). Furthermore, after having peaked in the 1970s and 1980s, the number of currently active serial killers in the United States is on the decline (Yaksic et al., 2019). None of this has diminished the allure of the serial murderer in the public's collective imagination and on its screens.

Research-wise, a full understanding of serial killing and why certain people murder again and again while others do not, given similar upbringings and socio-economic conditions, remains elusive. Indeed, serial killing is a complex phenomenon whose comprehension requires integrating elements from criminology, sociology and psychology, among other disciplines. Criminal justice agencies often limit the information they share with the public or with other agencies because of investigative or privacy concerns.

 DOI: 10.4324/9781003399476-18

Due to the rarity of serial murder, professionals working on a specific case may have ample experience of a single perpetrator's motives and actions, but their knowledge may not generalize to other situations. In addition, there are many subgroups of multiple homicide offenders (MHOs, serial killers but also mass or spree murderers) that do not always allow for unambiguous categorizations, making it difficult to even establish a working definition of serial murder (Egger, 1984; Holmes & Holmes, 1998; Ferguson et al., 2003; Morton, 2005). As a result, for a long time, serial killing remained a relatively understudied subject, with mostly speculative essays based on anecdotes or case studies of single offenders (Ressler et al., 1986; Fox & Levin, 1998, 2005). Attempts at profiling serial murders outlined various possible characteristics such as psychotic tendencies, hatred of prostitutes or young women, hedonism, desire for control (Holmes, 1985; Taylor et al., 2012).

In recent years, there have been increased efforts to dispel the many myths created by media portrayals and toward a more systematic study of serial murder using quantitative approaches (DeLisi & Scherer, 2006). Great emphasis has been placed on identifying motivations, victim selection, patterns and behaviors of killers (Myers et al., 2006; Schlesinger et al., 2010; Miller, 2014; James & Proulx, 2016), as well as any psychological disorders, early childhood experiences, personality or demographic traits that may have contributed to the development of murderous tendencies (Schlesinger, 2000; LaBrode, 2007; Culhane et al., 2019; Reid et al., 2019; Marono et al., 2020). These studies have led to the characterization of MHOs, a category that includes serial, mass and spree murderers, as hostile, aggressive, antisocial with an overall negative worldview (DeLisi et al., 2019; James et al., 2019). It has also emerged that as the murderous career of an MHO progresses, methods and targets become highly specialized without any escalation in violence (Wright et al., 2008; Morton et al., 2014) and that in order to avoid apprehension, MHOs often adjust their everyday behaviors.

One of the analytical and theoretical perspectives that has greatly advanced our understanding of crime is the so-called "criminal career" framework. This approach, however, has only been partially explored within the study of serial murder, while it has been very fruitful in other contexts. Indeed, longitudinal data analyses performed over the last 30 years have helped identify behavioral patterns and how they change over time, determine crime proclivity as a function of age, characterize escalation, clustering tendencies or inactivity periods, and to compare these findings among different individuals or demographic groups (Blumstein et al., 1986; Piquero et al., 2003).

In this chapter, we precisely study serial murder through the lens of the criminal career paradigm, adding to previous literature (DeLisi & Scherer,

2006; Campedelli & Yaksic, 2022) and exploring various new directions. We base our analysis on the Radford/Florida Gulf Coast University (FGCU) Serial Killer database, one of the most comprehensive of its kind, which catalogues MHOs worldwide combining criminal records, socio-demographic and contextual information. We obtain a workable sample of 2,888 male and female killers active in the United States from 1940 to 2022 which we study through survival analysis, particularly univariate Kaplan-Meier estimates (Kaplan & Meier, 1958) and structure our analytical framework around four main themes.

First, we describe career duration and frequency of the entire sample, without any disaggregation, for a general overview of the data. Second, we compare the careers of male and female serial offenders, to probe whether gender differences affect murderous trajectories. Third, we analyze whether and how criminal careers changed across decades, comparing duration and frequency for serial killers whose activities began in the 1960s, 1970s, 1980s and 1990s. Fourthly, and finally, we investigate whether onset age produces differences in duration and homicide frequency.

We find that the serial murderers in our sample are relatively young when they commit their first homicide (at average age 26 years) and that they are still relatively young when their careers conclude due to incarceration or death (at average age 32). The median career duration is three years, indicating that after three years the careers of half of the 2,888 offenders surveyed have ended; we also find a large number of killers continue to murder for more than ten years, with the longest career spanning 60 years. Offenders in the sample are responsible, on average, for 1.16 homicides per year. Upon comparing the criminal trajectories of male and female serial killers, we find that males enjoy slightly longer careers, while no differences in frequency emerge. We also find that killers who began murdering in the 1960s and 1970s have longer careers compared to those starting later, but that serial murderers whose offenses began in the 1980s and 1990s commit on average more homicides per year.

Finally, when considering onset age, serial murderers starting earlier tend to have longer careers compared to those starting later; differences in frequency are statistically significant only for those who began their careers before age 20. The remainder of this chapter is structured as follows. In the second section we present an overview on the criminal careers framework and we elaborate on the importance of studying serial killers through the criminal career paradigm. The third section describes the data, our analytic strategy and the methods we employed. In the fourth section, we report and discuss our findings across the four dimensions mentioned above. In the final section we summarize our main results and elaborate on possible future research directions

Criminal Careers and Serial Murderers

Criminal career studies follow the longitudinal sequence of criminal actions committed by an offender throughout his or her lifetime. This holistic approach allows to characterize an individual's criminal trajectory and was originally characterized by the study of four main parameters: participation, frequency, seriousness, criminal career length. Participation is defined as the percentage of the population that is involved in a given type of criminal activity; frequency is the number of crimes committed by a single offender within a given time window; seriousness refers to the severity of the crimes, and career length quantifies the period of activity of an offender (Piquero et al., 2003). As a methodology of investigation, the criminal career paradigm was introduced in earnest with the report "Criminal Careers and Career Criminals" presented in 1986 by an ad-hoc National Academy of Sciences panel (Blumstein et al., 1986; Blumstein, 1987).

This approach has profoundly affected criminological theory, the design of new data collection, and research analysis throughout the decades. It has also allowed to study the dynamics of distinct groups of offenders, to identify which classes of crime are more subject to spatio-temporal clustering, which offenders are more prone to specialization and/or crime escalation, and to derive age-crime curves. Longitudinal studies also led to the formulation of diverse classification schemes that go beyond the offender/non-offender dichotomy and that include the adolescence-peaked, the high-rate, the low-rate chronic offender, in addition to the non-offender. Some authors have used the criminal career paradigm to study the motives and societal drivers that shape criminal careers, including human development and early life events, and that lead individuals to start, persist and ultimately stop committing crimes (Farrington, 2008). There have also been controversies, especially in the early years, when it was argued that since the tendency to commit crimes is relatively stable over an offender's lifetime, aggregate studies are adequate and longitudinal examinations unnecessary (Gottfredson & Hirschi, 1986, 1987, 1988, 1990). Other issues emerged on how to classify juvenile delinquents (Moffitt, 1993, 1997; Sampson & Laub, 1993) or on the possibility that these new approaches could lead to imposing disproportionately lengthy sentences on offenders with long criminal career histories (Blumstein et al., 1986).

Despite the large body of work devoted to criminal careers in property or violent crime (Piquero et al., 2012), little attention has been devoted to quantifying the criminal careers of serial killers by studying the sequence of their homicides (DeLisi et al., 2019; Campedelli & Yaksic, 2022). This may be because serial killers often commit many non-lethal crimes throughout their careers, even before they begin engaging in homicide, so that murders appear

as rare episodes embedded in much longer criminal lists (Miller, 2014; James et al., 2019). One exception is a recent study of the criminal trajectories of the 1,394 US-based MHOs as recorded by the Consolidated Serial Homicide Offender Database (Campedelli & Yaksic, 2022) where MHOs were defined as offenders that committed at least two homicides in two distinct events. The authors found that females and MHOs who began their criminal careers early in life, as well as those who use multiple methods and acted in more than one state, typically had longer periods of criminal activity. MHOs offending with a partner and targeting victims from a single gender instead were more likely instead to have shorter careers.

We aim to enrich the literature on this topic by analyzing a complementary and more comprehensive database, the Radford/Florida Gulf Coast University (FGCU) Serial Killer database. The main questions we address are centered around quantifying (1) the duration of the criminal careers of the US-based killers in the database, and (2) the frequency of their offenses, defined as the number of murders committed each year by an offender. The period during which a serial killer is active and the frequency of homicides are known to depend on several factors. Some of these are inherent to the temperament and life circumstances of the killer such as marriage, employment, emotional attachments (Liem, 2013; Osborne & Salfati, 2015), others depend on the context of the murder scene such as surveillance, location, thoroughness of investigation of previous homicides (DeFronzo et al., 2007), others yet on the circumstances of the murder, including victim type and how the body was disposed (Quinet, 2011). Due to these many variables, there is a large variability in the duration of the criminal career of a serial killer and of the so-called "cooling periods", intervals of inactivity between murders (Osborne & Salfati, 2015). Current estimates of MHO criminal career lengths vary from four to five years with the average length peaking at nine years in the 1970s and plummeting to two years in 2009 (Arndt et al., 2004; Quinet, 2011). One other important observation is that the number of serial murderers was largest during the 1970s and 1980s, steadily declining afterwards likely due to improvements in policing, forensics, and technology, such as the ubiquity of surveillance cameras, GPS tracking and DNA profiling. These new tools have increased the likelihood that serial murderers will be detected, shortening their careers and acting as deterrents for other potential offenders. Mental health awareness and treatments has also risen, giving potential offenders with traumatic pasts more resources to positively contribute to society; attitudes towards personal safety have also changed, leading possible victims to be more aware of their surroundings; finally longer prison sentences and stricter parole requirements have helped restrain first-time offenders from committing more murders.

The Present Study

This section is divided into three subsections. In the first, we briefly describe the analytical design and research questions investigated in the current study. In the second subsection, we present the database we employed and the sample we analyzed. In the third, we outline the methodologies utilized to address the research questions of this study.

Analytical Design

We consider four separate analytical dimensions. The first focuses on the characterization of the overall sample of serial murderers, defined as offenders who committed at least two homicides in separate events in the United States from 1940 until 2022. The second, third and fourth dimensions consist of comparative analyses of three serial murderer subgroups, specifically: males versus females; serial murderers across decades; serial murderers grouped by the decade in which they committed their first homicide.

Male and Female Serial Killers

We begin by performing a comparative analysis of the criminal careers of the male and female serial killers in our sample. Although the majority of MHOs are male, it is estimated that one in six serial killers is a female (Segrave, 1992; Vronsky, 2007; Harrison et al., 2015). For a long time however, women were considered unlikely to commit multiple murders, so that structured attempts to categorize the female serial murderer emerged only in the 1990s (Holmes et al., 1991; Hickey, 1991; Keeney & Heide., 1994; Kelleher & Kelleher, 1998) using classifications similar to those already established for males. Despite the smaller volume of studies devoted to female killers, some major gender differences have been identified (Schurman-Kauflin, 2000; Silvio et al., 2006; White & Lester, 2012; Harrison et al., 2015). Female serial murderers tend to be less violent and less impulsive than male serial murderers, and prefer to rely on manipulation and deceit rather on than physical force. They tend to use poison or drowning to kill, which may diffuse suspicions as these murders may be filed as natural deaths; men prefer weapons or asphyxiation. Both male and female serial killers have, or have had, a history of mental health issues: among men antisocial personality disorders are most prevalent, among women psychiatric disorders stemming from past sexual abuse are often involved (Schurman-Kauflin, 2000). Female serial murderers are on average older and more educated than their male counterparts, are more likely to be employed in health care professions such as nursing; their targets are disproportionately chosen among society's weakest, the ill, the elderly and children. Women are also more likely than men to kill people

they know, primarily spouses or romantic partners, but also family members or acquaintances; this may be because their motives are often personal such as financial gain or revenge, whereas men are more often driven by sexual or other violent impulses aimed at strangers (Harrison et al., 2015). These of course are general trends and many female serial killers do not necessarily follow the above patterns. Due to a combination of female ingenuity and the prevailing subtext that women are less violent than men, it is often assumed that the careers of female serial killers extend for longer periods of time than men, and that in some cases women are able to entirely escape apprehension (Hickey, 1991; Pearson, 1998; Wilson & Hilton, 1998). This accentuates the need to better characterize the criminal careers of female serial killers, one of the objects of this chapter. Our work thus seeks to answer the following question:

RQ1: *Are the careers of male and female serial killers different? If so, how?*

Serial killers' Careers across Decades

The second comparative account we perform centers on whether serial killer careers differ across decades. To address this question we group male and female offenders by the decade in which their killing careers began. We filter out individuals whose careers started in the 1940s and 1950s due to insufficient data, and in the 2000s and 2010s to avoid structural right censoring, as these killers may still be active and their inclusion may lead to biased estimates. Thus, we restrict our analysis to offenders who began killing in the 1960s, 1970s, 1980s and 1990s. The study of criminal careers across decades has gained attention in recent years as it has been recognized that offending trends may depend not only on an individual's life experiences but also on societal features that may change across generations (Moffitt, 1993; Laub & Sampson, 2003; Moffitt, 2018). A seminal study followed the arrest trajectories of more than 1,000 individuals born in different decades over a 17-year period and found that different birth cohorts, separated by as little as ten years, display different offending and arrest patterns that cannot be explained by personal circumstances alone (Neil et al., 2021). This study underlines the importance of including the mutating historical and social contexts in which individuals commit their crimes, and that focusing solely on individual-level characteristics and risk factors is limiting. In this work, we do not include a multi-cohort analysis based on birth year, rather we group the individuals in our data by the year in which each they committed their first homicide. We hypothesize that the socio-cultural and technological environments at the onset of an offender's killing careers may shape their perception of danger, ease of finding a victim, likelihood of being arrested

and thus affect the unfolding of their criminal careers. The question we ask is thus:

RQ2: *Do the careers of serial murderers differ based on the decade in which they began offending?*

Onset Age and Career Characteristics

Determining the relationship between onset age and criminal behavior is one of the main goals of the criminal career approach to the study of crime, and, more in general, of other developmental and life-course methods. Early onset is generally correlated with longer careers marked by more serious offending. Glueck's seminal study, published in 1950, was the first to argue that career criminals tend to be involved in delinquency and crime earlier in life (Glueck & Glueck, 1950). Although little consensus exists on the definition and measurement of onset age (Doherty & Bacon, 2018) numerous subsequent studies support this conjecture. Similarly, there is no definite agreement on the causes that drive individuals who begin offending earlier in life to commit more serious offenses and for a longer time. Possible theories include inherent traits that lead to different types of offenders, population heterogeneity, the influence of past events, the disruption of social bonds (Gottfredson & Hirschi, 1990; Nagin & Paternoster, 1991; Nagin & Farrington, 1992; Moffitt, 1993; Sampson & Laub, 1995). Few studies have explicitly addressed the question of how onset age impacts the trajectory of a serial murder's career (DeLisi & Scherer, 2006; Vaughn et al., 2009; Campedelli & Yaksic, 2022). One of these studies found no difference in the onset age of multiple and single homicide offenders (DeLisi & Scherer, 2006). A different study, based on latent class analysis of 160 MHOs, identified three distinct subclasses of offenders, one of which displayed low levels of criminal activity and delayed arrest onset (Vaughn et al., 2009). Finally, a more recent study found age to be positively associated with career termination, so that the older an offender is when they commit their first murder, the shorter their career (Campedelli & Yaksic, 2022). Given the knowledge gap and the inconclusive findings, in this work, we formulate the following research question:

RQ3: *Do serial murderers whose careers begin at an earlier age have longer careers than those who started later?*

Data

The Radford/FGCU Serial Killer Database, whose curation began in 1992 and is one of the most comprehensive of its kind, uses the FBI characterization of a serial killer, defined as a person who unlawfully murders two

or more persons in separate events (Morton, 2005). As of this writing, the database contains information on 5,752 male and female serial murderers worldwide and 15,086 victims. Each criminal subject is profiled via their personal and demographic background, the timeline of their murders, their victim preference and treatment, and any other useful information about their crimes. We filtered our data to include only US-based male and female offenders whose careers have concluded, due to death or long-term imprisonment. US-based offenders were selected because they are the most numerous and because they are part of the same cultural, legal and value system. Focusing on closed criminal careers avoids the problem of censored data whereby certain quantities are unknown. Killers whose careers are still active are associated with missing data such as the age of the killer upon termination of his or her criminal career, its length, and the total number of victims, to name a few. We thus eliminated foreign and active serial murderers from our sample; this filtering led us from an original list of 5,752 offenders to a total of 3,648 serial male and female killers with closed careers. To avoid including spree murderers or individuals for whom no certainty about culpability was determined, we also excluded all records that in the "Type of Killer" column contained the following words or expressions: "awaiting confirmation", "killed one person", "accused", "self-proclaimed", "suspected", "spree", "mythical", "doubt", "dropped", "poison". This further pruning reduced our sample to 3,183 individuals. We also filtered out offenders who committed their first homicide before 1940 to reduce the risk of incomplete, noisy or incorrect data, leading us to a total of 2,891 offenders. Finally, we removed three individuals for which no information was provided in the "Years between first and last" columns, which establishes career duration. Thus, our final working sample consists of 2,888 male and female serial murderers active in the United States from 1940 to 2022.

Methods

To quantify the criminal careers of US-based offenders whose careers have concluded, we mainly evaluate the survival function using the Kaplan-Meier estimator (Kaplan & Meier, 1958) which was initially developed within the medical literature. With the context of criminal careers, the survival function $S(t)$ is defined as the likelihood that one's criminal career extends beyond a period t. Using a dataset of n_i individuals whose careers lasted for a period of at least t_i, and of d_i individuals whose careers ended after a period t_i, the estimated survival function $\widehat{S(t)}$ is:

$$\widehat{S(t)} = \prod_{I:t \geq t_i} \left(\frac{n_i - d_i}{n_i} \right) \tag{15.1}$$

We also evaluated the duration T_j of the killing career of each subject in our sample using the following expression:

$$T_j = \left(Y_j^L - Y_j^1\right) + 1 \tag{15.2}$$

where Y_j^L and Y_j^1 are the years of the first and last recorded homicides for offender *j*, respectively. We add the extra unit so that the career duration of offenders who committed their first and last murder in the same calendar year is one year. Equation (15.2) also implies that career durations cannot be less than one year. We determine the frequency of homicides per offender by dividing the number of murders throughout his or her career by its length.

Additionally, we compare groups of serial murderers (per sex, decade and age of onset), analyzing the distributions of several relevant quantities, including duration and frequency. For the analysis of male and females, we employ a t-test for the means of both groups across the variables of interest without assuming equal variance. When more than two groups are considered, such as for the decade and onset age-based analyses, we use pairwise Welch t-tests for multiple comparisons of independent groups with Holm correction. The Welch t-test does not assume equal variances and the Holm correction is utilized to deal with family wise error rates, reducing the possibility of obtaining type I errors when performing multiple tests.

Results

Overall Sample

The filtered sample used in this work is derived from the Radford/FGCU Serial Killer database and consists of 2,888 US-based male and female offenders. The first homicide in this list occurred in 1940; the last in 2022. Of the surveyed criminal careers, the first concluded in 1941, the last in 2022. Table 15.1 provides summary statistics of the sampled offenders. The average number of suspected murders per killer is 3.94 persons with a standard deviation (SD) of 4.21, indicating a large variability. This figure is slightly lower when considering the number of victims ascertained via offender conviction, 2.65 persons (SD 2.32) per killer. The oldest offender was born in 1891 and the youngest in 2002. The average age at first murder is 26.23 years (SD 8.39), with the youngest first-time offender being 11 years old and the oldest 72 when their first murders occurred. On average, careers are concluded at age 32.18 (SD 10.80) and span a duration of 6.97 years (SD 8.26), suggesting large variations across subjects. The shortest careers lasted one year, the longest 60 years. Frequency-wise, on average, offenders committed 1.16 homicides per year, with a maximum of 25 per year.

Figure 15.1 displays the Kaplan-Meier curve for the career duration of the 2,888 serial murderers in the sample (left) and the histogram of the number of homicides per year per offender as obtained from the same sample (right). The median survival time, as can also be seen from Table 15.1, is three years, meaning that after three years, 50% of all careers have terminated. Table 15.1 also shows that 75% of careers terminate after ten years, indicating that a substantial number of serial murderers have quite prolonged careers,

Table 15.1 Descriptive Statistics for Variables Pertaining to the Sample of the US-Based Serial Murderers in the Radford/FGCU dataset (N = 2,888)

	N Victims (Suspected)	*N Victims (Convicted)*	*Year of Birth*	*Age First Kill*	*Age Last Kill*	*Year First*	*Year Last*	*Duration*	*Frequency*
Obs	2,888	2,819	2,870	2,865	2,865	2,888	2,888	2,888	2,819
Mean	3.94	2.65	1959	26.23	32.18	1985	1991	6.97	1.16
SD	4.21	2.32	16.25	8.39	10.80	14.98	14.24	8.26	1.42
Min	0	0	1891	11	14	1940	1941	1	0
25%	2	2	1949	20	24	1976	1982	1	0.18
50%	3	2	1959	24	30	1986	1992	3	0.67
75%	4	3	1970	30	38	1996	2003	10	2.00
Max	100	49	2002	72	83	2022	2022	60	25

Note: We only report 2,870 observations in the "Year of birth" category since the birth date of 18 offenders was not available from the database.

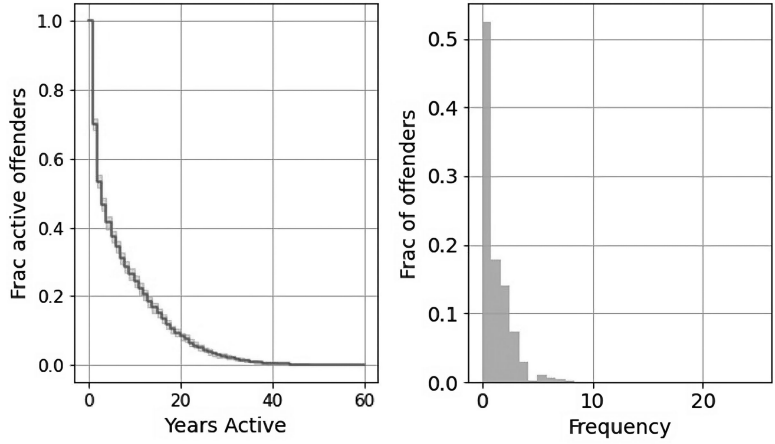

Figure 15.1 Career duration via Kaplan-Meier estimate (with 95% confidence intervals) and frequency distribution for the whole sample of analyzed offenders in the filtered Radford/FGCU Serial Killer database (N = 2,888).

lasting between one and six decades; at 25% this is about 722 individuals over the 82-year period in examination. The frequency panel in Figure 15.1 also shows a considerably skewed distribution. Table 15.1 shows that 75% of the offenders in our sample commit, at most, two homicides per year during the course of their career. This implies, similarly to what observed for duration, that a large cohort of offenders, about 722, committed more than two homicides per year throughout their entire career. These are likely serial murderers who were active for very short periods and concentrated their murders in a one- or two-year timeframe. Overall, the statistical analysis performed so far reveals high levels of variability of career duration and homicide frequency of the serial murderers in our sample. This variability may be due to different offender cohorts operating in different ways. To better probe this possibility in the next subsections we stratify the data by taking into account relevant demographic offender features such as gender and decade of activity.

Comparing Male and Female Serial Murderers

This subsection assesses career differences between male and female serial murderers. Descriptive statistics are presented in Table 15.2; the statistical significance of any discrepancy between findings for the two groups is determined via a t-test. As can be seen, male serial murderers represent the vast majority of subjects (N_m = 2,723) accounting for almost 95% of killers in the sample, while females are a small minority (N_f = 165). The two groups do not exhibit significant differences in terms of mean suspected victims: the average is 3.95 suspected victims (SD 4.29) per male killer and 3.60 (SD 2.40) per female killer. The average number of victims per offender that resulted in a conviction is 2.67 persons (SD 2.45) for males and 2.24 (SD 1.49) for females. This difference is instead statistically significant, implying that on average male serial killers kill slightly more victims for which a conviction is returned than women. Statistically significant differences also emerge upon comparing the duration of male and female killing careers, as well as offender age at the time of first and last murder. On average, career duration for males is 7.04 years (SD 8.28) and 5.75 years for females (SD 7.80). Interestingly the longest career in the entire sample (60 years) is associated with a female offender. Females begin their criminal careers later, at 29.85 years on average (SD 8.12) compared to males who commit their first murder, on average, at 26.01 years (SD 11.30); they also end their careers later, at 34.55 years on average (SD 12.90) while the last murder committed by a male occurs on average, when they are 32.03 years old (SD 10.64). Finally, male and female cohorts are not statistically distinguishable when considering homicide frequency: for males the average homicide frequency is 1.15 events per year (SD 1.42), for females it is 1.16 (SD 1.30).

Table 15.2 Descriptive Statistics for Variables Pertaining to Male (Nm = 2,723) and Female (Nf = 165) Offenders in the Filtered Radford/FGCU Serial Killer Database, along with t-Tests for the Means (No Equal Variance Is Assumed)

	Male					*Female*					*T-test (p val)*
Variable	*Obs*	*Mean*	*SD*	*Min*	*Max*	*Obs*	*Mean*	*SD*	*Min*	*Max*	
N victims (suspected)	2,723	3.95	4.29	2	100	165	3.60	2.40	2	16	1.76 (0.07)
N victims (convicted)	2,658	2.67	2.35	0	49	161	2.24	1.49	0	10	3.39 (<0.0001)
Duration	2.723	7.04	8.28	1	49	164	5.75	7.80	1	60	2.06 (0.04)
Frequency	2,658	1.15	1.42	0	25	161	1.16	1.30	0	8	–0.10 (0.92)
Age 1st kill	2,700	26.01	11.30	11	72	165	29.85	8.12	14	68	–4.29 (<0.001)
Age Last kill	2,700	32.03	10.64	14	80	165	34.55	12.90	15	83	–2.45 (0.01)

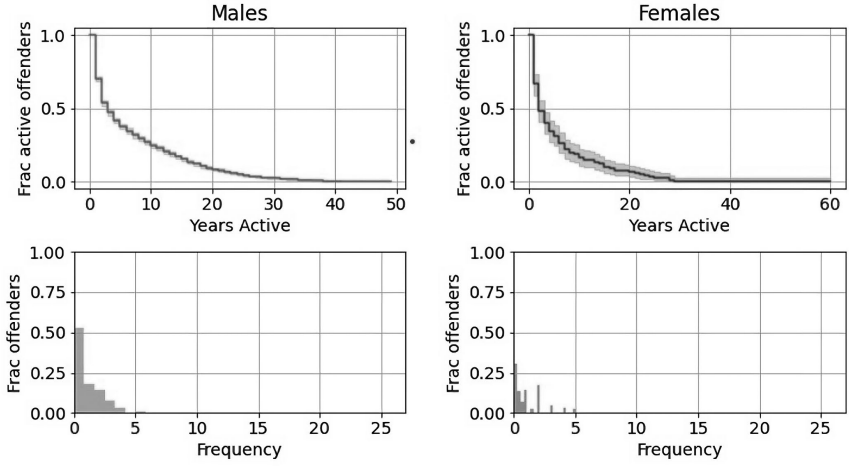

Figure 15.2 Career duration via Kaplan-Meier estimate (with 95% confidence intervals) and frequency for male (N_m = 2,723) and female (N_f = 165) offenders in the filtered Radford/FGCU Serial Killer database.

Figure 15.2 displays the Kaplan-Meier curves for male and female offenders and the respective frequency distributions. While the duration curves are monotonically decreasing, males on average have longer careers compared to women. However, the frequency distributions appear to be very different, although differences in the mean values are not statistically significant. The curve for male serial killers exhibits a long right tail, representing a small fraction of particularly prolific offenders, a feature not observed for female offenders.

Assessing Differences across Decades

In this subsection we stratify the data based on the decade in which the first murder occurred. As illustrated above, we focus on four decades, from the 1960s to the 1990s. Although this ten-year division and the start date of the four intervals are arbitrary, analyzing the data in different eras may lead to the identification of features tied to the particular period of a murderer's activity, which, on average and as seen in subsection "Comparing male and female serial murderers", lasts less than a decade for both men and women. We do not separate genders in this analysis as the overall low representation of females would result in even less data in the four periods. In Table 15.3, we list relevant statistics per decade, such as the number of victims, both suspected and for which the offender was convicted, as well as duration and frequency. Figure 15.3 complements this information showing the p-value

Table 15.3 Descriptive Statistics for Variables Pertaining to Offenders that Committed the First Murder during the 1960s, 1970s, 1980s and 1990s in the Filtered Radford/FGCU Serial Killer Database

	1960–1969					*1970–1979*					*1980–1989*					*1990–1999*				
Variable	*Obs*	*Mean*	*SD*	*Min*	*Max*	*Obs*	*Mean*	*SD*	*Mi*	*Max*	*Obs*	*mean*	*SD*	*Min*	*Max*	*Obs*	*Mean*	*SD*	*Min*	*Max*
N victims (suspected)	227	4.51	6.86	2	93	606	4.76	4.84	2	46	738	3.92	3.67	2	53	638	3.38	2.16	2	23
N victims (conviction)	223	2.75	2.43	0	21	598	2.82	2.93	0	37	722	2.71	2.77	0	49	631	2.52	1.57	0	12
Duration	227	12.60	10.82	1	60	606	9.38	9.23	1	45	738	6,71	7.91	1	37	638	5.57	6.15	1	29
Frequency	223	0.64	1.14	0	9	598	0.90	1.57	0	25	722	1.20	1.45	0	12	631	1.23	1.32	0	10

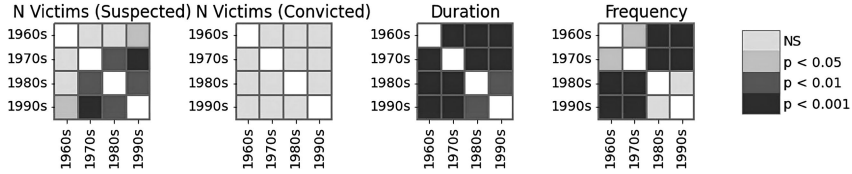

Figure 15.3 Heatmaps visualizing p-values after post-hoc t-test between decade groups with Holm correction for (1) number of victims (suspected), (2) number of victims (for which the offender was convicted), (3) Duration and (4) Frequency.

evaluated from a t-test on the difference of a given statistic between two decades, using Holm's correction.

We find that serial killers who started their activity in the 1970s have the highest average number of suspected murders (4.76). This value is not statistically greater than the corresponding 1960s value (4.51 suspected victims), but it is larger than the corresponding value for those who started their careers in the 1980s and 1990s (3.92 and 3.38 suspected victims respectively). Yet, when analyzing the number of victims for which the offenders were actually convicted, we find no statistical significance across all paired combinations, suggesting that the number of victims for which the judicial system could establish culpability remained stable over the 40-year period under investigation. Not surprisingly, sensible differences instead emerge upon comparing duration and frequency across decades.

The duration of criminal careers associated with each decade is statistically different from all the others, and delineate a decreasing trend. Those starting their careers in the 1960s continued to offend for an average of 12.60 years (SD 10.82). Careers were significantly shorter for the 1970s cohort (9.38 years, SD 9.23), and even shorter for the 1980s (6.71 years, SD 7.91) and 1990s (5.57 years, SD 6.16) cohorts. The large SD values indicate considerable variability within decades and the presence of robust outliers. A pattern in pairs emerges upon considering murder frequency. Murderers who began their careers in the 1960s and 1970s are statistically different from one another, while no statistical differences emerge between those starting in the 1980s and 1990s. The homicide frequency for earlier groups (career onset in the 1960s and 1970s) is instead statistically lower than that of the later groups (career onset in the 1960s and 1970s). When read in combination with data on duration, these findings indicate that serial murderers that started in the 1980s or 1990s had shorter careers that were however marked by a higher number of victims per year.

In Figure 15.4, we display the Kaplan-Meier curves for career duration and the frequency distributions across decades. The longer career length of

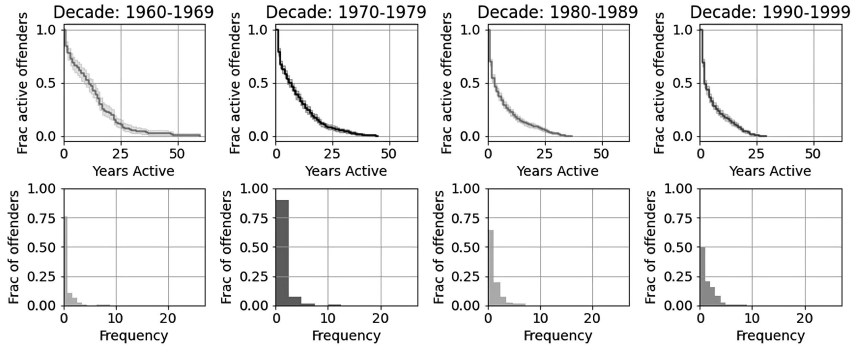

Figure 15.4 Career duration via Kaplan-Meier estimate (with 95% confidence intervals) and frequency across age groups in the filtered Radford/FGCU Serial Killer database. The visualization compares offenders that started to perpetrate homicides (1) in the 1960s (N = 227), (2) 1970s (N = 606), (3) 1980s (N = 738) and (4) 1990s (N = 638).

those who began murdering in the 1960s and 1970s emerges clearly from these curves, along with the higher offending frequency for those that began in the 1980s and 1990s. The median duration for serial killers who started their careers in the 1960s is 11 years, indicating that half of them managed to commit crime for 11 years which is considerably higher than the average length of serial murderers beginning in the 1970s and, foremost, serial murderers beginning in the 1980s and 1990s. In the 1970s, the median duration was six years, while in the 1980s and 1990s, half of the offenders had their careers terminated after three and two years, respectively.

Serial Murderers' Careers and Onset Age

Finally, in the last subsection, we investigate whether the age at which serial killers began offending affects their criminal career trajectories. We group offenders by age at first offense using four ten-year intervals, starting from 10–19 years to 40–49 years. As detailed above, the youngest first-time offender was 11 years old, the oldest 72. However, we do not include first-time offenders older than 49 in our analysis as there is insufficient data for this demographic group. For the same reason, we do not further stratify the data by gender or initiation decade. Similarly to what done for gender and decade, Table 15.4 lists statistical quantities for the number of suspected victims, the number of victims for which a serial murderer was convicted, career duration and homicide frequency. Figure 15.5 integrates this information with p-values obtained after paired t-tests among the age groups with Holm correction.

Table 15.4 Descriptive Statistics for Variables Pertaining to Offenders Who Committed Their First Murder between Ages 10–19, 20–29, 30–39, 40–49 in the Filtered Radford/FGCU Serial Killer Database

	Onset Age 10–19					*Onset Age 20–29*					*Onset Age 30–39*					*Onset Age 40–49*				
Variable	*Obs*	*Mean*	*SD*	*Min*	*Max*	*Obs*	*Mean*	*SD*	*Min*	*Max*	*Obs*	*mean*	*SD*	*Min*	*Max*	*Obs*	*Mean*	*SD*	*Min*	*Max*
N victims (suspected)	614	3.75	5.01	2	100	1,449	3.97	4.17	2	93	579	4.09	3.79	2	53	171	4.11	3.19	2	24
N victims (conviction)	600	2.56	2.23	0	37	1,424	2.68	2.20	0	33	566	2.69	2.81	0	49	169	2.55	1.96	0	11
Duration	614	9.14	9.28	1	49	1,449	6.87	8.30	1	60	579	5.84	7.33	1	48	171	4.88	5.92	1	40
Frequency	600	0.86	1.08	0	10	1,424	1.18	1.35	0	11	566	1.35	1.79	0	25	169	1.29	1.49	0	7

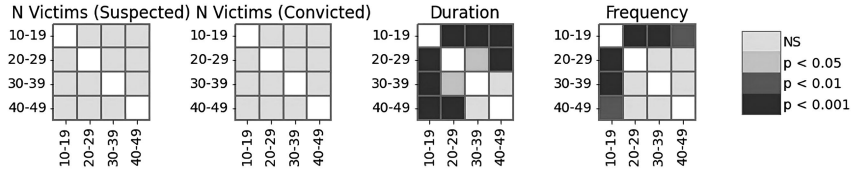

Figure 15.5 Heatmaps visualizing p-values after post-hoc t-test between onset age groups with Holm correction for (1) number of victims (suspected), (2) number of victims (for which the offender was convicted), (3) duration and (4) frequency.

Contrary to what observed for the stratification by decade analysis, we find no statistically significant differences upon comparing the average number of victims among serial killers in the four age groups. This implies that the average number of murders committed by a killer during his or her career does not depend on the age at first murder. However, diverging patterns emerge when considering duration and homicide frequency. The youngest first-time offenders (10–19 years) have considerably long careers (of average duration 9.14 years, SD 9.28) that are significantly longer than the careers of those in the older age groups. Serial murderers who begin to kill in their 20s have the second-longest career duration (6.87 years, SD 8.30), which is also statistically different from all other groups. We find no differences between serial killers whose onset age is between 30–39 and 40–49 years, given the average duration of 5.83 (SD 7.33) and 4.88 (SD 5.92) years, respectively. The youngest offenders (10–19 years) are also associated with statistically lower frequency values (0.86 victims per year on average) compared to all other groups. Our main finding is thus that those who begin killing in their teens exhibit statistically longer careers but lower homicide frequency.

Figure 15.6 shows the Kaplan-Meier curves, which offers various interesting results. First, although serial murderers who begin offending in the 10–19 age group have the longest careers on average, offenders in all groups continue to commit murders later in life. The median duration for serial murderers whose career begins in their teens is five years, indicating that only 50% of serial murderers in this group continue to kill after five years. The median is much lower than the average duration (9.14 years), revealing a right-skewed distribution. For offenders whose careers begin in their 20s, the median career duration is three years; for those starting in their 30s and 40s, it is two years, indicating similarly right-skewed distributions.

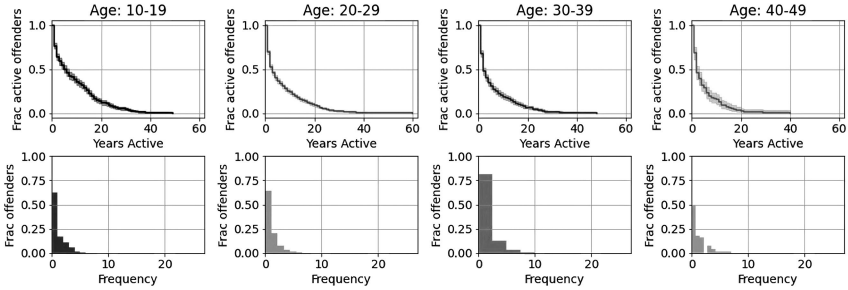

Figure 15.6 Career duration via Kaplan-Meier estimate (with 95% confidence intervals) and frequency across age groups in the filtered Radford/FGCU Serial Killer database. The visualization compares offenders that started to perpetrate homicides when aged (1) between 10 and 19 (N = 614), (2) between 20 and 29 (N = 1,449), (3) between 30 and 39 (N = 579) and (4) between 40 and 49 (N = 171).

Discussion and Conclusions

While serial murderers represent a small minority of homicide offenders, their impact on society is far reaching. Empirical studies are central in advancing the criminological, sociological, and psychological understanding of their motives and actions; these studies also provide data-informed recommendations that can facilitate the investigative efforts of law enforcement. In this spirit, we investigated the criminal careers of a large sample of serial murderers active in the United States from 1940 to 2022, focusing specifically on career duration and homicide frequency. This work builds on previous research (Campedelli & Yaksic, 2022) and expands it by leveraging a different dataset and offering complementary perspectives. Data were retrieved from the Radford/FGCU Serial Killer database, one of the most comprehensive sources for the empirical study of MHOs. By focusing on a final sample of 2,888 serial murderers, we analyzed their characteristics across four different viewpoints primarily through descriptive statistics (with hypothesis testing) and survival analysis via Kaplan-Meier curves.

We first studied the entire sample with no disaggregation, and later compared the careers of male and female serial murderers, of serial killers that began offending in four different decades (i.e., the 1960s, 1970s, 1980s and 1990s), and of serial killers that committed their first murder before age 20, 30, 40 and 50. This four-fold analytical structure provided several interesting and novel results. Overall, the entire sample was characterized by an average career duration of 6.87 years, although the median value was three years, implying right-skeweness in the distribution. In fact, while 50% of careers are terminated after three years, we also reported a considerable

amount of offenders whose homicide series spanned over than ten years. The average number of murders per year is 1.16 per offender, with a maximum of 25. Male offenders accounted for more than 95% of the subjects we examined; nonetheless the sample had sufficient data on female offenders for us to compare the criminal careers of the two sexes. Thus, we were able to answer RQ1: career duration is slightly higher for male compared to female serial murderers, while no statistical difference emerges in terms of homicide frequency. This contradicts speculation that the killing careers of women last longer than those of men as they tend to draw less attention to themselves (Farrell et al., 2011) and also diverges from previous empirical work on this topic (Campedelli & Yaksic, 2022), although Campedelli and Yaksic leveraged different data and a more comprehensive inferential approach. The careers of the two sexes are different in other respects: males, start and conclude their careers earlier than females (26.01 against 29.85 years as onset ages, 32.03 against 34.55 years as age at last murder, respectively) and are convicted for a slightly higher number of homicides (2.67 versus 2.24).

The decade-based analysis was meant to answer RQ2 and indicated that serial murderers that started in the 1960s had statistically longer careers compared to those starting in the 1970s and, foremost, in the 1980s and 1990s. Yet, those that started in the 1980s and 1990s displayed higher homicide frequency, so that although on average their careers were shorter, they also killed more victims per year. At the same time, we found that the average number of victims for which a serial killer is convicted does not vary significantly across decades. This line of investigation falls under the purview of recent scholarship in developmental and life-course criminology which posits that offending patterns should be viewed in the context of historical and socio-cultural changing scenarios (Neil et al., 2021).

Finally, to answer RQ3 and determine whether age at first murder impacts the criminal careers of serial killers we analyzed the characteristics of four cohorts who began offending in their teens, 20s, 30s and 40s. Those who started offending between ages 10 and 19 were found to have significantly longer careers, followed by those that committed their first murder in their 20s. No differences instead emerge between those starting in their 30s or 40s. The only subgroup with a statistically different number of yearly homicides are the murderers who began their careers in their teens. The youngest offenders are characterized by long careers, spanning more than one year, but less than one victim per year, on average.

Our study comes with limitations that are worth discussing. Our results are descriptive representations of existing subgroups of serial killers; hence no inferential or causal explanations should be extracted from our findings. Additionally, since we base our findings on a sample made entirely of

US-based offenders, no external validity is granted. Different patterns may arise or serial murderers that were active in other countries. Indeed, this is very likely, given the possibly different prevalence of the phenomenon, the different types of law enforcement strategies, resources and efforts available to investigate serial homicides, and the different judicial systems.

Nonetheless, our analyses offer various contributions to the empirical study of serial killers, as detailed above. The patterns we unveiled highlight the importance of the criminal career framework to study serial murderers. Since its development in the late 1980s, this approach has been used to study a plethora of offenses and offender typologies within property and violent crime. To the best of our knowledge, ours is one of few works where the criminal career paradigm is used to characterize specific serial murderer subgroups and to dissect relevant demographic and macro-level variations in offending patterns. Another important observation that arises from this work, specifically from contrasting careers across decades, is that going beyond mere individual-level demographic features and taking into account macro-level conditions can yield novel perspectives. Although our descriptive results – as cautioned above – do not allow for the identification of the mechanisms that drive any changes in offending patterns over the 40-years under investigation, which may be related to innovation in forensic technologies and better investigative resources and strategies, our findings underline the need to explore macro-level social, political, psychological dynamics in future work as these may play primary roles in shaping the serial killer phenomenon.

Finally, this study calls for more extensive efforts to create, maintain, and systematically populate rich data sources on MHOs and serial killers. The source we used in this chapter is extremely valuable, but the many missing data across the available variables made it impossible to develop an inferential research design. We acknowledge that gathering and organizing information on MHOs is challenging and requires considerable effort. For this reason, we hope that in the near future new strategies will be developed to enrich the present data source or to generate new ones. Possible avenues may involve academic partnerships between the United States and other countries to offer better representation at the global level or, alternatively, the integration of human-coded protocols with computational methods that can reduce the monetary and time costs of compiling and maintaining such sources. A better understanding of the overall characteristics of serial killers will help decision makers recognize early warning signs, design better risk assessment and profiling techniques, and improve investigative methods. These advances, in turn, will help improve public safety through the adoption of effective prevention measures and strategies to apprehend offenders.

References

Arndt, W. B., Hietpas, T., & Kim, J. (2004). Critical characteristics of male serial murderers. *American Journal of Criminal Justice*, *29*, 117–131.

Blumstein, A. (1987). Criminal careers and 'career criminals'. *Interface*, *12*, 33–36.

Blumstein, A., Cohen, J., Roth, J. A., & Visher, C. A. (1986). *Criminal careers and "career criminals": Volume I*. The National Academies Press.

Campedelli, G. M., & Yaksic, E. (2022). Survival of the recidivistic? Revealing factors associated with the criminal career length of multiple homicide offenders. *Homicide Studies*, *26*, 244–268.

Culhane, S. E., Walker, S., & Hildebrand, M. M. (2019). Serial homicide perpetrators' self-reported psychopathy and criminal thinking. *Journal of Police and Criminal Psychology*, *34*, 1–13.

DeFronzo, J., Ditta, A., Hannon, L., & Prochnow, J. (2007). Male serial homicide: The influence of cultural and structural variables. *Homicide Studies*, *11*, 3–14.

DeLisi, M., Ruelas, M., & Kruse, J. E. (2019). Who will kill again? The forensic value of 1st degree murder convictions. *Forensic Science International: Synergy*, 11–17.

DeLisi, M., & Scherer, A. M. (2006). Multiple homicide offenders: Offense characteristics, social correlates, and criminal careers. *Criminal Justice and Behavior*, *33*, 1–25.

Dietz, P. E. (1986). Mass, serial, and sensational homicides. *Bulletin of the New York Academy of Medicine*, *62*, 492–496.

Doherty, E., & Bacon, S. (2018). *Age of onset of offending behavior* (pp. 34–48). https://doi.org/10.1093/oxfordhb/9780190201371.013.3

Egger, S. A. (1984). Working definition of serial murder and the reduction of linkage blindness. *Journal of Police Science and Administration*, *12*, 348–357.

Farrell, A. L., Keppel, R. D., & Titterington, V. B. (2011). Lethal ladies: Revisiting what we know about female serial murderers. *Homicide Studies*, *15*(3), 228–252. https://doi.org/10.1177/1088767911415938

Farrington, D. P. (2008). Human development and criminal careers. In M. E. Vogel (Ed.), *Crime, inequality and the state* (1st ed.) (pp. 223–244). New York: Routledge. https://doi.org/10.4324/9781003060581

Ferguson, C. J., White, D. E., Cherry, S., Lorenz, M., & Bhimani, Z. (2003). Defining and classifying serial murder in the context of perpetrator motivation. *Journal of Criminal Justice*, *31*, 287–292.

Fox, J. A., & Levin, J. (1998). Multiple homicide: Patterns of serial and mass murder. *Crime and Justice*, *23*, 407–455.

Fox, J. A., & Levin, J. (1999). Serial murder: Popular myths and empirical realities. In M. D. Smith, & M. A. Zahn (Eds.), *Homicide: A sourcebook of social research* (pp. 165–175). Sage.

Fox, J. A., & Levin, J. (2005). *Extreme killing: Understanding serial and mass murder*. Sage.

Glueck, S., & Glueck, E. (1950). *Unraveling Juvenile delinquency*. Commonwealth Fund.

Gottfredson, M. R., & Hirschi, T. (1986). The true value of lambda would appear to be zero: An essay on career criminals, criminal careers, selective incapacitation, cohort studies, and related topics. *Criminology: An Interdisciplinary Journal*, *24*, 213–234.

Gottfredson, M. R., & Hirschi, T. (1987). The methodological adequacy of longitudinal research on crime. *Criminology: An Interdisciplinary Journal*, *25*, 581–614.

Gottfredson, M. R., & Hirschi, T. (1988). Science, public policy, and the career paradigm. *Criminology*, *26*, 37–55.

Gottfredson, M. R., & Hirschi, T. (1990). *A general theory of crime*. Stanford University Press.

Harrison, M. A. (2023). Why are we interested in serial killers? In M. A. Harrison (Eds.), *In just as deadly: The psychology of female serial killers* (pp. 17–31). Cambridge University Press.

Harrison, M. A., & Frederick, E. J. (2022). Interested in serial killers? Morbid curiosity in college students. *Current Psychology*, *41*, 3768–3777.

Harrison, M. A., Murphy, E. A., Ho, L. Y., Bowers, T. G., & Flaherty, C. V. (2015). Female serial killers in the United States: Means, motives, and makings. *The Journal of Forensic Psychiatry and Psychology*, *26*(3), 383–406. https://doi.org/10.1080/14789949.2015.1007516

Hickey, E. (1991). *Serial murderers and their victims* (1st ed.). Thomson Wadsworth.

Holmes, R. M. (1985). Profiles in terror: The serial murderer. *Federal Probation*, *44*, 29–34.

Holmes, R. M., & Holmes, S. T. (1998). *Serial murder* (2nd ed.). Sage Publications.

Holmes, S. T., Hickey, E., & Holmes, R. M. (1991). Female serial murderesses: Constructing differentiating typologies. *Journal of Contemporary Criminal Justice*, *7*, 245–256.

James, J., Beauregard, E., & Proulx, J. (2019). Sexual murderers in everyday life. *Journal of Criminal Justice*, *60*, 64–73.

James, J., & Proulx, J. (2016). The modus operandi of serial and nonserial sexual murderers: A systematic review. *Aggression and Violent Behavior*, *3*, 200–218.

Kaplan, E. L., & Meier, P. (1958). Nonparametric estimation from incomplete observations. *Journal of the American Statistical Association*, *53*, 457–481.

Keeney, B. T., & Heide, K. M. (1994). Gender differences in serial murderers: A preliminary analysis. *Journal of Interpersonal Violence*, *9*, 383–398.

Kelleher, M. D., & Kelleher, C. L. (1998). *Murder ost rare: The female serial killer*. Praeger Publishers.

LaBrode, R. T. (2007). Etiology of the psychopathic serial killer: An analysis of antisocial personality disorder, psychopathy, and serial killer personality and crime scene characteristics. *Brief Treatment and Crisis Intervention*, *7*, 151–160.

Laub, J. H., & Sampson, R. J. (2003). *Shared beginnings, divergent lives: Delinquent boys to age 70*. Harvard University Press.

Liem, M. (2013). Homicide offender recidivism: A review of the literature. *Aggression and Violent Behavior*, *18*, 19–25.

Marono, J., Reid, S., Yaksic, E., & Keatleya, D. A. (2020). A behaviour sequence analysis of serial killers' lives: From childhood abuse to methods of murder. *Psychiatry, Psychology and Law*, *27*, 126–137.

Miller, L. (2014). Serial killers: I. Subtypes, patterns, and motives. *Aggression and Violent Behavior*, *19*, 1–11.

Moffitt, T. E. (1993). "Life-course-persistent" and "Adolescent-limited" antisocial behavior: A developmental taxonomy. *Psychological Review*, *100*, 674–701.

Moffitt, T. E. (1997). Adolescence-limited and life-course persistent offending: A complementary pair of developmental theories. In T. P. Thornberry (Ed.), *Developmental theories of crime and delinquency: Advances in criminological theory, volume 7* (pp. 11–54). Transaction Publishers.

Moffitt, T. E. (2018). Male antisocial behaviour in adolescence and beyond. *Nature Human Behaviour*, *2*(3), 177–186. https://doi.org/10.1038/s41562-018-0309-4

Morton, R. J. (2005). *Serial murder: Multi-disciplinary perspectives for investigators*. U.S. Department of Justice, Federal Bureau of Investigation/Behavioral analysis unit. National Center for the Analysis of Violent Crime. http://www.fbi.gov/stats-services/publications/serial-murder

Morton, R., Tillman, J. M., & Gaines, S. J. (2014). *Serial murder: Pathways for investigations*. US Department of Justice – Federal Bureau of Investigation.

Myers, W. C., Husted, David S., Safarik, M. E., & O'Toole, M. E. (2006). The motivation behind serial sexual homicide: Is it sex, power, and control, or anger? *Journal of Forensic Sciences*, *51*, 900–907.

Nagin, D. S., & Farrington, D. P. (1992). The onset and persistence of offending. *Criminology: An Interdisciplinary Journal*, *30*(4), 501–524. https://doi.org/10.1111/j.1745-9125.1992.tb01114.x

Nagin, D. S., & Paternoster, R. (1991). On the Relationship of past to future participation in delinquency. *Criminology : An Interdisciplinary Journal*, *29*(2), 163–189. https://doi.org/10.1111/j.1745-9125.1991.tb01063.x

Neil, R., Sampson, R. J., & Nagin, D. S. (2021). Social change and cohort differences in group-based arrest trajectories over the last quarter-century. *Proceedings of the National Academy of Sciences*, *118*, e2107020118. https://doi.org/10.1073/pnas.2107020118

Osborne, J. R., & Salfati, C. G. (2015). Re-conceptualizing "cooling-off periods" in serial homicide. *Homicide Studies*, *19*, 188–205.

Pearson, P. (1998). *When she was bad: Violent women and the myth of innocence*. Viking Adult.

Piquero, A. R., Farrington, D. P., & Blumstein, A. (2003). Criminal career paradigm. In M. Tonry (Ed.), *From crime and justice: A review of research* (pp. 359–506). University of Chicago Press.

Piquero, A. R., Jennings, W. G., & Barnes, J. C. (2012). Violence in criminal careers: A review of the literature from a developmental life-course perspective. *Aggression and Violent Behavior*, *17*, 171–179.

Quinet, K. (2011). Prostitutes as victims of serial homicide: Trends and case characteristics, 1970–2009. *Homicide Studies*, *15*, 74–100.

Reid, S., Katan, A., Ellithy, A., Stua, R. D., & Denisov, E. V. (2019). The perfect storm: Mapping the life course trajectories of serial killers. *International Journal of Offender Therapy and Comparative Criminology*, *63*, 1621–1662.

Ressler, R. K., Burgess, A. W., Douglas, J. E., Hartman, C. R., & D'Agostino, R. B. (1986). Sexual killers and their victims: Identifying patterns through crime scene analysis. *International Journal of Violence*, *1*, 288–308.

Sampson, R. J., & Laub, J. H. (1993). *Crime in the making: Pathways and turning points through life*. Harvard University Press.

Sampson, R. J., & Laub, J. H. (1995). Understanding variability in lives through time: Contributions of life-course criminology. *Studies on Crime & Crime Prevention*, *4*, 143–158.

Schlesinger, L. B. (2000). *Serial offenders: Current thought, recent findings, unusual syndromes*. CRC Press.

Schlesinger, L. B., Kassen, M., Mesa, V. B., & Pinozzotto, A. J. (2010). Ritual and signature in serial sexual homicide. *Journal of the American Academy of Psychiatry and the Law*, *38*, 239–246.

Schurman-Kauflin, D. (2000). *The new predator: Women who kill*. Algora Publishing.

Scrivner, C. (2021). The psychology of morbid curiosity: Development and initial validation of the morbid curiosity scale. *Personality and Individual Differences*, *183*, 111139.

Segrave, K. (1992). *Women serial and mass murderers: A worldwide reference, 1580 through 1990*. McFarland & Company, Inc.

Silvio, H., McCloskey, K., & Ramos-Grenier, J. (2006). Theoretical consideration of female sexual predator serial killers in the United States. *Journal of Criminal Justice*, *34*, 251–259.

Taylor, S., Lambeth, D., Green, G., Bone, R., & Cahillane, M. A. (2012). Cluster analysis examination of serial killer profiling categories: A bottom-up approach. *Journal of Investigative Psychology and Offender Profiling*, *9*, 30–51.

Vaughn, M. G., DeLisi, M., Beaver, K. M., & Howard, M. O. (2009). Multiple murder and criminal careers: A latent class analysis of multiple homicide offenders. *Forensic Science International*, *183*(1), 67–73. https://doi.org/10.1016/j.forsciint.2008.10.014

Vicary, A. M., & Fraley, R. C. (2010). Captured by true crime: Why are women drawn to tales of rape, murder, and serial killers? *Social Psychological and Personality Science*, *1*, 81–86.

Vronsky, P. (2007). *Female serial killers: How and why women become monsters*. Berkeley Books Penguin Group.

White, J., & Lester, D. (2012). A study of female serial killers. *American Journal of Forensic Psychology*, *30*, 25–29.

Wilson, W., & Hilton, T. (1998). Modus operandi of female serial killers. *Psychological Reports*, *82*, 495–498.

Wright, K. A., Pratt, T. C., & DeLisi, M. (2008). Examining offending specialization in a sample of male multiple homicide offenders. *Homicide Studies*, *12*(4), 381–398.

Yaksic, E., Allely, C., Silva, R. D., Smith-Inglis, M., Konikoff, D., Ryan, K., Gordon, D., Denisov, E., & Keatley, D. A. (2019). Detecting a decline in serial homicide: Have we banished the devil from the details? *Cogent Social Sciences*, *5*, 1678450.