Patterns of Female Offending: Childhood and Adolescent Risk Factors

by

Kelsey Gushue

B.A., Simon Fraser University, 2015

Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts

in the
School of Criminology
Faculty of Arts and Social Sciences

© Kelsey Gushue 2018

SIMON FRASER UNIVERSITY

Summer 2018

Approval

Name:	**Kelsey Gushue**
Degree:	**Master of Arts**
Title:	**Patterns of Female Offending: Childhood and Adolescent Risk Factors**
Examining Committee:	**Chair: William Glackman**
	Associate Professor

Jennifer Wong
Senior Supervisor
Associate Professor

Evan McCuish
Supervisor
Assistant Professor

Laura Guy
External Examiner
Adjunct Professor
Department of Psychology
Simon Fraser University

Date Defended/Approved: August 8, 2018

Ethics Statement

The author, whose name appears on the title page of this work, has obtained, for the research described in this work, either:

      a.   human research ethics approval from the Simon Fraser University Office of Research Ethics

or

      b.   advance approval of the animal care protocol from the University Animal Care Committee of Simon Fraser University

or has conducted the research

      c.   as a co-investigator, collaborator, or research assistant in a research project approved in advance.

A copy of the approval letter has been filed with the Theses Office of the University Library at the time of submission of this thesis or project.

The original application for approval and letter of approval are filed with the relevant offices. Inquiries may be directed to those authorities.

<div align="right">

Simon Fraser University Library
Burnaby, British Columbia, Canada

Update Spring 2016

</div>

Abstract

Differences in offending patterns between male and female youth are well established in the literature. In comparison to female youth, males are more involved in serious and violent offending and are also more likely to engage in offending that persists across the life course. Offending trajectory comparisons between males and females suggest that the trajectories of the highest rate female offenders are different from the highest rate trajectories of male offenders and that comparing trajectory association across gender can mask important within-group differences among female offenders. Indeed, little research has moved past analyzing female juvenile offenders as a homogenous group (Odgers et al., 2007). Consequently, there is limited understanding of the impact that risk and protective factors have on offending persistence or desistance specifically for female offenders. Using data from the Incarcerated Serious and Violent Young Offender Study, the current study examined the impact of key theoretical constructs on the offending trajectories of female adolescent offenders during emerging adulthood. Analyses using Traj for STATA revealed more heterogeneity in female offending trajectories than earlier indications in the literature. The results are discussed with reference to how childhood and adolescent risk factors help inform female offenders' continued offending into adulthood.

Keywords: gender; developmental criminology; longitudinal; offending trajectories; risk factors

To my children, London and Iverson.

Acknowledgements

I would like to thank all of the members of my supervisory committee; this thesis would not have been possible without you! To Dr. Jennifer Wong, I will forever be grateful for having you as my senior supervisor. In undergrad, you were the first person to give me an opportunity to work as a research assistant. This experience ignited my interest in research and solidified my decision to attend grad school. I would not be here today if it wasn't for you! To Dr. Evan McCuish, I would like to thank you for giving me the opportunity to work on the Incarcerated Serious and Violent Young Offender Study and providing me with the data for this thesis. Thank you for your support and feedback at every step of this thesis, it has made me a better writer and student. I look forward to working with you for years to come! To Dr. Laura Guy, thank you for your thoughtful comments and recommendations. You encouraged me to challenge my assumptions and my research will benefit from this going forward.

To my family, no amount of thanks will ever be enough. To my husband, Steven, thank you for your endless support. I will forever be thankful for the many nights you spent listening to my thesis presentation and for repeatedly talking me off the ledge. Your confidence in my abilities has always pushed me to go further in my academic career. Thank you x a million. To London and Iverson, I love you both more than you will ever know. Thank you for being the bright part of my day, every day. I would have never made it through the stress of grad school without you. To Nicole, thank you for being the best sister/auntie/cheerleader ever! I would have never made it this far in my academic career without your constant support and many days/nights spent babysitting. You are the best. Finally, to my Mom and Dad, thank you for your never-ending love, support, and encouragement. You never gave up on me and always pushed me to see my true potential. I will be forever thankful for having you both as my parents.

Last but not least, thank you to the friends who made grad school more bearable. Chelsey, Vanja, and Taylor, I will always remember our girl's nights and conference trips. Grad school would not have been the same without you!

Table of Contents

List of Tables

List of Figures

Chapter 1.   Introduction

The field of criminology and our understanding of crime was built on theoretical perspectives and analyses of male offending. Until roughly the 1970s, traditional perspectives on crime largely ignored delinquency among females (Belknap, 1996; Belknap & Holsinger, 2006). In the late 1900s, the "invisible girl" became visible: violent crime among females was increasing and the gap in offending rates between males and females was diminishing (Savoie, 1999). As such, it is imperative to understand the extent to which male-focused theories can be applied to female offenders. The developmental perspective within criminology is not exempt from these concerns.

One of the earliest developmental theories in criminology is Moffitt's (1993) dual taxonomy. The dual taxonomy posited two distinct offending patterns, or trajectories, across the life course: adolescent-limited (AL) and life-course persistent (LCP). AL and LCP offenders differ not only in their pattern of offending across the life course, but also in their exposure to childhood and adolescent risk factors. While AL offenders are influenced to commit crime in an attempt to bridge the "maturity gap," LCP offenders are characterized by both neurological deficits and exposure to a negative environment (Moffitt, 1993, p.16).

The developmental perspective has evolved significantly since Moffitt's initial conception of AL and LCP offenders. While trajectory analyses have often identified patterns mirroring Moffitt's dual taxonomy, Jennings and Reingle (2012) found that most offending trajectory studies report three to four distinct offending patterns (Jennings & Reingle, 2012). The majority of studies surveyed by Jennings and Reingle (2012) involved analyses of males alone or males and females combined, highlighting the fact that very little is known about female-specific offending trajectories. As such, the current study extends previous research by conducting analyses of offending patterns utilizing a high-risk female offender sample and analyzing the relationship between key risk factors for crime and the identified offending patterns.

1.1. Patterns of Offending

Combining males and females together in trajectory analyses masks the heterogeneity that exists within female offending. Using a sample of 262 males and 64 females, Corrado, McCuish, Hart, and DeLisi (2015) identified four distinct offending trajectories: bell shape, slow desisters, high rate chronic, and slow rising chronic. Of the 62 female offenders, only 11 were associated with the two chronic trajectories. While the two chronic trajectories were composed of primarily male offenders (95% and 88.7%, respectively), the bell-shaped trajectory was composed of 62.6% male offenders. Based on their findings, Corrado et al. (2015) contemplate if chronic female offending patterns exist. Similar findings have been reported elsewhere (e.g., Livingston, Stewart, Allard, & Ogilvie, 2008). Corrado and colleagues posit that these results could be a result of gender differences in offending rate (males simply commit more crime) and that female-specific trajectory analyses should be conducted to determine if a chronic female offending trajectory does exist.

In the most recent contribution to the literature, Loeber, Jennings, Ahonen, Piquero, and Farrington (2017) identified three distinct offending trajectories for a community-based female sample: non-offenders, low-rate offenders, and high-rate offenders. Despite being the most comprehensive analysis of female-specific offending trajectories to date, Loeber et al.'s analysis possessed a number of key limitations. First, analyses did not account for time spent in custody across the life course, a key methodological concern in the offending trajectory literature (Eggleston, Laub, & Sampson, 2004; Piquero et al., 2001). Second, Loeber et al. (2017) utilized a community-based sample, which are often not able to capture the most serious female offenders and often prevent advanced statistical analyses (Moffitt & Caspi, 2001; Odgers et al., 2007). This limitation is highlighted in Loeber et al. (2017) as 72.5 percent of the sample fell into the non-offender trajectory. Finally, Loeber and colleagues did not conduct any multivariate analyses assessing the impact of childhood and adolescent risk factors on patterns of female offending, an important feature for the targeted implementation of prevention and intervention programs.

1.2. Risk Factors for Female Offending

Limited research has assessed the impact of risk and protective factors on trajectory group membership using a custody-based sample of female offenders. Using community-based samples, Fergusson and Horwood (2002) and Odgers et al. (2008) found that risk factor exposure operated in a similar manner for both males and females. The extremely small number of female offenders in the chronic trajectory limited Fergusson and Horwood's analysis. Odgers et al.'s (2008) analyses were only able to assess antisocial behaviour from the age of seven to 15, preventing analyses of offending patterns into adulthood. In the most recent analysis of risk factor impact on female offending patterns, Wolff, Baglivio, Vaughn, DeLisi, and Piquero (2017) set out to determine the impact of a number of key risk factors on distinguishing between serious, violent, and chronic (SVC) and non-SVC female offenders. Logistic regression analyses identified a handful of significant risk factors, including age at first arrest, age at first school suspension, gang membership, government care experience, and a number of temperament characteristics (e.g., anger, irritability). Interestingly, key risk factors that are commonly shown to predict SVC offending amongst male youth were not significant in predicting SVC offending amongst female youth (Wolff et al., 2017). The authors suggest that further research should identify gender-specific risk factors that can differentiate female patterns of offending.

1.3. The Current Study

Previous research has yet to consistently identify the key risk factors that can distinguish between different patterns of female offending across the life course (Jennings & Reingle, 2012). Consequently, our ability to target prevention and intervention strategies to the most high-risk female populations is hindered. The current study will enable identification of childhood and adolescent risk factors for serious female offending that persists across the life course. This will be achieved by addressing two primary research questions: (1) Can multiple trajectories of offending among a high-risk female sample be identified? (2) Can these trajectories be distinguished from one another based on key risk factors?

Chapter 2.   Theoretical Perspectives

From the earliest free will and rational choice perspectives of the Classical School of Criminology to the sociologically based perspectives of the Chicago School, early explanations of crime were deeply rooted in between-individual differences. For the most part, early theorists tried to explain why one individual committed crime, yet another individual did not. The 1940s work of Eleanor and Sheldon Glueck was, arguably, the first that employed a longitudinal research design to the study of crime (Laub & Sampson, 2001). While cross sectional research designs are well-suited to the study of between-individual differences, longitudinal designs allow for the study of within-individual change over time. Analysis of within-individual change is a key focus of both life-course and developmental perspectives on crime (LeBlanc & Loeber, 1998). Through the use of longitudinal research designs, criminologists discovered the age-crime curve. Aggregate level official and self-report data, with minor variations, show that crime peaks in adolescence (roughly around the age of 17) and declines rapidly into young adulthood (Loeber et al., 2015; Moffitt, 1993). The presence of the age-crime curve is one of the most undisputed "facts" in criminology (Nagin, Farrington, & Moffitt, 1995; Tibbetts & Hemmens, 2010). There is significant contention, however, regarding explanations and perspectives on the age-crime curve. Four key frameworks/theoretical perspectives will inform this discussion: the general theory of crime, the criminal career, life-course criminology, and developmental criminology.

2.1. General Theory of Crime

Another key, yet disputed, characteristic of early criminological theory is the use of "general" explanations in which all crime and offenders can be explained through the same causal mechanisms (Moffitt, 1993; Piquero, Brame, Mazerolle, & Haapanen, 2002). The general theory of crime, developed by Gottfredson and Hirschi (1990), is the most notable "general" criminological theory. According to Gottfredson and Hirschi, crime and deviance is the result of low levels of self-control. Low self-control is characterized, primarily, by impulsivity, risk-taking behaviour, and lack of perseverance (Tibbetts & Hemmens, 2010). Much like other control theories of crime, Gottfredson and Hirschi (1990) assume that individuals are born with selfish and self-centred tendencies

that, without adequate child rearing and socialization, will result in low self-control and potential criminal involvement. Gottfredson and Hirschi view self-control as a time-invariant construct; if it is not developed by the age of 10, it will never become fully developed.

Gottfredson and Hirschi's (1990) general theory of crime can be classified as a mono-causal theory as it uses one latent construct (low self-control) to explain all types of crime and deviance ("all crime, all the time"). From this perspective, low self-control can account for both violent and non-violent crime. While a substantial body of research has established key correlates of offending across the life course, Gottfredson and Hirschi assert that there is only a relationship between "x" risk factor and crime to the extent that the risk factor functions as a moderating variable between low self-control and crime. For example, empirical research posits a relationship between substance use and crime. According to Gottfredson and Hirschi (1990), this finding would reflect a propensity for individuals with low levels of self-control to engage in substance use and, subsequently, engage in crime. In essence, there is an element of self-selection at play (Laub & Sampson, 1993).

In addition, the general theory of crime also asserts that different "groups" of offenders do not exist. While developmentalists posit the existence of distinct groups of offenders and associated offending trajectories, Gottfredson and Hirschi (1990) assert that any differences in offending characteristics are simply the result of varying levels of self-control and opportunity. From a policy perspective, this assertion indicates that the same intervention programs can be applied to all offenders and, as such, variety in treatment and intervention programs is unnecessary. This claim is in stark contrast to the Risk-Need-Responsivity (RNR) model developed by Andrews, Bonta, and Hoge (2007). Unlike developmental and criminal career frameworks that attribute different risk factor correlates to different aspects of offending (e.g., onset, persistence, desistance), the general theory of crime hypothesizes that low self-control and opportunity can explain all components of an individual's criminal career (Blumstein, Cohen, & Farrington, 1988). Because of the key tenets and assumptions of the general theory of crime, Gottfredson and Hirschi see longitudinal research as unnecessary (Gottfredson & Hirschi, 1987).

In explaining the age-crime curve from a low self-control perspective, Gottfredson and Hirschi (1990) distinguish between crime and criminality. Criminality, they assert,

refers to stable, individual-level differences in the propensity to engage in crime. A crime, on the other hand, is a discrete event reliant on opportunity (Gottfredson & Hirschi, 1990). While crime may decrease with age, as evidenced by the age-crime curve, criminality, or the propensity to commit crime, does not (Gottfredson & Hirschi, 1990). Gottfredson and Hirschi (1990) rely on both opportunity and age to explain why some people desist from the act of crime. To be clear, Gottfredson and Hirschi believe that the decline in the age-crime curve is a result of all offenders slowing down in their frequency of offending at roughly the same time. As such, in contrast to the Gluecks who view desistance from crime as a process of maturation, Gottfredson and Hirschi (1990) view desistance as a function of age. Gottfredson and Hirschi also make predictions regarding the age-crime curve and gender.

A central position of Gottfredson and Hirschi (1990) is that the relationship between age and crime does not vary across race, gender, geographical location, or crime type (Blumstein et al., 1988; Jang & Krohn, 1995). Important for the discussion at hand are assertions regarding the relationship between age, gender, and crime. Jang and Krohn (1995) conducted a direct test of what they refer to as the sex-invariance hypothesis, "that sex differences in delinquency are invariant over developmental stages of adolescents" (p. 195). Using a sample of African American adolescents derived from the Rochester Youth Development Study, Jang and Krohn (1995) found that differences in delinquency between males and females actually varied over time. More specifically, Jang and Krohn (1995) identified greater discrepancy in offending of males and females between the ages of 13 and 15 and less variability between the ages of 15 to 17. These findings contradict the invariance assertion held by Gottfredson and Hirschi, indicating that the relationship between age and crime does vary across gender. The criminal career framework, by allowing different criminal career parameters to vary across individuals, moves away from an invariance perspective.

2.2. The Criminal Career Framework

A criminal career, according to Blumstein et al. (1988), is "the longitudinal sequence of offenses committed by an offender who has a detectable rate of offending during some period" (p. 2). The concept of the "criminal career" is completely atheoretical. Rather, the criminal career framework allows for the sorting and organization of different key elements of offending across the life course (Blumstein et

al., 1988). In particular, the criminal career framework identifies onset, duration, and termination of offending as key features of the criminal career. In contrast to Gottfredson and Hirschi's (1990) assertion that low self-control explains "all crime, all the time," Blumstein et al. (1988) posit that different causal factors can predict different elements of the criminal career. For example, sexual abuse might be an important correlate of participation in crime for female offenders, but it might not be a strong predictor of continued offending or persistence. Blumstein et al. (1988) also argue that it is necessary to distinguish between different types of crimes as they too could have differing causal factors.

From a criminal career perspective, the aggregate age-crime curve is a reflection of both prevalence and frequency. Prevalence, according to Blumstein et al. (1988), is the proportion of people in a population that are actually committing crime. Prevalence is sometimes referred to as participation. Frequency, on the other hand, is the number of crimes that are actually being committed by active offenders (Blumstein et al., 1988). Frequency is also referred to as lambda in order to distinguish it from the aggregate population crime rate often found in officially recorded crime statistics (Blumstein et al., 1988). While Gottfredson and Hirschi (1990) view the decline in offending over time as a function of all offenders reducing their frequency of offending, Blumstein and colleagues (1988) view the decline as a reflection of a change in prevalence. More specifically, they argue that the age-crime curve is a reflection of some offenders continuing to offend at a stable rate, while others stop offending completely. Initially, Blumstein et al. (1988) argued that while prevalence or participation would mirror the age-crime curve, frequency or lambda would not. Recent research testing this assertion reveals that this may not be the case.

In a direct test of the prevalence versus frequency debate, Loeber and colleagues (2015) set out to examine disaggregated age-crime prevalence curves and age-crime frequency curves. An age-crime prevalence curve addresses the age at which the proportion of individuals actively offending peaks and declines (Loeber et al., 2015). An age-crime frequency curve addresses the age at which offending frequency peaks and declines (Loeber et al., 2015). Using both self-report and officially recorded data from the Pittsburgh Youth Study and the Pittsburgh Girls Study, Loeber et al. (2015) found that, for the most part, both prevalence and frequency curves mirrored the traditional aggregate-level age-crime curve. The one exception to this finding was that

the age-crime frequency curve based on official data for females was less peaked than the traditional age-crime curve, indicating a more stable frequency of offending over time. These findings, much like Jang and Krohn's (1995) research, demonstrate that the relationship between age and crime is not invariant across gender. Given the findings suggesting variability in the age-crime curve across gender, it is important to analyze the different parameters of the age-crime curve for females specifically.

Based on an accumulation of research, utilizing primarily male samples (Loeber et al., 2017), Farrington (2005) asserts some common parameters of the criminal career. Of interest to this discussion are the following: onset of offending typically occurs between the ages of eight and 14, offending peaks in late adolescence and declines thereafter, and an earlier onset of criminal behaviour is indicative of a longer career duration. A key question that researchers have begun to address is the extent to which these commonalities are present in female offending as well. When drawing on a community-based sample using measures of self-report delinquency, Loeber et al. (2017) identified key parameters of the female criminal career: offending prevalence peaked at the age of 15, the average age of onset was 13.9 years old, and an early age of onset was associated with a longer career duration and a higher average number of offences. These findings suggest similarity between males and females on key constructs of the criminal career (Loeber et al., 2017). Similarly, Block, Blokland, van der Werff, van Os, and Nieuwbeerta (2010) also found that an earlier age of onset predicted a longer career duration for both males and females. In contrast to Loeber et al. (2017), Block et al. (2010) and DeLisi (2002) found that females had a later average age of onset than males. Additionally, Block et al. (2010) found that offending prevalence peaked for females later than it did for boys. One possible explanation as to the variation in these findings is the use of different follow-up periods. Loeber et al. (2017) had data on offending from the ages of 11 to 19, while Block et al.'s (2010) data spanned from 12 to 87 years old. From a criminal career perspective, there is, as of yet, inconclusive evidence regarding the criminal career parameters for female offenders.

Despite finding relatively similar age-crime curves for both prevalence and frequency, Loeber et al. (2015) caution against the assumption that the age-crime frequency curve represents the frequency of offending amongst all offenders. Rather, the age-crime frequency curve is a composite of a number of individual-level offending trajectories with distinct patterns of onset, persistence, and desistance. If, in fact,

individual offenders follow distinctive trajectories of offending characterized by differences in onset, persistence, and desistance, what factors can account for these individualized changes in offending? Both life-course and developmental theories posit different perspectives on change across the life course.

2.3. Life-Course Criminology

Drawing on more traditional sociological explanations of crime (e.g., social bonds, labelling theory), Laub and Sampson (1993) identify the importance of change and continuity throughout the life course. While agreeing with Gottfredson and Hirschi regarding the "generality" assumption, Laub and Sampson argue that turning points across the life course can impact patterns of offending across the life course (Piquero et al., 2002). Change, according to Laub and Sampson (1993), occurs through social capital – or the investment in social institutions such as marriage, employment, or the military. More specifically, social capital can act as a turning point in the prevention or desistance of crime (Laub & Sampson, 1993). Much in line with Elder's (1998) assertion that the timing of life events can differentially impact development, turning points during the transition from adolescence to adulthood are significant in altering life trajectories (Laub & Sampson, 1993).

Continuity, on the other hand, addresses the accumulation of experiences across the life course and how these experiences impact developmental pathways (Laub & Sampson, 1993). Cumulative continuity of disadvantage addresses the fact that certain events or experiences can produce subsequent negative effects in terms of an individual's ability to form social bonds and, consequently, invest in social institutions (Laub & Sampson, 1993). Cumulative continuity of disadvantage is, in effect, a chain of events. For instance, a juvenile incarceration impacts the ability of youth to receive their education and gain valuable job skills, which in turn would affect their ability to obtain employment upon release. The preceding example signifies what Laub and Sampson (1993) term 'state dependence'. Taken as a whole, Laub and Sampson's (1993) conceptions of age-graded turning points, cumulative continuity, and state dependence have the ability to explain both stability and change in offending across the life course.

Significant societal changes have occurred since Laub and Sampson's (1993) conception of change and continuity across the life course. In 2000, Arnett coined a new

stage of development – emerging adulthood. According to Arnett, emerging adulthood (roughly 18-25 years old) is a time of significant instability and in which typical demographic shifts, such as marriage and having children, are occurring at a decreased rate. The importance of this is that factors across the life course that have been afforded great importance in the desistance of crime (e.g., marriage – Laub & Sampson, 1993) are occurring much later in the life course for recent generations. What we are left with is a developmental stage in the life course in which typical informal and formal social controls are weakened, and thus the persistence of crime is more likely. When we consider Laub and Sampson (1993) and Elder's (1998) assertion that timing of events in the life course matter, Arnett's (2000) proposition of emerging adulthood and its associated lack of social controls has important implications. When considered in conjunction with the idea of cumulative disadvantage, prolonging the period of time in which there is little investment in social institutions could have a significant negative effect on an individual's ability to invest in social capital and, consequently, desist from crime.

Change across the life course is not a homogenous experience. Rather, change occurs for some individuals, yet not others. According to Laub and Sampson (1993), people change through investment in social institutions. What is less easily answered though, is why some people never experience change or turning points across the life course. From a life-course perspective, Laub & Sampson (2001) assert that change is either random or the result of a societal level "exogenous shock" (e.g., war) (Laub & Sampson, 2001, p. 45). Developmental perspectives, on the other hand, view change across the life course as predictable (LeBlanc & Loeber, 1998). As such, developmental perspectives are particularly well suited to examining why some people change and others do not.

2.4. Developmental Criminology

Both Gottfredson and Hirschi (1990) and Laub and Sampson (1993) agree, to some extent, regarding the assumption of generality (i.e., that persistent individual differences inform offending for all offenders) (Piquero et al., 2002). While Laub and Sampson (1993) agree that all offenders tend to follow one trajectory of offending, they also argue that this trajectory can be significantly altered through turning points, or bonds to key societal institutions (Piquero et al., 2002). Developmental theorists tend to

agree that both stable individual propensity and life experiences can impact the development of offending (Piquero et al., 2002). How developmental theorists differ is on the assumption that all offenders follow the same pattern of offending across the life course. Rather, developmental theories posit the existence of different groups of offenders (Piquero et al., 2002). This assertion composes the first of two key features of developmental criminology as proposed by Loeber and LeBlanc (1990). Based on the notion that offenders can follow different developmental sequences, the second key feature of developmental criminology is that these varying sequences can be differentially impacted by causal factors or correlates (LeBlanc & Loeber, 1998).

Developmental theorists are particularly interested in the patterned development of behaviour over time (LeBlanc & Loeber, 1998). Having been heavily influenced from psychology and the notion of orthogenetics, developmental criminology views change as predictable across the life course (LeBlanc & Loeber, 1998). The view that change is predictable led LeBlanc and Loeber (1998) to identify three key processes of behavioural development over time: activation (age of onset), aggravation, and desistance. Three sub processes characterize activation: acceleration (increased frequency), stabilization (increased continuity), and diversification in offending. Aggravation addresses the increase in offence seriousness over time. Desistance refers to the termination of offending and is composed of four sub-processes: deceleration (a slowing down in frequency), de-escalation (a reduction in offence severity), reaching a ceiling, and specialization (movement from general to specific patterns of offending) in offending. Unlike Gottfredson and Hirschi (1990), developmental criminologists do not see desistance as a reflection of age. Rather, developmental theorists, such as Moffitt (1993), view desistance as normative.

The three key processes of behavioural development identified by LeBlanc and Loeber (1998) are reflected in developmental trajectories, or patterns of offending across the life course. A trajectory is distinct from a pathway in that trajectories focus on the quantity of offending, while pathways tend to focus on the qualitative nature of offending. Developmental trajectories allow for the identification of within-individual changes in development across the life course, while also allowing for differences in development between individuals. In this way, offending trajectories reflect the developmental assumption that multiple groups of offenders exist. One of the most influential

developmental theories, Moffitt's (1993) dual taxonomy, identifies two distinct offending trajectories and proposes distinct causal pathways for each group.

2.4.1. Moffitt's (1993) Dual Taxonomy

Moffitt's (1993) dual taxonomy proposes two distinct categorizations of juvenile offenders based on the well-established age-crime curve: life-course persistent (LCP) offenders and adolescence-limited (AL) offenders. Moffitt (1993) views the age-crime curve as a reflection of offending prevalence, rather than frequency. This perspective, if true, would indicate that the peak in offending in adolescence is the result of an increased number of individuals actively offending in that time. In essence, the age-crime curve reflects both continuity and change in offending across the life course. Moffitt (1993) uses the categorizations of LCP and AL offenders to explain this possibility.

LCP offenders are those individuals that make up a small proportion of juvenile offenders, yet are responsible for a significant amount of juvenile crime. These individuals display different forms of antisocial behaviour across both time and space Unlike AL offenders, LCP offenders do not desist from crime. Rather, LCP offenders exhibit astounding continuity in offending across the life course. According to Moffitt (1993), LCP offenders differ from AL offenders in that they have neuropsychological impairment (which affects behaviour) in combination with exposure to criminogenic environments. Due to the combination of neuropsychological impairment and criminogenic environment, LCP offenders are at a significant disadvantage early on in the life course in terms of their ability to adapt to life in prosocial ways. Much like Laub and Sampson's (1993) assertion that delinquency reduces opportunities for the creation of social bonds, the presence of neuropsychological impairment and exposure to criminogenic environment begins a chain of events in which subsequent life events decrease the opportunities for engaging in prosocial behaviours and pathways (Moffitt, 1993).

In contrast to LCP offenders, AL offenders are those individuals in which involvement in delinquency or antisocial behaviour is confined to adolescence (Moffitt, 1993). Unlike LCP offenders, an AL offenders' antisocial behaviour is typically context-specific. According to Moffitt (1993), AL offenders' participation in crime is "motivated by

the gap between biological maturity and social maturity" (p. 14). In other words, biologically a youth feels like an adult, yet is restricted from engaging in typical adult behaviours (e.g., drinking alcohol or driving a car). Borrowing from social learning theory, Moffitt (1993) asserts that AL offenders observe and mimic the antisocial behaviour of their LCP peers. Unlike LCP offenders, AL offenders desist from crime due to opportunity – as they grow older, they begin to have more advantageous opportunities. This distinction is one of the key differences between LCP and AL offenders. From early childhood, LCP offenders lack the opportunity to build social bonds and engage in prosocial behaviour due to their neuropsychological deficit and exposure to criminogenic environment. For AL offenders, the time spent involved in delinquency is limited to a short time period so there is less opportunity for the accumulation of disadvantage. Due in part to the delay in onset, AL offenders had the opportunity to build social skills and attachment to social institutions prior to engaging in delinquency. The effect of the delayed onset is more opportunities for an AL offender to participate in prosocial activity and, thus, desist from crime. In relation to Laub and Sampson's (1993) conceptualization of turning points, Moffitt (1993) asserts that LCP and AL offenders can both experience turning points, but the turning points will differentially impact them. For instance, a LCP offender may still marry, but it is likely that the marriage would not have a positive impact on desistance from crime. One of the key limitations of Moffitt's (1993) dual taxonomy is the theoretical and empirical exclusion of female offenders.

Criticisms of the male-centric nature of the dual taxonomy prompted Moffit to empirically test the theory with a female inclusive sample. Moffitt and Caspi (2001) identify two key propositions that, if true, would provide support for the application of the dual taxonomy to females. First, due to the gendered-nature of risk factors for offending, females would be less likely to follow an LCP pathway than males. As such, most female offenders could be characterized as AL. Second, the causal explanations for AL offending in males would apply equally well to girls. Using data from the Dunedin Multidisciplinary Health and Development Study, Moffitt and Caspi (2001) found that, as predicted, males were ten times more likely than females to follow the LCP path. In contrast, the ratio of males to females following the AL path was quite similar. Additionally, the same factors were related to both males and females following the AL path. Moffitt and Caspi (2001) use this finding to assert that the dual taxonomy applies to both males and females. One of the key limitations of this study is that the authors used

a priori classifications of offenders into either the LCP or AL pathways, ignoring the possibility that two trajectories may not best reflect the heterogeneity within female offending. Silverthorn and Frick (1999), in particular, argue that a single developmental pathway best represents female offending.

2.4.2. Silverthorn and Frick's Delayed Onset Pathway

Silverthorn and Frick (1999) question the applicability of Moffitt's dual taxonomy to female offending. Both criminal career and developmental perspectives consistently identify early onset of problem behaviour as indicative of a more chronic offending pattern across the life course (Farrington, 2005). Similar to Moffitt's dual taxonomy, the bulk of criminal career research was developed for and validated on samples of males only (Loeber et al., 2017). As such, the relationship between age of onset and offending chronicity is less understood for females. In relation to age of onset, Silverthorn and Frick (1999) propose their delayed onset pathway for females. According to Silverthorn and Frick (1999) very few girls exhibit antisocial behaviour in early childhood. If this were true, Moffitt's notion of the LCP offender would be an exclusively male phenomenon. Rather, Silverthorn and Frick (1999) assert that the activation of delinquency and offending for females does not occur until adolescence as a result of biological change and social influence. Interestingly, the delayed onset pathway for females is proposed to share many of the same causal influences as the LCP pathway for males. Recent research has empirically tested the existence of a delayed onset pathway for girls.

White and Piquero (2004) set out to test Silverthorn and Frick's (1999) assertion that the LCP pathway is composed exclusively of males. Using data from the National Collaborative Perinatal Project, White and Piquero (2004) found evidence in contradiction of a delayed onset pathway for girls. First, White and Piquero (2004) clearly identified both an early-onset and a late-onset pathway for female offenders, with only a small variation in the number of males versus females following the early-onset pathway. Second, analyses revealed that early-onset males and females had similar criminal outcomes in adulthood. This finding would appear to indicate that, to some degree, there is a level of persistence or continuity in offending amongst the late-onset females. Additionally, early-onset females indicated a more negative background and functioning than late-onset females. In support of Silverthorn and Frick's (1999) assertion regarding the predictors of the delayed onset pathway in girls, White and

Piquero (2004) found that late-onset females did, in fact, mirror their early-onset male counterparts in terms of risk factors. Empirical analyses of both Moffitt's (1993) dual taxonomy and Silverthorn and Frick's (1999) delayed onset pathway call into question the applicability of both single and dual pathway models to female offenders. Advancements in statistical methods, primarily the introduction of semi-parametric group-based modeling, have provided a new avenue through which developmental criminologists can explore the patterns of offending among females.

Chapter 3. Patterns of Offending

In line with the first key feature of developmental criminology (i.e., the existence of multiple groups of offenders), developmental theorists and proponents of the criminal career framework posit that the age-crime curve is actually an aggregate of a number of distinct offending patterns, or offending trajectories. According to Ahonen, Jennings, Loeber, and Farrington (2016), "one way to investigate this hypothesis is to undertake trajectory analyses, which are designed to reveal the age-crime curve of subgroups of individuals who may be different from the aggregate curve" (p. 263). While not the only method through which to approach this hypothesis, trajectory analyses have gained considerable traction within criminology in recent years (Piquero, 2008). Recently, a number of critical reviews (e.g., Fontaine, Carbonneau, Vitaro, Barker, & Tremblay, 2009; Jennings & Reingle, 2012; Piquero, 2008) have asserted that the number and shape of trajectories identified in trajectory analyses can be influenced, among others, by sample characteristics (e.g., community-based versus high-risk) and choice of measurement (e.g., self-report versus official record). As such, research presented herein will be organized by both sample type and measurement of offending used in order to aid in the synthesis of existing research findings.

3.1. Male and Female Combined Analyses

Akin to other areas of empirical research within criminology, the vast majority of studies using trajectory analysis have focused on males (Ahonen et al., 2016; Loeber et al., 2017). Recently, Piquero and Moffitt (2010) cited the need for research analyzing the role of gender in developmental perspectives on crime. The following section provides a summary of research bringing gender into the analysis of offending patterns.

3.1.1. Community-Based Samples

Initially, many studies employing trajectory analysis combined males and females together within the analysis. This section provides an overview of trajectory analyses conducted on males and females combined. One factor to be cognizant of when interpreting the results of trajectory analyses using community-based samples is the tendency for these samples to underestimate the prevalence of the more serious

offending patterns (Moffitt & Caspi, 2001; Odgers et al., 2007). In 2004, Bongers, Koot, van der Ende, and Verhulst analyzed a Dutch birth cohort of 2,600 males and females Relying on parent reports, Bongers et al. (2004) found a three-trajectory solution for both aggressive behaviour and property violations. The three trajectories identified for aggression include near zero, low decreasers, and high decreasers. Similarly, trajectories identified for property violations include near zero, low decreasers, and high persisters. Both of the near zero trajectories had almost no aggressive behaviour or property violations from the ages of four to 18. The low decreaser trajectories both had low levels of aggression and property violation at age four and declined until age 18. The high decreaser trajectory had high levels of aggression at the age of four, but slowly declined over time. In contrast, the high persister trajectory had high levels of property violation at age four that persisted until the age of 18. Unsurprisingly, the vast majority of females fell into the near zero trajectory for both aggression and property violation (81% and 79.7% respectively). It should be noted that Bongers et al. (2004) initially conducted trajectory analyses for both males and females separately, but found substantial similarity in the results. Consequently, all analyses reported focused on a combined analysis of males and females.

In 2000, Fergusson, Horwood, and Nagin evaluated a cohort of 936 children from New Zealand who were followed from birth until the age of 18 (The Christchurch Health and Development Study). Based on both self, parental, and significant other reports of offending, Fergusson et al. (2000) identified four offending trajectories: nonoffenders, moderate offenders, adolescent-onset offenders, and chronic offenders. Similar to Bongers et al. (2004), Fergusson and colleagues conducted separate analyses of both males and females, but because of similarity in the shape of offending trajectories they did not report the results of the individual analyses. A breakdown of gender composition was not provided for each trajectory. Rather, Fergusson et al. (2000) indicate that males disproportionately followed the moderate and chronic offender trajectories.

The Seattle Social Development Project (SSDP) is a longitudinal study of the development of both pro-social and antisocial behaviours amongst a sample of 808 5th grade students from 18 public elementary schools in Seattle. Using data from the SSDP, Chung, Hill, Hawkins, Gilchrist, and Nagin (2002) identified five distinct trajectories based on self-reported offending seriousness: nonoffenders, late onsetters, desisters, escalators, and chronics. Chi-square analyses indicated significant differences between

trajectories in terms of gender. Specifically, males were significantly more likely to follow the chronic trajectory than females. Conversely, females were significantly more likely to follow the nonoffender trajectory than males.

Using the Middle Adolescent Vulnerability Study, Wiesner and Windle (2004) evaluated self-reported delinquency among 1,218 male and female high school students (average age at first data collection was 15.5 years). Latent growth mixture modeling revealed that a six-class solution best fit the data: rare offenders, moderate late peakers, high late peakers, decreasers, moderate-level chronics, and high-level chronics. Youth associated with the rare offender trajectory had near zero rates of offending from the ages of 15.5 to 17. The moderate late peaker trajectory was characterized by near zero rates of offending at the age of 15.5, which increased and peaked at the age of 16.5 and declined thereafter. The high-late peaker trajectory mirrored the moderate late peaker trajectory, but with a higher rate of offending. Youth associated with the decreaser trajectory had the second highest level of offending at age 15.5, but declined until the age of 17. Both the moderate-level and high-level chronic trajectories had stable levels of offending from age 15.5 to 17, but with the high-level trajectory offending more frequently. Significant gender differences emerged for the rare offender, moderate level chronic, and high-level chronic trajectories. While the use of community-based samples promotes generalizability, high-risk samples have the unique ability to identify the more serious female offenders.

3.1.2. High-Risk Samples

Three studies were identified that conducted male-female combined analyses of a high-risk sample. Yessine and Bonta (2006) analyzed a sample of 438 male and 75 female juvenile offenders from Manitoba, Canada. Similarly to Moffitt's (1993) dual taxonomy, results of the trajectory analyses based on both offending frequency and severity revealed two distinct offending patterns: chronic high and stable low. The chronic high trajectory was characterized by high levels of offending at age 12 that increased into adulthood. Lower levels of offending which declined into adulthood characterized the stable low trajectory. Youth associated with the chronic trajectory offended with greater severity and at a more frequent rate than youth associated with the stable low trajectory. Parallel to patterns observed among community-based samples,

Yessine and Bonta (2006) reported that the vast majority (96%) of the female offenders in the sample were associated with the stable low trajectory.

The Criminal Career and Life Course study is a study of 4,180 male and 432 female adjudicated offenders in the Netherlands (Block et al., 2010). Criminal histories were collected retrospectively until age 12 and prospectively until age 87 (Block et al., 2010). Two studies conducted trajectory analyses using this sample: Block et al. (2010) and Blokland, Nagin, and Nieuwbeerta (2005). Both studies identified four offending trajectories: sporadic offenders, low-rate desisters, moderate-rate desisters, and high-rate persisters. The sporadic offending trajectory was characterized by a near zero rate of offending into adulthood. The low-rate desister trajectory was characterized by a peak in offending in emerging adulthood (i.e., 18-21) and a decline thereafter. The moderate-rate desister trajectory closely mirrored the low-rate desister trajectory. However, the moderate-rate desister pattern had a higher rate of offending and a slightly later peak in offending. Finally, the high-rate persister trajectory was characterized by offending that increased until emerging adulthood and remained high and stable across the life course. The vast majority of both men and women were associated with the sporadic offending trajectory. However, females were significantly more likely to be associated with the sporadic offending trajectory than the high-rate persister trajectory (Blokland et al., 2005).

One of the key implications of the summarized studies (*see Table 1*) is the distribution of gender across offending trajectory. In every study, female offenders were disproportionately associated with the low-rate or non-offender trajectory, while males were disproportionately associated with trajectories indicating chronic offending patterns. This finding is one of the key limitations of offending trajectory analyses that combine both males and females. Combined male-female analyses constrains our opportunity to truly understand female offenders. One of the ways in which to overcome this limitation is through the use of female-only samples.

Table 1.   Summary of Previous Research – Male-Female Combined Analyses

	Number of Trajectory Groups	Shape of Trajectories
Community-Based Samples		
Bongers et al. (2004)	Three	Near zero, low decreasers, and high decreasers (aggression); Near zero, low decreasers, and high persisters (property)
Fergusson et al. (2000)	Four	Nonoffenders, moderate, adolescent-onset, and chronic
Chung et al. (2002)	Five	Nonoffenders, late onsetters, desisters, escalators, and chronics
Wiesner & Windle (2004)	Six	Rare offenders, moderate late peakers, high late peakers, decreasers, moderate-level chronic, and high-level chronic
High-Risk Samples		
Yessine & Bonta (2006)	Two	Stable low, and chronic
Block et al. (2010); Blokland et al. (2005)	Four	Sporadic offenders, low-rate desisters, moderate-rate desisters, and high-rate persisters

3.2. Female-Only Analyses

The use of male-female combined trajectory analyses has important limitations. The inclusion of males in the analyses masks the heterogeneity that exists within female offending simply because males commit more crime (a reflection of both prevalence and frequency). In comparison to male offenders, female offenders will always resemble a low-rate or non-chronic offending pattern. To circumvent this issue, Corrado et al. (2015) called for female specific analyses. Again, in order to facilitate the synthesis of research findings, results presented in the following section are organized in terms of both sample and measurement of delinquency.

3.2.1. Community-Based Samples

Self-report. The vast majority of research analyzing female specific offending trajectories has relied on community-based samples using self-reports of delinquency. Broidy et al. (2003) was one of the first studies to conduct female-only analyses using semi-parametric group-based modeling. Broidy et al. analyzed four different data sets (Christchurch Health and Development; Dunedin Multidisciplinary Health and Development; Child Development Project [CDP]; Quebec Provincial) with similar outcome measures to observe patterns of female aggression across the life course. To be clear, these analyses were not focusing on crime or delinquency, but rather parent,

teacher, and self-reported measures of aggression in early childhood (i.e., between six and 13 years old depending on the sample). Results of the study produced between two and four trajectories depending on the dataset analyzed. Analyses for each dataset will be discussed in turn.

First, for the Christchurch sample, three trajectories best fit the data: stable chronic (10% of the sample), stable low-level (48%), and never (42%). Both of the stable trajectories show unchanging levels of aggression between the ages of six and 13, but vary in the level of aggression. Analysis of the Dunedin sample revealed a two-trajectory solution: little physical aggression (57%) and moderate physical aggression declining (43%). While the little physical aggression trajectory is stable over time, the moderate trajectory has a higher level of aggression that declines over time. Similar to the Christchurch sample, results indicated that a three-trajectory solution best fit the CDP sample (rare=46%; high-stable=10%; low-stable=44%). Youth associated with the rare trajectory infrequently engaged in aggression. Both the high and low trajectory were characterized by stable levels of aggression over time, but with the high-stable trajectory characterized by more frequent aggression. Finally, results from the Quebec Provincial sample revealed a four-trajectory solution: little physical aggression (52%), stable (3%), stable low (33%), and high-level rapid decline (12%). Youth associated with the little physical aggression trajectory were rarely aggressive. The stable trajectory was characterized by stability in aggression. However, no information was given as to the frequency of offending among this trajectory. The stable low trajectory was characterized by low levels of offending that were stable across the period of study. Finally, youth associated with the high-level rapid decline trajectory engaged in high levels of aggression in early childhood that rapidly declined until the age of 12, after which time aggression levels were near zero. Broidy et al.'s (2003) analyses revealed that females follow high-rate patterns of aggression with greater prevalence than identified in male-female combined analyses.

In their 2006 study, Lahey et al. used a sample of dependents (n=4,752) whose mothers took part in the National Longitudinal Survey of Youth (NLSY79). Trajectory analyses were based on parental reports of conduct problems between the ages of four and 13 and self-reports of delinquency between the ages of 14 and 17. Results indicate a five-group model as best fitting the data. The five trajectories identified include low (17.1%), normative (37%), moderate (27.6%), AL (11.4%), and LCP (6.9%). The low,

normative, and moderate trajectories were all characterized by relatively stable levels of conduct problems from the ages of four to 17. However, the trajectories differed in the rate of conduct problems, with low having the lowest rate and moderate having the highest rate. Lahey et al.'s (2006) research identified both an AL and an LCP pathway, but the results also indicate that offending patterns among females may be more complex than those posited by Moffitt's (1993) dual taxonomy and Silverthorn and Frick's (1999) delayed onset pathway.

In the most recent undertakings, Ahonen et al. (2016) and Loeber et al. (2017) analyzed data from the Pittsburgh Girls Study. The Pittsburgh girls study is composed of a community-based sample of 2,450 participants interviewed yearly. It should be noted that Ahonen et al. (2016) analyzed self-reported delinquency from the ages of 11 to 18, while Loeber et al. (2017) analyzed from the ages of 11 to 19. Because of this small distinction, the composition of each trajectory varied between the two studies, but the overall trajectories remain the same between studies. Both studies identified three distinct trajectories: non-offenders (72.5 - 77.5%), low-rate offenders (20.7 - 21.4%), and high-rate offenders (1.8 - 6%). The low-rate and high-rate offending trajectories followed a similar shape in offending (peak in mid-adolescence and decline thereafter), but varied in prevalence and frequency. One of the limitations of using community-based samples is evidenced in the fact that nearly three-quarters of the Pittsburgh Girls Study participants had never committed a crime.

Official record. In 2012, Andersson, Levander, Svensson, and Levander (2012) analyzed a sample of 518 female Swedish offenders drawn from the larger community-based Swedish Longitudinal Project Metropolitan. Using latent class analysis, Andersson et al. (2012) identified four distinct classes of offenders based on officially recorded crimes between the ages of 12 and 30: low-rate desister (64.3%), early-onset desister (17.2%), adult onset (10.8%), and high-level chronic (7.7%). Females associated with the low-rate desister trajectory displayed increasing levels of offending until the age of 19-20 and a gradual decline thereafter. The early-onset desister trajectory was characterized by a peak-offending rate at the age of 15-16 followed by near zero offending into adulthood. Females associated with the adult onset trajectory displayed near zero levels of offending until the age of 23-24, with a peak at age 27-28, followed by a decline. Finally, the high-level chronic trajectory was characterized by incremental growth in offending from the ages of three to 25-26, followed by a gradual decline. Both

the adult onset and high-level chronic trajectory were characterized by active offending at the end of the study period (age 30). Of particular interest from a criminal career perspective is the early-onset desister trajectory. The identification of a trajectory with an early onset followed by a complete desistance from crime thereafter stands in stark contrast to the assertion that an early age of onset is indicative of a longer duration of criminal offending (Andersson et al., 2012). These findings suggest that the typical criminal career parameters may not be equally applicable to females as they are to males.

Both D'Unger, Land, and McCall (2002) and Cohen, Piquero, and Jennings (2010) undertook trajectory analysis of a community-based sample of females derived from the Second Philadelphia Birth Cohort Study. Trajectory analyses were based on official police records from the age of eight to 26. It is important to note that D'Unger et al. (2002) analyzed a random sub-sample (n=3,000) of the original 14,000 female study participants; as such there are minor variations between D'Unger et al. (2002) and Cohen et al. (2010). In both studies, a three-trajectory solution was found to best fit the data. The trajectories include: non-offender (84.4-89.9%), low-adolescence peaked (9.5-10.37%), and high-adolescence peaked (0.5-5.3%). Cohen et al. (2010) note that although a three-trajectory model best fit the data, the results, from a practical standpoint, indicate two offending trajectories: offender and non-offender. Again, this lack of variation is one of the inherent limitations of the use of a community-based sample. High-risk offender based samples are necessary to overcome these limitations and estimate the full magnitude of chronic offending among females.

3.2.2. High-Risk Samples

Female-specific trajectory analyses conducted on high-risk offender based samples are uncommon. In one of the few such studies, Jennings (2011) analyzed a sample of youth referred to Florida Department of Juvenile Justice for child welfare concerns/status offending (i.e., child in need of supervision [CINS] or family in need of supervision [FINS]). The sample was composed of 1,226 females. Although not exclusively an offender-based sample, this sample is appropriately characterized as high-risk in comparison to the general population. Trajectory analyses were based on juvenile delinquency arrests from the age of 13 to 17. Five trajectories were identified: non-offender (58.7%), low-rate adolescence limited (25.1%), high-rate adolescence

limited (6.3%), late-onset adolescent offenders (8.5%), and high-rate chronic (1.5%). In line with Silverthorn and Frick's (1999) delayed onset model, Jennings (2011) did identify a late-onset trajectory that was unique to female offenders. More specifically, analyses conducted on male offenders drawn from the same sample did not identify a late onset trajectory. Taken in conjunction with other studies (e.g., Block et al., 2010), it is possible that late onset may be a unique characteristic of the female criminal career. The identification of two AL trajectories and a high-rate chronic trajectory also provide support for elements of Moffitt's (1993) dual taxonomy. However, similarly to previous studies identified, the trajectory analyses conducted by Jennings (2011) reveal much greater heterogeneity than predicted by Moffitt (1993) and Silverthorn and Frick (1999).

In one of the only studies to use a truly offender-based sample, Blokland and van Os (2010) analyzed 432 women from the Criminal Career and Life Course Study. Previous research utilizing this sample (e.g., Block et al., 2010; Blokland et al., 2005) identified a four-trajectory solution when analyzing both males and females combined. Blokland and van Os (2010) analyzed female offenders specifically and still found a four-trajectory solution best fit the data. The four trajectories included sporadic offender (similar to that identified in the previous male-female combined analysis; 88.8%), emerging adulthood desisters (3.9%), emerging adulthood onsetters (6.6%), and high-frequent chronics (similar to that identified in the previous male-female combined analysis; 0.7%). Based on Blokland and van Os' (2010) study and comparisons with previous findings (e.g., Block et al., 2010; Blokland et al., 2005), it appears that desistance in emerging adulthood and onset in emerging adulthood are unique characteristics of the female criminal career. The summarized studies using female-only samples identified between two and five distinct offending trajectories, a number of which indicate a more chronic offending pattern than identified in the male-female combined analyses (*see Table 2*). While community-based samples promote generalizability (Bongers et al., 2004), high-risk offender based samples are necessary to capture the full magnitude of chronic female offending and enable the study of associations between various risk factors and offending trajectories.

Table 2.   Summary of Previous Research – Female-Only Analyses

	Number of Trajectory Groups	Shape of Trajectories
Community-Based Samples		
Broidy et al. (2003)		
1) Christchurch	Three	Never, stable low-level, and stable chronic
2) Dunedin	Two	Little aggression, and moderate declining
3) Child Development	Three	Rare, low-stable, and high-stable
4) Quebec	Four	Little aggression, stable low, stable, and high-level rapid decline
Lahey et al. (2006)	Five	Low, normative, moderate, AL, and LCP
Ahonen et al. (2016); Loeber et al. (2017)	Three	Nonoffenders, low-rate, and high-rate
Andersson et al. (2012)	Four	Low-rate desister, early-onset desister, adult onset, and high-level chronic
D'Unger et al. (2002); Cohen et al. (2010)	Three	Nonoffender, low-adolescence peaked, and high-adolescence peaked
High-Risk Samples		
Jennings (2011)	Five	Nonoffender, low-rate adolescence limited, high-rate adolescence limited, late-onset adolescent offenders, and high-rate chronic
Blokland & Van Os (2010)	Four	Sporadic offenders, emerging adulthood desisters, emerging adulthood onsetters, and high-frequent chronic

Chapter 4.   Risk Factors for Female Offending

In comparison to understandings of the risk factor profiles of male offenders, little is known about the predictors of crime for females (Moretti, Catchpole, & Odgers, 2005; Moretti & Odgers, 2002). While some research indicates that the risk factor profiles of male and female offenders are quite similar (e.g., Simourd & Andrews, 1994), Moretti and Odgers (2002) question the extent to which this applies to high-risk offender-based samples. For example, Johansson and Kempf-Leonard (2009) identified distinctive risk factor profiles of delinquent boys and girls. Specifically, experiences of abuse (e.g., physical, sexual, emotional) and mental health concerns were more common among females. Research also suggests that disparate risk factors may differentially impact offending for males and females. Using a sample of brothers and sisters of original participants in the Cambridge Study in Delinquent Development, Farrington and Painter (2004) studied the impact of different risk factors on offending for both males and females. While a number of risk factors operated in a similar manner for boys and girls (e.g., parental criminality, sibling criminality, and school delinquency rate), certain risk factors had a stronger impact on offending for girls than boys (e.g., socioeconomic status and child-rearing factors). These findings support the assertion that (1) risk factor profiles of high-risk males and females are dissimilar and (2) research needs to address the impact of risk factors on offending for males and females separately. The following review of the literature focuses on two areas: relevant risk factors for the prediction of general offending among females and relevant risk factors for the prediction of specific patterns of offending among females (i.e., which risk factors are predictive of the more chronic female offending patterns).

4.1. Risk Factors for General Female Offending

In 1996, Catalano and Hawkins proposed an integrated model of antisocial behaviour development. Drawing on both social bond theory and social learning theory, Catalano and Hawkins (1996) identify key domains of risk and protective factors for the development of both pro-social and antisocial behaviour (e.g., individual, family, and school). In line with other developmental models of offending, Catalano and Hawkins (1996) identify four ancillary models dependent on the developmental period in the life

course (e.g., preschool, elementary, middle school, and high school). Following the orthogenetic principle, outcomes at one developmental period are posited to impact outcomes for the subsequent developmental period and so forth (Catalano and Hawkins, 1996). Although Catalano and Hawkins (1996) did not incorporate gender explicitly into their formulation of the social development model, empirical analyses have demonstrated that the model works equally well for both males and females (Fleming, Catalano, Oxford, & Harachi, 2002). The social development model is used herein to provide a framework through which to organize risk factors for female offending and to provide a theoretical justification for the inclusion of proposed risk factors.

4.1.1. Individual

A number of key individual-level characteristics emerge as important correlates of offending among females, including substance use, self-perception, and aggressive tendencies. Substance use has been identified as a key characteristic of the risk factor profile of female juvenile offenders (e.g., Corrado, Odgers, & Cohen, 2000; Welch-Brewer, 2017). Bennett, Holloway, and Farrington (2008) recently conducted a meta-analysis on the impact of substance use on crime. For studies that analyzed females separately, whether or not substance use increased the risk of crime was dependent on the type of substance use measured and the delinquency outcome (e.g., prostitution, property crime). For example, two studies found a significant relationship between heroin use and prostitution, but this relationship did not hold across different substance and crime types. Among adolescent females referred to the Oregon Youth Authority, substance use was not associated with age of first arrest (Leve & Chamberlain, 2004). Indeed, some research suggests that substance use is more informative of offending in males than females (Welch-Brewer, Stoddard-Dare, & Mallett, 2011).

In their 2018 meta-analysis, Mier and Ladny established a significant and negative relationship between self-esteem and delinquency/crime. Mier and Ladny report that the relationship between self-esteem and offending varies depending on crime type analyzed. This finding lends support to the developmental perspective that different explanations are required for different types of crimes and offenders. However, it should be noted that no moderator analyses were conducted based on gender. Addressing females specifically, Calhoun, Jurgens, and Chen (1993) assert that female offenders have more negative self-perceptions than their non-delinquent peers. Further,

Calhoun et al. (1993) question whether or not this is a result of confounding with other risk factors. For example, physical abuse and sexual abuse are related to delinquency, but physical and sexual abuse can also have detrimental effects on self-esteem (Calhoun et al., 1993). A final important individual-level characteristic to consider is aggression.

At the more extreme end of the continuum, males are more likely than females to engage in violence (Odgers & Moretti, 2002). In contrast, when analyzing less extreme forms of aggression (e.g., relational, pushing, shoving), the gap between males and females decreases (Odgers & Moretti, 2002). Indeed, Crick and Grotpeter (1995) found that females were significantly more likely to engage in relational aggression than males. Whether or not a relationship between aggression and general offending exists for females is disputed within the literature (Odgers & Moretti, 2002). Odgers and Moretti (2002) discuss the potential for a relationship between relational aggression and future violent behaviour. In contrast, Broidy et al. (2003) determined that high levels of physical aggression in early childhood were not associated with an increased risk of both violent and non-violent juvenile delinquency among females. As it currently stands, the relationship between aggression and delinquency for females is inconclusive.

4.1.2. Family

Female offenders at the "deep-end" of the criminal justice system are characterized by high rates of familial dysfunction and abuse (Corrado et al., 2000; Moretti et al., 2005). Family dysfunction is often characterized by criminality, mental illness, substance abuse, and parental experiences of abuse. Delinquent girls, in comparison to boys, are significantly more likely to have a parent with a history of criminality, substance abuse issues, and/or mental illness (McCabe, Lansing, Garland, & Hough, 2002; van der Put et al., 2010). In Rosenbaum's (1989) study, the vast majority of females came from a home in which at least one family member was criminally involved. Further, Leve and Chamberlain (2004) conducted a study of 62 girls referred to the Oregon Youth Authority and found a significant relationship between biological parent criminality and age at first arrest. In addition to the family dysfunction characteristics discussed above, physical and sexual abuse are also key characteristics of dysfunction within the family unit.

Evidence suggests that male and female youth have differential experiences of abuse (Belknap & Holsinger, 2006; Smith et al., 2014). For instance, in their national survey of victimization, Finkelhor, Ormrod, Turner, and Hamby (2005) found that females were more likely to experience sexual abuse than males (Finkelhor et al., 2005). Among a sample of female incarcerated youth, it was found that personal victimization and exposure to multiple different types of victimization were extremely common; only two percent of the females in the sample reported never having experienced victimization (DeHart & Moran, 2015). Using a sample of 88 adolescent females referred to the Oregon Juvenile Justice system for conduct problems, Smith, Leve, and Chamberlain (2006) analyzed the relationship between traumatic experiences and delinquency. Smith et al. (2006) found high rates of self-reported physical and sexual abuse among girls in their sample, for example, 96 percent of the sample had experienced either physical or sexual abuse. Additionally, these traumatic experiences (e.g., physical abuse, sexual abuse, witnessing violence, parental incarceration, foster care placement) were predictive of adolescent offending among females (Smith et al., 2006). In contrast, Leve and Chamberlain (2004) found that sexual abuse was not a significant predictor of age at first arrest.

Numerous scholars also discuss the implications of abuse within the family unit. Huizinga, Miller, and the Conduct Problems Prevention Group (2013) discuss running away from home as a gendered pathway into crime and delinquency. For females who have been physically and/or sexually abused within the home, running away can be a way to escape the abuse (Chesney-Lind & Shelden, 2014; Kim, Tajima, Herrenkohl, & Huang, 2009). Once on the streets, females turn to crime and delinquency out of necessity (e.g., stealing food, prostitution) (Calhoun et al., 1993; Chesney-Lind & Shelden, 2014). Additionally, living on the streets places youth at risk of personal and property victimization (Whitbeck & Simons, 1993). Another concern regarding females running away from home is the effect that it has on school bonding. According to Belknap and Holsinger (2006), females, in comparison to males, were nearly twice as likely to report dropping out of school as a consequence of running away. Based on these findings, it is clear that issues within the family can have a detrimental effect on other domains of risk, such as school.

4.1.3. School

Reminiscent of both social bond theory and life-course criminology, Catalano, Haggerty, Oesterle, Fleming, and Hawkins (2004) assert that bonding to school promotes prosocial development. Studies using the Seattle Social Development Project sample reveal that, for both males and females, school attachment in both middle and high school was negatively associated with delinquency (Catalano et al., 2004). However, dropping out of school is more common among female juvenile delinquents than males (Belknap & Holsinger, 2006). For criminally involved boys and girls, school commitment and attachment in the seventh grade was associated with an increase in the likelihood of desistance in the following two years (Catalano et al., 2004). This result suggests that bonding to school (a key societal institution for youth) acted as a turning point for those already engaging in delinquency. Unique to girls, commitment and attachment to school in the seventh grade inhibited delinquency involvement in the following two years (Catalano et al., 2004). One of the key limitations inherent to all of the previously identified studies is their treatment of female offenders as a homogenous group. Odgers et al. (2007) question this "one size fits all" approach used in much of the existing research. By treating female offenders as comparable to one another, the literature is omitting key distinctions in both the qualitative and quantitative nature of female offending.

4.2. Risk Factors for Specific Offending Patterns

One of the most common uses of offending trajectory analysis is what Piquero (2008) describes as the classify/analyze approach: "after sorting individuals into the various trajectory classifications, treat the groups as nominal categories and then examine how an array of risk/protective factors vary across the groups" (p. 29). This approach is ideal as it enables researchers to move past analyzing female offenders as a homogenous group. The classify/analyze approach fits squarely within the second key feature of the developmental perspective, mainly that different offending patterns can be differentially impacted by risk factors (LeBlanc & Loeber, 1998).

4.2.1. Qualitative Patterns

Three studies discuss different female offending subgroups based, primarily, on the qualitative nature of the act(s) and subsequently link the distinct groups to risk factors for offending. Odgers et al. (2007) conduct latent class analysis on a sample of 133 juvenile female offenders incarcerated in the United States. A three-class solution was found to best fit the self-reported offending data: violent and delinquent (13%), delinquent only (28%), and low probability violent and delinquent (59%). The violent and delinquent subgroup, compared to the low subgroup, was significantly more likely to have experienced violence within a number of different environments (e.g., the home, school) (Odgers et al., 2007). In comparison to the delinquency-only subgroup, the violent and delinquent girls were significantly more likely to have experienced domestic violence and sexual abuse. Additionally, the violent and delinquent subgroup was characterized by the highest rates of familial criminality. In line with the criminal career perspective, the violent and delinquent subgroup had the earliest average age of onset of offending. Overall, the primary distinguishing factor between the most serious subgroup (violent and delinquent) and the remaining two subgroups is personal victimization and exposure to violence. While the general risk factor literature posits a relationship between abuse and offending, Odgers et al.'s (2007) research links abuse and exposure to violence to more high-risk offending patterns.

Welch-Brewer (2017) conducted latent profile analysis (a variation on latent class analysis) of a sample of 203 incarcerated female juvenile offenders. Welch-Brewer's analysis is unique in that she included both risk factors and offending outcomes in the latent profile analysis. Risk factor measurements were obtained through clinical self-report assessment tools. Latent profile analyses suggest a four-class solution: aggression only (51%), aggression and drug use (19%), socio-emotional and family relationships (24%), and severe alcohol and drug use (6%). There are two important findings for each class: risk factor composition and associated crime type involvement. Each of these will be discussed in turn. In terms of risk/need factors, high scores on the aggression subscale characterized the aggression class. High scores on seven of the 11 measured risk domains characterized the aggression and drug use class (e.g., problems with school, family relationships, alcohol use, and drug use). High scores on eight of the 11 measured risk domains characterized the socio-emotional and family relationship problems class. This subgroup was not characterized by alcohol and drug use, but was

associated with issues regarding self-esteem, depression, and low-school bonding. Finally, girls associated with the severe alcohol and drug use class reported clinically elevated scores on nine of the 11 measured risk factor domains, with extremely high scores on alcohol and drug use and aggression. Interestingly, unlike Odgers et al. (2007), chi-square analyses revealed no significant differences between the classes in terms of a history of victimization (e.g., physical, sexual, and emotional abuse). In regards to offending outcomes, the commission of property-based offences characterized the aggression only and severe alcohol and drug use classes. The commission of person-based offences characterized the remaining two classes (aggression and drug use; socio-emotional and family relationships).

Wolff et al. (2017) analyzed a sample of 3,008 female juvenile offenders within a Florida juvenile justice residential program. Wolff and colleagues classified the females in the sample as either serious, violent, chronic, or a combination of such. Based on these classifications, study participants were coded as: serious, violent, and chronic (SVC); none of the above; or all other youth. None of the above indicates that the youth was not serious, violent, or chronic. All other youth indicates that the youth could have met one or two of the serious, violent, chronic classification, but not all three. At the bivariate level, a number of key distinctions emerged between the classifications. SVC females were significantly more likely than the other two groups to be Black, younger at the age of first school suspension, and have a history of alcohol and drug abuse. Interestingly, no significant differences emerged in adverse childhood experiences, exposure to violence, or running away from home. Results from logistic regression analyses reveal an earlier age of onset and earlier age at first school suspension were predictive of SVC classification. Again, abuse experiences were not predictive of SVC membership.

While the studies cited above mark an important contribution to the literature by analyzing female offenders as a heterogeneous group, they miss out on the important temporal component to the heterogeneity. Results from these studies provide an important snapshot of female juvenile offenders, but it is necessary to analyze the long-term individual outcomes. Even if characteristics of serious offending and associated correlates are present during adolescence, this does not always indicate that the behaviour will persist outside of adolescence. From a developmental perspective, desistance during adolescence and into young adulthood is normative. In terms of

intervention, the most useful analysis will enable the identification of offenders most at risk for continued offending into adulthood and their associated risk factor profiles. Using a metaphor described by Nagin and Tremblay (2005), the qualitative nature of offending provides but a picture of offending, while analysis of the quantitative nature of offending is akin to cinema, capturing movement over time.

4.2.2. Quantitative Patterns

Six studies conducted analyses to assess the risk factor correlates of female-specific offending trajectories. First, using data from the Dunedin Multidisciplinary Health and Development study, Odgers et al. (2008) identified four distinct trajectories among 494 female participants: early-onset persistent (7.5%), adolescent-onset (17.4%), childhood-limited (20%), and low (55.1%). The early-onset persistent trajectory appeared to be following a pattern synonymous to the LCP path identified by Moffitt (1993), but the analyses were only from the ages of seven to 15 so it would have been inappropriate to classify these offenders as LCP. Regardless, the early-onset persistent trajectory showed a number of individual-level characteristics reminiscent of the LCP offender, such as low IQ and hyperactivity. Again, in line with Moffitt's (1993) dual taxonomy, a criminogenic environment (e.g., mothers with mental illness, harsh parenting practices, conflict, and low SES) was characteristic of the persistent offending trajectory. Interestingly, having a mother with poor mental health emerged as a significant difference between all of the trajectories and the low trajectory. Additionally, youth associated with the adolescent-onset trajectory were significantly more likely to report family conflict than the low trajectory.

Second, the Pathways to Desistance study is composed of serious juvenile offenders from Phoenix and Philadelphia. Using this sample, Cauffman, Monahan, and Thomas (2015) conducted a trajectory analysis of females' self-reported antisocial behaviour from the age of 14 to 25. A five-group solution was identified as best fitting the data: low (39.9%), moderate (21.9%), early-desister (35.7%), late-desister (10.1%), and persister (12.9%). A number of key risk factor differences between trajectories emerged. Youth who had a criminally involved parent were significantly more likely to be associated with the persistent, in comparison to low, trajectory. Additionally, female offenders associated with the persistent trajectory were more likely to experience victimization and have a substance use diagnosis. In sum, results from Cauffman et al.

(2015) suggest that persistent offending into emerging adulthood is associated with both high levels of family dysfunction and substance use.

In the third study, Ferrante (2013) analyzed gender and ethnic differences in offending trajectories based on official court records (Western Australia Criminal Justice System) of all offenders born between 1977 and 1995. Trajectory analyses revealed two female-specific offending trajectories. Ferrante (2013) referred to the trajectories as Estimate one and Estimate two. Estimate one consisted of 91.5 percent of the sample and reflected a low-rate of offending with a flat peak (indicating a more gradual incline and decline) around the age of 15. Estimate two consisted of 8.5 percent of the sample and reflected a high peak around the age of 15 and a slow decline until around the age of 30. It is important to note that at the end of data collection, the Estimate two group was still actively offending, whereas the Estimate one group appeared to be near zero. The Estimate two group was associated with an earlier-onset of offending than the Estimate one group. Additionally, being of Indigenous ethnic background was associated with membership in the Estimate two group. Results of this study are hindered because of the nature of the data source (i.e., official records with limited information regarding psycho-social background).

In the fourth study, Jennings et al. (2010) used the Boricua Youth Study. The Boricua Youth Study is based on Puerto-Rican youth living in two different areas: The Bronx, New York, and San Juan, Puerto Rico. Three waves of self-reported data collection took place between 2000 and 2004. The average age of participants at wave one was approximately nine and a half years old for both samples. Jennings et al. (2010) focused on both gender and cultural differences within and between samples. Of importance here are the gender-based analyses. Trajectory analyses revealed a four-group solution for the Bronx females: non-offender (68.7%), low-decline (25.1%), high fast declining (2.2%), and high increasing (4.0%). The low-decline trajectory was characterized by relatively low-levels of offending that decline over time. The high fast declining trajectory was characterized by high levels of offending at wave one followed by near zero offending at waves two and three. Finally, females associated with the high increasing trajectory displayed high levels of offending at wave one which increased at waves two and three. Multinomial logistic regression analyses reveal important differences between the trajectories. Importantly, for the Bronx female sample, all of the trajectories were significantly different from the low trajectory in terms of exposure to

violence. Additionally, the low-declining and high-increasing trajectories were significantly different from the low trajectory in terms of exposure to coercive discipline (indicative of family conflict).

For the San Juan female sample, a three-group solution was found to best fit the data: non-offender (80.5%), low stable (18.4%), and high fast declining (1.1%). The low stable trajectory displayed very low levels of offending at all three waves of data collection. The high fast declining trajectory mirrored the high fast declining trajectory identified among the Bronx females. Again, multinomial logistic regression analyses revealed important between-group differences. For the San Juan female sample, all of the trajectories were significantly different from the low trajectory in terms of exposure to violence. Additionally, the low-stable trajectory was significantly different from the low trajectory in terms of coercive parental discipline.

Fifth, Weaver (2010) analyzed a longitudinal sample of 5,938 female first-time juvenile (i.e., first offence occurred before the age of 18) offenders in the southeastern United States. Analyses revealed a three-trajectory solution: low-level desister (70%), low-level peaked (26%), and high-level peaked (4%). Both the low-level and high-level peaked trajectories displayed an increase in offending starting around the age of 11, followed by a peak in mid-adolescence and a decline thereafter. These two trajectories differ, however, in their rate of offending. The low-level peaked trajectory is characterized by lower levels of offending from the age of 11 to 18 than the high-level peaked trajectory. Multinomial logistic regression analyses compared the low-level and high-level peaked trajectories against the low-level desister trajectory. Results identified ethnicity, prior childhood maltreatment, and school dropout as significant predictors of membership in the low-level peaked trajectory. Similarly, prior childhood maltreatment and school dropout, but not ethnicity, emerged as significant predictors of membership in the high-level peaked trajectory.

Finally, using the Christchurch Health and Development Study, Fergusson and Horwood (2002) conducted trajectory analyses for both males and females. It is important to note that in their 2000 study Fergusson et al. used the same dataset, but the follow up period was until 18. In contrast, Fergusson and Horwood (2002) have delinquency measures up until age 21, so the results of each study are slightly different. Fergusson and Horwood (2002) identified a five-trajectory solution. Analyses were

conducted separately for both males and females; however, the substantive results did not vary across gender so only the male-female combined analyses were presented. The five trajectories include low-risk (71% of females were associated with this trajectory), early-onset AL (21%), intermediate-onset AL (3.7%), late-onset AL (2.4%), and chronic (2.1%). The three AL trajectories resembled the traditional age-crime curve, but with each group having an incrementally later age of onset and, as such, a later peak in offending and decline. The chronic trajectory was characterized by an early onset of conduct problems, followed by stable, high levels of offending between the ages of 11 and 17. For the chronic trajectory, there was a slight decline in offending at the age of 20. A number of key risk factors emerged as significant predictors of trajectory group membership, including parental criminality, parent conflict, and self-esteem. Of all the trajectory groups, those associated with the chronic trajectory had the most negative psychosocial background. The findings between risk factors and trajectory group membership did not vary across gender.

Based on the previous review, female-specific trajectory analyses tended to reveal between two and five distinct trajectories. Additionally, a number of key risk factors emerged as significant predictors of trajectory group membership (*see Table 3*). From the individual domain, ethnicity, substance abuse, and self-esteem emerged as important predictors of trajectory group membership. Significant predictors from the family domain included parental criminality, familial conflict, abuse, and exposure to violence. Finally, dropping out of school emerged as an important school-level risk factor.

Table 3.   Summary of Previous Research – Risk Factor Correlates

	Number of Trajectory Groups	Shape of Trajectories	Risk Factor Correlates
Community-Based Samples			
Odgers et al. (2008)	Four	Early-onset persistent, adolescent-onset, childhood-limited, and low	Low IQ, hyperactivity, maternal mental illness, harsh parenting, family conflict, low SES
Jennings et al. (2010)			
Bronx sample	Four	Nonoffender, low-decline, high fast declining, and high increasing	Exposure to violence, exposure to coercive discipline
San Juan sample	Three	Nonoffender, low stable, and high fast declining	
Fergusson & Horwood (2002)	Five	Low risk, early-onset AL, intermediate-onset AL, late-onset AL, and chronic	Parental criminality, parent conflict, self esteem
High-Risk Samples			
Cauffman et al. (2015)	Five	Low, moderate, early-desister, late-desister, and persister	Parental criminality, victimization experiences, substance use
Ferrante (2013)	Two	Low rate with flat peak, and high peak with slow decline	Age of onset, ethnicity
Weaver (2010)	Three	Low-level desister, low-level peaked, and high-level peaked	Ethnicity, childhood maltreatment, school dropout

Chapter 5. Method

5.1. Sample and Procedures

Data for the current study are derived from the Incarcerated Serious and Violent Young Offender Study (ISVYOS). The ISVYOS is a prospective longitudinal study following approximately 1,400 individuals initially interviewed in adolescence while incarcerated in the province of British Columbia (BC), Canada. Permission to conduct the study was granted by the Ministry of Children and Family Development (MCFD). While in custody, the MCFD acts as youths' primary caregiver. Additionally, ethics approval was granted through Simon Fraser University's Research Ethics Board. The ISVYOS has two essential components: self-report data derived from structured interviews and official court records of offending.

Structured interviews took place in both open and secure custody facilities across British Columbia between 1998 and 2011. To obtain participants, youth were approached on their custody unit and asked if they would like to participate in a Simon Fraser University study. Youth were informed that participation in the study was voluntary and that there was no risk of physical harm, but that the interview would touch on uncomfortable topics. Participants were read and given a copy of an information sheet explaining that all interview material would be kept confidential unless the youth threatened to harm themselves or others. If a youth agreed to participate in the study, they were required to sign a consent form indicating that they understood all of the content within the information sheet. Only five percent of all youth declined to participate in the study. Youth were given juice and potato chips as compensation for their participation. Trained graduate or undergraduate level research assistants (RAs) conducted the interviews. Prior to the interview, RAs would review the youth's file information. This initial review enabled RAs to better develop rapport with the youth and flag any inconsistencies in the interview. The interview itself was typically spread over two days and required 90 minutes to complete. Official court records were obtained through BC's computerized system, Corrections Case Management Network (CORNET). The current study focused on a subset of 284 female offenders interviewed between 1998 and 2011 as part of the ISVYOS.

5.2. Measures

5.2.1. Ethnicity

Previous research has identified ethnic background as an important correlate of trajectory group membership. For example, Livingston et al. (2008) found that Indigenous offenders were significantly more likely to be associated with a chronic offending trajectory. As such, ethnic background of participants has been included in all regression models. Ethnicity was measured through self-report interviews. Youth could indicate if they were: Indigenous; White; Asiatic; Black; East Indian/South Asian; or 'Other'. Due to low frequencies for Asiatic (*n=2, .72%*), Black (*n=12, 4.35%*), East Indian/South Asian (*n=1, .36%*), and 'Other' (*n=9, 3.26%*), these four ethnicities were combined into a new category that captured individuals from a non-Indigenous minority background. The result was a three-level categorical variable: Indigenous (*n=103, 37.3%*), White (*n=149, 54%*), Other (*n=24, 8.7%*) (*Table 4*). Although 37.3 percent of the full sample self-identified as Indigenous, only 6.2 percent of the population of British Columbia identified as such (Statistics Canada, 2013). The ethnic composition of the sample is reflective of local demographics; yet quite distinct from similar American (US) samples in which the dominant ethnicities are often White, Hispanic, and African American (e.g., Wolff et al., 2017). The overrepresentation of Indigenous offenders within this sample may impact the generalizability of the study. However, the use of this particular sample also allows for a greater understanding of Indigenous youth; an ethnicity that is, in general, understudied in the offending trajectory literature. In regression analyses, White is the reference category.

5.2.2. Measures of Offending

Offending was measured using official data from BC's computerized system, CORNET. CORNET contains each youth's social history, movements in and out of custody, and specific details of criminal offences – including date of offence, date of conviction, and sentence received. One limitation to the use of CORNET is that it is only able to track offences committed within the province of BC. Using CORNET, every criminal charge resulting in a conviction from the age of 12 to 23 was coded. Convictions were categorized as violent, property, administrative violation, weapon, miscellaneous, drug, and sexual. In line with previous research (e.g., Eggleston et al., 2004; van der

Geest, Blokland, & Bijleveld, 2009), if a youth in the sample died (*n=5, 1.8%*) or moved out of province (*n=5, 1.8%*), convictions measured after the date of death or movement were coded as missing rather than as zero. On average, a female offender in the sample was convicted for 13.7 (*SD=8.5*) offences from the ages of 12 to 23. The average number of days spent in custody from the ages of 12 to 23 was 389.2 (*SD=363.7*). These numbers are substantially lower than what has been reported in studies using the same dataset but including both males and females (Corrado et al., 2015). This contrast highlights the importance of conducting female-specific analyses. Official criminal convictions from the ages of 12 to 23 were used in trajectory analyses to identify distinct patterns of female offending.

5.2.3. Criminogenic Risk Factors

Substance Use. Three items were used as indicators of substance use: early alcohol use, early drug use, and substance use versatility. Respondents were asked to indicate the age at which they first experimented with alcohol and the age at which they first experimented with illicit substances. In Canada, the age of criminal responsibility is 12. In order to capture substance use that preceded any involvement in the criminal justice system, responses to these questions were transformed into two binary variables capturing alcohol use before the age of 12 (*n=100, 35.2%*) and drug use before the age of 12 (*n=99, 34.9%*). Eight dichotomized indicators of substance use (*alcohol, marijuana, hallucinogens, ecstasy, heroin, cocaine, crack cocaine, and crystal meth*) were summed to create a substance use versatility scale. The substance use versatility scale ranged from zero to eight, with higher scores indicating more diverse substance use (*mean=5.1, SD=2.0*). When analyzing a scale composed of dichotomous indicators, tetrachoric ordinal alpha provides a more accurate estimation of internal consistency (Gadermann, Guhn, & Zumbo, 2012). As such, a tetrachoric ordinal alpha value was calculated for the substance use versatility scale. The tetrachoric ordinal alpha value of 0.88 indicates that there is a high level of internal consistency between the items used to create the substance use versatility scale. Recent research has identified substance use issues as a distinct risk factor for incarcerated female juvenile offenders (Welch-Brewer, 2017), supporting the inclusion of substance use measures in the model.

Self-Identity. Self-identity was originally measured through Schneider's (1990) Good Citizens Scale. Using this scale, respondents were asked to rate themselves from

one to seven on 15 identity traits: *cooperative, good, obeys rules, polite, helpful to others, brave, smart, honest, hardworking, tough, wild, nice, kind, rich, attractive*. Certain items on the Schneider's Good Citizens Scale were reverse-coded so that lower scores indicated a negative identity and higher scores indicated a positive identity. Following previous research (e.g., Corrado et al., 2015), these 15 responses were summed to create the self-identity measure (*Cronbach's alpha=0.72; mean=70.1, SD=9.1*). Using the same 15 identity traits and one to seven scale, youth were also asked to rate how they think other people perceive them. Again, these 15 responses were summed to create the measure 'other's perception of self' (*Cronbach's alpha=0.63; mean= 63.7, SD= 10.8*).

Physical aggression. One item was used to measure physical aggression and was defined by whether the participant got into a physical fight at least once a week (*n=53, 18.7%*).

Abuse and Sexuality. Research continually highlights the prevalence and importance of abuse experiences among incarcerated female offenders (for an overview see Moretti et al., 2005; Odgers and Moretti, 2002). In the current study, respondents self-reported whether or not they had experienced physical abuse and sexual abuse. A majority of the sample had been physically abused (*n=195, 68.7%*) and just under half of respondents had been sexually abused (*n=140, 49.3%*). In terms of sexual activity, youth were asked to report the age at which they first experienced consensual sexual activity, which was defined as any sexual contact other than kissing. Moretti et al. (2005) report that research suggests early sexual maturation can play a role in female delinquency. The age of onset of sexual activity was recoded into a dichotomous indicator of early consensual activity to avoid excluding individuals who did not report any consensual sexual activity. A limited number of respondents reported engaging in consensual sexual activity before the age of 12 (*n=15, 5.3%*). Again, "early" was defined as before the age of 12 to ensure temporal ordering between the behaviour and the onset of involvement in the criminal justice system.

Familial Dysfunction. Three variables in the current study measure familial dysfunction. Respondents were asked whether or not they had left home willingly for more than 24 hours and, if so, the age at which this first occurred. Similarly, youth were also asked if they had been kicked out of home for more than 24 hours and, if so, the

age at which this first occurred. Similar to previous measures, these variables were recoded into dichotomized indicators of leaving home before the age of 12 (*n=53, 18.7%*) and being kicked out of home before the age of 12 (*n=20, 7.0%*). To measure family dysfunction, participants were asked to indicate if any of their family members had a drinking problem, substance use problem, had experienced physical abuse, had experienced sexual abuse, had a criminal record, or had a mental illness. Responses on each of these questions were summed to create a familial dysfunction scale (*Tetrachoric ordinal alpha=0.81, mean=3.5, SD=1.5*). Scores on this measure ranged from zero to six, with higher scores indicating greater familial dysfunction. Odgers and Moretti (2002) report familial dysfunction and conflict (e.g., leaving home and being kicked out of the family home) as key risk factors for female offenders (see also Wolff et al., 2017).

School Problems. Three measures were used as indicators of school disruption: whether the participant was attending school prior to incarceration, whether the participant skipped school before age 12, and the number of times the participant changed schools for reasons other than grade changes (e.g., the transition from elementary to middle school or middle school to high school). An example of such would be an expulsion from a school. Approximately half of the sample reported attending school prior to incarceration (*n=125, 44.0%*). Additionally, one-fifth of the youth reported skipping school before the age of 12 (*n=59, 20.8%*). Respondents reported an average of 5.8 (*SD=5.0*) school changes. Moffitt (1993) hypothesized that LCP offenders would be characterized by significant problems in school functioning. As such, measures of school behavioural issues and attachment were included in the current study.

Table 4.   Description of the Sample

Variables	% (*n*)	M (*SD*)
Demographic Characteristics		
Ethnicity[a]		
Indigenous	37.3 (*103*)	
White	54 (*149*)	
'Other'	8.7 (*24*)	
Criminogenic Risk Factors		
Early Alcohol User	35.2 (*100*)	
Early Drug User	34.9 (*99*)	
Substance Use Versatility		5.1 (*2.0*)
Self-Identity		70.1 (*9.1*)
Other's Perception of Self		63.7 (*10.8*)
Fight at Least Once a Week	18.7 (*53*)	
Physical Abuse	68.7 (*195*)	
Sexual Abuse	49.3 (*140*)	
Consensual Sex Before Age 12	5.3 (*15*)	
Left Home Before Age 12	18.7 (*53*)	
Kicked Out Home Before Age 12	7.0 (*20*)	
Family Dysfunction Scale		3.5 (*1.5*)
School Prior to Custody	44.0 (*125*)	
Skip School Before Age 12	20.8 (*59*)	
Number of School Changes		5.8 (*5.0*)
Criminal Career Measures		
Number of Convictions (ages 12 to 23)		13.7 (*8.5*)
Days in Custody		389.2 (*363.7*)

[a] Values reported for ethnicity were not imputed.

5.2.4. Analytic Strategy

First, missing value analysis was conducted. The first step of the missing data analysis is to determine whether or not data were missing completely at random (MCAR). Little's MCAR test revealed that the data was MCAR ($p > .05$), indicating that missing values were randomly distributed across observations (Garson, 2015). Essentially, the missingness does not depend on the values of any variables in the dataset. Because the data is MCAR, listwise deletion would be an appropriate solution, but only if the number of deleted cases is not large (e.g., less than five percent) (Garson, 2015). With the current dataset, listwise deletion of cases would result in a substantial

loss of sample size and, as such, a loss of statistical power (Garson, 2015). As a result, missing values were estimated using multiple imputation. Multiple imputation replaces each missing value with a set of plausible values that represent the uncertainty about the correct value to impute (Rubin, 1996). Stata's chained equation command was used, creating 20 imputed datasets. While previously scholars have recommended between three and five imputations, recent advancements suggest upwards of 40 imputations in cases for which there is substantial missing data (Garson, 2015; Graham, 2007). All predictor and outcome variables were included in the imputation procedure, but the outcome variable and ethnicity were not imputed. The average value of the 20 imputed datasets was used in all descriptive, bivariate, and multivariate analyses.

Second, bivariate analyses were conducted among the predictor variables in the models. Bivariate analyses conducted include chi-square, Pearson's correlation, independent samples *t*-test, and ANOVA. Individual assumptions for each test were observed. Four chi-square analyses violated the expected cell count assumption (fight weekly*ethnicity; early sex*ethnicity; early left home*ethnicity; early kicked home*ethnicity) and could not be rectified through the use of Fischer's exact test due to the three-level ethnicity variable. It did not make sense to collapse the 'other' ethnic group in with White or Indigenous ethnic groups. Additionally, given its importance to the study of different offending patterns (Livingston et al., 2008), ethnicity could not be removed from the models. Given this, chi-square analyses that violated the expected cell count assumption were retained in the study, but with an understanding that they should be interpreted with caution.

To account for potential heterogeneity in female offending patterns, semi-parametric group-based modeling was conducted (Nagin & Land, 1993). Trajectory analysis was conducted in Stata IC 15 using the traj add-on developed by Jones and Nagin (2013). Trajectory group membership results created the outcome variable for the study. Bivariate comparisons were made between the risk factor predictors and trajectory groups that emerged from the analysis; this step was necessary to establish if a relationship existed between the different female offending patterns and the risk factor variables. Bivariate analyses conducted include chi-square and ANOVA. One chi-square analysis violated the expected cell count assumption (early sex*trajectory groups) and could not be rectified through the use of Fischer's exact test due to the three-level outcome variable. As such, the analysis was retained in the study, but should be

44

interpreted with caution. Upon completion of the bivariate analyses, multivariate regression analyses were conducted using Stata IC 15. Analyses included multinomial logistic regression models to assess the relationship between the risk factor variables and the offending trajectories.

Chapter 6.   Results

6.1. Bivariate Analyses

The first bivariate analyses conducted were between all of the predictor variables (*Table 5*). There are a few relationships at the bivariate level worth noting. In terms of ethnicity, both Indigenous youth and youth identified in the 'other' ethnic category were more likely to have been physically abused. Additionally, Indigenous youth had significantly higher levels of familial dysfunction than White youth and youth identified in the 'other' ethnic category[1].

A number of significant relationships emerged when assessing measures of substance use (early alcohol use, early drug use, and substance use versatility). Early alcohol use was found to be a significant correlate of a number of other important risk factors. Youth who had engaged in alcohol use before the age of 12 were also more likely to have engaged in early drug use, weekly physical altercations, early consensual sexual activity, running away from home before the age of 12, being kicked out of home before the age of 12, and skipping school before the age of 12. Additionally, youth who engaged in early alcohol use had experimented with a greater number of illicit substances and had higher levels of family dysfunction.

Similar to early alcohol use, analyses revealed that early drug use was associated with early sexual activity, leaving home before the age of 12, being kicked out of the home before the age of 12, and skipping school before the age of 12. Youth who engaged in early drug use also reported higher levels of substance use versatility and family dysfunction than youth who did not engage in drug use before the age of 12. Additionally, compared with youth who did not engage in early drug use, those who used drugs before the age of 12 were more likely to report experiences of physical abuse and changing schools more often.

Further, as substance use versatility increased, scores on the self-identity measure decreased. That is, youth who were experimenting with a greater number of

---

[1] Bivariate analyses involving ANOVA used Bonferroni (equal variances assumed) or Tamhane (equal variances not assumed) post-hoc comparisons to identify significant differences.

illicit substances had more negative self-perceptions. Similarly, higher substance use versatility scores were associated with lower scores on the 'other's perception of self' measure. Youth who had been involved in physical altercations at least once a week, had been physically abused, had engaged in consensual sexual activity before the age of 12, and had skipped school before the age of 12 had experimented with a greater number of illicit substances. Youth who reported attending school prior to incarceration had experimented with fewer illicit substances. Higher substance use versatility scores were associated with higher levels of familial dysfunction.

Significant associations emerged between the measure of self-identity and other key risk factors. Higher scores on the self-identity measure were associated with higher scores on the 'other's perception of self' measure. This finding indicates that youth who had a more positive self-perception felt that others viewed them positively as well. Higher self-identity scores were associated with lower levels of familial dysfunction. Youth who had experienced physical abuse, youth who had been kicked out of the family home before the age of 12, and youth who had engaged in consensual sexual activity before the age of 12 all indicated a more negative self-perception. Youth who reported being in physical altercations at least once a week also reported lower scores for others' perception of self.

Engaging in frequent physical altercations was also significantly associated with a number of other risk factors. Youth who engaged in fighting at least once a week were more likely to also report experiences of physical abuse and running away from home before the age of 12. Frequent involvement in physical altercations was associated with higher levels of family dysfunction and a greater number of school changes.

Bivariate analyses revealed that physical abuse and sexual abuse go hand-in-hand. Youth who were physically abused were more likely to have also been sexually abused. Experiences of physical abuse and sexual abuse were both associated with higher levels of familial dysfunction and a greater number of school changes. Engaging in consensual sexual activity before the age of 12 was also associated with a number of family and school risk factors. More specifically, youth who had engaged in early sexual activity were also more likely to report leaving home willingly before the age of 12, to report being kicked out of home before the age of 12, and to have skipped school before

47

the age of 12. Additionally, youth who reported early sexual activity also reported higher levels of familial dysfunction.

Measures of family dysfunction and conflict (leaving home before the age of 12 and being kicked out of the home before the age of 12) were significantly associated with a number of other key risk factors. Higher levels of family dysfunction were associated with skipping school before the age of 12. Youth who reported higher levels of family dysfunction also reported a greater number of school changes. Youth who reported leaving the home before the age of 12 also reported a greater number of school changes. Additionally, youth who reported leaving home before the age of 12 were more likely to have been kicked out of home before the age of 12. Youth who reported leaving home before the age of 12 and youth who reported being kicked out of the home before the age of 12 both reported significantly higher levels of familial dysfunction and skipping school before the age of 12. Finally, youth who reported skipping school before the age of 12 also reported a greater number of school changes

Table 5. **Bivariate Associations**

	Ethnicity	Early Alcohol	Early Drug	Substance Versatility	Self-Identity	Other Identity	Fight Weekly	Physical Abuse	Sexual Abuse	Early Sexual Activity	Left Home Before 12	Kicked Out Before 12	Family Dysfunction	Attend School	Skip School Before 12	# School Changes
Ethnicity	-															
Early Alcohol	3.8^c	-														
Early Drug	$.38^c$	67.1^{c***}	-													
Substance Versatility	$.38^a$	5.7^{d***}	6.0^{d***}	-												
Self Identity	1.5^a	-1.6^d	$-.70^d$	$.19^{b**}$	-											
Other Identity	$.42^a$	-1.9^d	-1.3^d	$.13^{b*}$	$.52^{b***}$	-										
Fight Weekly	2.6^c	10.1^{c**}	2.7^c	3.0^{d**}	-2.0^d	-3.9^{d***}	-									
Physical Abuse	6.8^{c*}	1.9^c	4.3^{c*}	3.7^{d***}	-3.1^{d**}	-1.5^d	5.4^{c*}	-								
Sexual Abuse	3.7^c	$.91^c$	$.29^c$	1.3^d	-1.1^d	$.00^d$	$.18^c$	36.5^{c***}	-							
Early Sexual Activity	3.7^c	17.8^{c***}	9.8^{c**}	2.5^{d*}	-2.1^{d*}	$-.12^d$	$.01^e$	$.77^e$	$.06^c$	-						
Left Home Before 12	4.1^c	19.9^{c***}	29.8^{c***}	1.4^d	1.6^d	$-.96^d$	7.3^{c**}	2.7^c	2.7^c	12.2^{e**}	-					
Kicked Out Before 12	1.4^c	14.4^{c***}	14.6^{c***}	1.3^d	-3.6^{d***}	$.24^d$	$.01^e$	2.3^c	$.23^c$	25.7^{e***}	13.5^{e**}	-				
Family Dysfunction	7.3^{a**}	3.2^{d**}	4.2^{d***}	$.23^{b***}$	$.18^{b**}$	$-.10^b$	2.2^{d*}	4.9^{d***}	6.1^{d***}	2.0^{d*}	2.1^{d*}	3.3^{d**}	-			
Attend School	$.09^c$	2.1^c	1.1^c	-3.3^{d**}	$.51^d$	$-.92^d$	3.1^c	1.3^c	$.00^c$	2.1^c	$.71^c$	$.20^c$	$-.42^d$	-		
Skip School Before 12	$.37^c$	26.6^{c***}	24^{c***}	3.7^{d***}	-1.3^d	$-.35^d$	3.2^c	2.3^c	$.17^c$	9.9^{e**}	26.6^{c***}	19.5^{e***}	2.3^{d*}	$.02^c$	-	
# School Changes	$.40^a$	1.7^d	2.4^{d*}	$.07^b$	$-.03^b$	$.06^b$	2.6^{d**}	2.0^{d*}	2.3^{d*}	$.74^d$	2.2^{d*}	1.7^d	$.19^{b**}$	$-.79^d$	2.5^{d*}	-

a. F-value reported b. Pearson's r value reported c. Chi-square value reported d. T-value reported e. Fischer's exact value reported
$*p < 0.05, **p < 0.01, ***p < 0.001$

.

6.2. Trajectory Analysis

To create the outcome variable for this study, semi-parametric group-based modeling (SPGM) was conducted in Stata IC 15 using the traj add-on developed by Jones and Nagin (2013). Using all officially recorded convictions at each age between ages 12 to 23, offending patterns within the sample were allowed to emerge from the data. Exposure time was included and was defined as the proportion of time at each year of age that an individual was free in the community (i.e., as opposed to being incarcerated). Previous research has outlined the importance of including exposure time to avoid artificially inflating the prevalence of desistance (Eggleston et al., 2004; Piquero et al., 2001). In line with previous research (e.g., Piquero et al., 2001), exposure time was calculated as follows:

$Exposure_{ji}$ = 1 − (Number of days incarcerated/367)
where j is the respondent and i is the year of observation.

The first step in the trajectory analysis was to identify the shape and number of trajectories that best fit the data. The zero-inflated Poisson (ZIP) model with quadratic functional form was used to estimate the distribution of the offending trajectories. The ZIP model was chosen to account for the excess zeroes in the data not typically accounted for with the traditional Poisson model (Jones & Nagin, 2013). The estimated model parameters for each trajectory show that a quadratic functional form most accurately reflected the shape of the distributions (values closer to zero indicate better fit to the data).

Following previous research (e.g., D'Unger, Land, & McCall, 2002) Bayesian Information Criteria (BIC) values were used to identify the number of offending trajectories that best represented the data. BIC values closer to zero indicate better model fit (Livingston et al., 2008). According to Baskin-Sommers and Baskin (2016) three considerations should inform the selection of the best trajectory solution: lowest BIC value, parsimony, and no trajectories that contain less than five percent of the sample. A five-group quadratic model resulted in a BIC value of -5588.39, which was lower than the four-group solution. However, the five-group solution resulted in one trajectory with only 3.52 percent of the total sample (*n=284*). Given that having a trajectory with only 3.52 percent of the sample (approximately 10 observations) would

prevent any multivariate analyses, a five-group solution would not be optimal. The five-group model met the first criteria (lowest BIC value), but not the second (parsimony) or third (>5%). A four-group solution produced a BIC value of -5669.20, which was slightly lower than the three-group solution (*BIC=-5868.71*). Based on this, the four-group solution met the first and third criteria. However, aside from differences in BIC value, both the three and four-group solution evidenced similar classification accuracy in terms of the average posterior probability and odds of correct classification (OCC).

The average posterior probability is based on the probability of accurately assigning individuals to a particular trajectory (Eggleston et al., 2004; Nagin, 2010). In general, an average posterior probability above .7 is accepted as a good fit (Nagin, 2005; Skardhamar, 2010). OCC is a more conservative method of evaluating classification accuracy as it also accounts for the sample size of each trajectory group. An OCC value above five indicates good model fit (Nagin, 2005; Skardhamar, 2010). For both the three- and four-group trajectory solution, all posterior probabilities were above .7 and all OCCs were above five. These results indicate that both solutions were appropriately fit to the data. Analyses of visual trajectory plots revealed that a four-group trajectory solution was not providing much more information than the three-group trajectory solution. Moving from a three-group solution to a four-group solution resulted in two trajectories with very similar shape (i.e., trajectory splitting), although one had a slightly longer duration of active offending. Given the similarity between the three- and four-group solution, a three-group solution was selected, as it was more parsimonious. In essence, the three-group solution meaningfully met the second (parsimony) and third (>5%) criteria. According to Collins and Lanza (2010), selecting the correct number of classes or trajectories almost always involves a trade-off between parsimony, ease of interpretation, and correct model specification. As such, choosing the trajectory solution with fewer groups for the purpose of parsimony and ease of interpretation is supported in the literature (Collins & Lanza, 2010). The parameters of the three-group model are outlined in table six and help support the retention of this model.

Table 6.   Fit-Statistics for Zero-Inflated Poisson Trajectory Model

	Offending Trajectories		
	Bell Shaped	RORD	SRC
% (*n*)	43.7 (*124*)	33.1 (*94*)	23.2 (*66*)
Estimated model parameters			
Intercept	-61.4	-42.1	-13.6
Linear	7.4	5.8	1.6
Quadratic	**-.2**	**-.2**	**-.1**
Model fit characteristics (*m/SD*)			
Mean probability: Bell shaped	**.95** (.11)	.04 (.10)	.01 (.04)
Mean probability: RORD	.04 (.09)	**.95** (.11)	.02 (.06)
Mean probability: SRC	.01 (.01)	.001 (.003)	**.99** (.03)
OCC	**18.85**	**18.8**	**97.5**

Note: RORD = Rapid Onset, Rapid Desistance, SRC = Slow Rising Chronic. OCC = Odds of Correct Classification

Results of the trajectory analysis suggest that there are three distinct patterns of offending amongst the sample (*Figure 1*). The first pattern is the bell-shaped trajectory (*n=124, 43.7%*). The bell-shaped trajectory most closely reflects the typical age-crime curve pattern of offending. For this group, offending peaked at the age of 17 with females in this group averaging 2.5 convictions. By the age of 23, offending was virtually non-existent for this group. The second pattern is the rapid onset, rapid desistance trajectory (RORD) trajectory (*n=94, 33.1%*). The RORD trajectory was characterized by an early onset of frequent offending. For this group, offending peaked at the age of 14 with an average of four convictions. Additionally, the RORD trajectory desisted from offending much quicker than the other two trajectories. Similar to the bell-shaped trajectory, offending was virtually non-existent by the age of 23. The RORD trajectory was characterized by the greatest disruption in adolescence. The final pattern identified is the slow rising chronic (SRC) trajectory (*n=66, 23.2%*). The SRC trajectory had a slow growth in offending from the ages of 12 to 15, with peak offending occurring at ages 16 to 17 with an average of three convictions. The slow rising chronic trajectory was the only trajectory that was characterized by persistent offending into adulthood.

Figure 1.   Offending Trajectories from ages 12 to 23

Bell-Shaped (n=124, 43.7%)   Rapid Onset, Rapid Desistance (n=94, 33.1%)   Slow Rising Chronic (n=66, 23.2%)
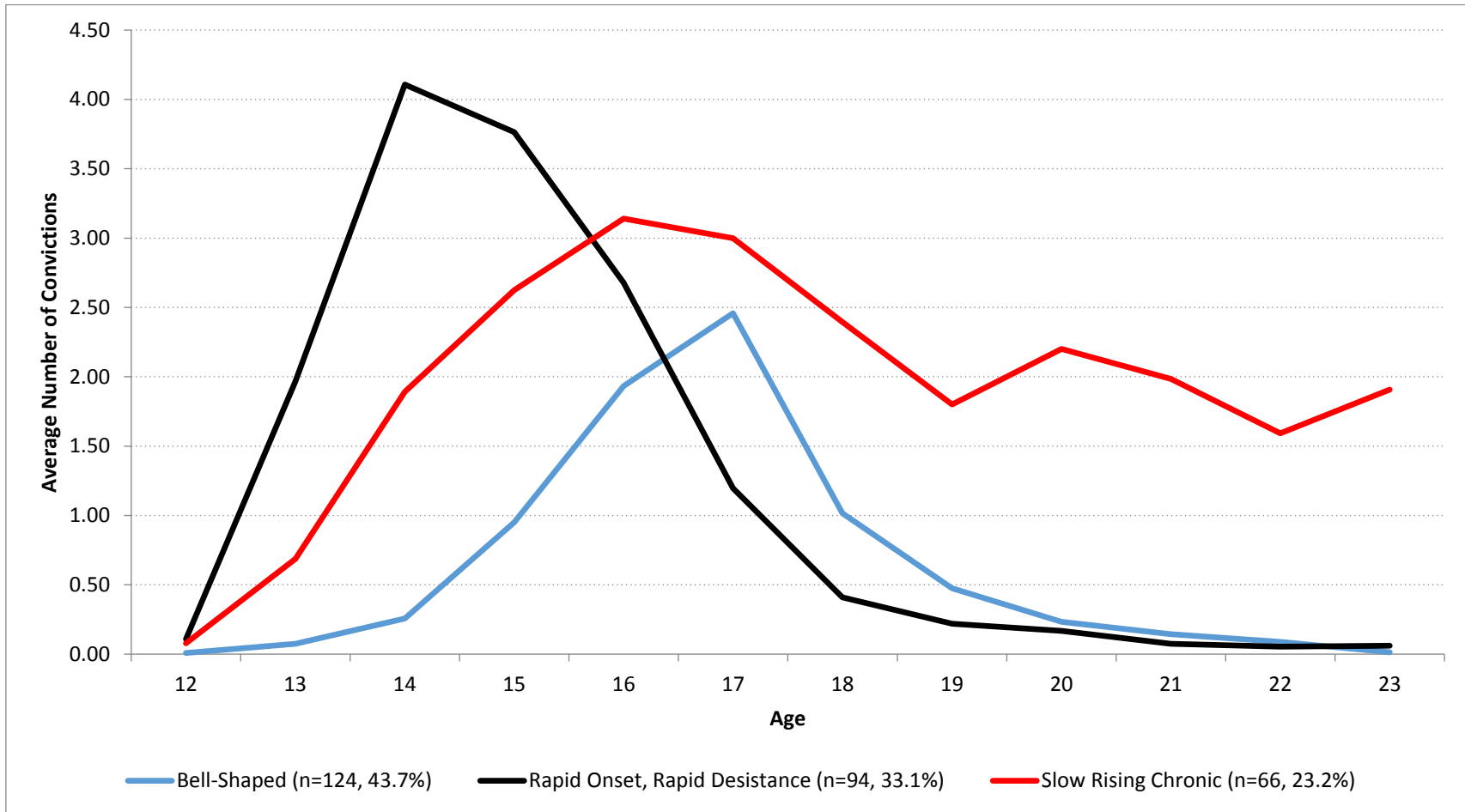
Bivariate analyses were conducted to examine the risk factor profiles associated with each of the three trajectories identified (*Table 7*). Contrary to previous research (Livingston et al., 2008; Wolff et al., 2017), ethnicity was not significantly associated with the different offending patterns at the bivariate level. There were no significant differences between the trajectories for both early alcohol use and early drug use. There were, however, significant differences in terms of substance use versatility. Youth associated with the SRC trajectory had experimented with a significantly greater number of substances than youth associated with the RORD trajectory. While there were no significant differences between the three trajectories in terms of self-identity, the three trajectories did vary in terms of 'others' perception of self.' Youth associated with the SRC trajectory had significantly lower scores on the 'others perception of self' measure than youth associated with the bell-shaped trajectory. Measures of aggression and both physical and sexual abuse were not significantly different between the three trajectories. Whether or not a youth had engaged in consensual sexual activity before the age of 12 was significant at the bivariate level. Results from the chi-square analysis suggest that early sexual activity was most prominent amongst members of the SRC trajectory (*n=7, 10.6%*). One out of the three family dysfunction measures was significant at the bivariate level: leaving home before the age of 12. Willingly leaving home before the age of 12 was most characteristic of youth associated with the RORD trajectory (*n=27, 30.3%*). One of the three measures addressing school problems was significant. Bivariate analyses revealed that youth associated with the RORD trajectory reported a significantly greater number of school changes (*mean=6.4, SD=6*) than youth associated with the SRC trajectory. Finally, the SRC trajectory was characterized by a significantly greater number of convictions (*mean=23.1, SD=9.1*) and days spent in custody (*mean=539.6, SD=372.5*) than both the RORD and bell-shaped trajectory. Similarly, the RORD trajectory was characterized by a significantly greater number of convictions (*mean=14.9, SD=5.4*) and days spent in custody (*mean=394.4, SD=273.5*) than the bell-shaped trajectory.

Table 7.   Bivariate Results

	Offending Trajectories			
	Bell Shaped (n=124)	RORD (n=94)	SRC (n=66)	χ^2/F
	% (*n*)	% (*n*)	% (*n*)	
Demographic Characteristics				
Ethnicity				
Indigenous	41.3 (*50*)	32.6 (*29*)	36.4 (*24*)	
White	50.4 (*61*)	56.2 (*50*)	57.6 (*38*)	2.8
'Other' Ethnicity	8.3 (*10*)	11.2 (*10*)	6.1 (*4*)	
Criminogenic Risk Factors				
Early Alcohol	33.9 (*42*)	38.2 (*34*)	36.4 (*24*)	.43
Early Drug	30.1 (*37*)	41.6 (*37*)	37.9 (*25*)	3.2
Substance Use Versatility mean (SD)	5.2 (*1.9*)	4.8 (*2.1*)	5.6 (*1.9*)	3.0*
aSelf-Identity mean (SD)	71.3 (*8.7*)	69.3 (*10.7*)	68.8 (*6.9*)	2.7
aOther Identity mean (SD)	64.8 (*8.7*)	63.6 (*10.9*)	61.9 (*5.9*)	3.6*
Fight Weekly	16.1 (*20*)	20.2 (*18*)	22.7 (*15*)	1.4
Physical Abuse	71.8 (*89*)	64 (*57*)	74.2 (*49*)	2.3
Sexual Abuse	54 (*67*)	51.7 (*46*)	40.9 (*27*)	3.1
Early Sexual Activity	1.6 (*2*)	6.7 (*6*)	10.6 (*7*)	7.3*
Left Home Before 12	8.1 (*10*)	30.3 (*27*)	24.2 (*16*)	18.3***
Kicked Out Home Before 12	4.8 (*6*)	10.1 (*9*)	7.6 (*5*)	2.2
Family Dysfunction mean (SD)	3.7 (*1.4*)	3.3 (*1.6*)	3.6 (*1.4*)	1.7
Attend School	40.3 (*50*)	52.8 (*47*)	42.4 (*28*)	3.5
Skip School Before 12	15.3 (*19*)	28.1 (*25*)	22.7 (*15*)	5.2
aNumber of School Changes mean (SD)	6 (*4.9*)	6.4 (*6.0*)	4.8 (*3.1*)	3.5*
Criminal Career Measures				
aNumber of Convictions mean (SD)	7.7 (*3.8*)	14.9 (*5.4*)	23.1 (*9.1*)	127.5***
Days in Custody mean (SD)	304.6 (*394.1*)	394.4 (*273.5*)	539.6 (*372.5*)	9.5***

*p<0.05, **p<0.01, ***p<0.001
a Welch statistic reported

6.3. Multinomial Logistic Regression

Multinomial logistic regression analyses assessed the relationship between the risk factors previously identified and trajectory group membership (*Table 8*). Before conducting the multinomial logistic regression, all assumptions were checked. Multicollinearity was assessed by including all of the predictor variables in a linear

regression model to produce the variance inflation factor (VIF) statistics. VIF statistics were all below five, indicating that multicollinearity was not an issue in the multinomial regression models. The multinomial logistic regression assumption of independence of irrelevant alternatives (IIA) was assessed using the Hausman-McFadden test. Results of the Hausman-McFadden test for the full model (*p>.05*) and the final model (*p>.05*) indicate that the IIA assumption has been upheld. The final multinomial logistic regression assumption is correct model specification. To determine the final multinomial logistic regression model, a general to specific testing methodology was followed. In the full model, all theoretically informed variables were included. Variables were removed from this model one-by-one (starting with the highest *p*-value). To determine the final model, 11 different models were estimated. There are both advantages and disadvantages to the general to specific testing methodology. Of particular importance to the current study is that the general to specific testing methodology results in the most parsimonious model. However, this methodology also poses a risk of omitted variable bias. To ensure that there was no omitted variable bias, the following statistics were assessed between every variation of the model: coefficient (both magnitude and direction), standard error, and significance level. Likelihood ratio tests were conducted at every second variation of the model (i.e., after every removal of two variables). Comparisons between model one and three, three and five, five and seven, seven and nine, and nine and 11 revealed no joint significance (χ^2=2.7, p>.05; χ^2=2.8, p>.05; χ^2=3.6, p>.05; χ^2=6.8, p>.05; χ^2=8.1, p>.05, respectively). These results indicate that no two variables were insignificant individually, yet jointly statistically significant.

The first model, including all theoretically informed variables, was significant (χ^2=73.7, p<.001). The McFadden's Pseudo R^2 of .13 indicated weak to moderate model fit (Garson, 2016). The reference category used for the multinomial logistic regression is the bell-shaped trajectory. The bell-shaped trajectory was chosen as it most closely reflects the adolescent age-crime curve. Using the bell-shaped trajectory as the reference category allowed for differences between the typical adolescent offending pattern and the more serious, disruptive offending patterns to emerge.

In the full model, a number of variables were significantly associated with trajectory group membership. Four variables emerged as significant in the comparison between the RORD and bell-shaped trajectories. A one-unit increase in self-identity score significantly decreases the odds of being in the RORD, as opposed to bell-shaped,

trajectory (*RRR=.94, p<.01*). Two variables addressing family conflict emerged as significant in the comparison of the RORD and bell-shaped trajectories. Youth who had left home willingly before the age of 12 were significantly more likely to be associated with the RORD, in comparison to the bell-shaped, trajectory (*RRR=6.5, p<.001*). A one-unit increase in family dysfunction significantly decreases the odds of being in the RORD, as opposed to the bell-shaped, trajectory (*RRR=.75, p<.05*). Last, youth who were attending school prior to incarceration were significantly more likely to be associated with the RORD, in comparison to the bell-shaped, trajectory (*RRR=2.0, p<.05*).

When comparing the SRC and bell-shaped trajectories, there were several significant differences between the two offending patterns. Youth who had engaged in consensual sexual activity before the age of 12 were significantly more likely to be associated with the SRC, in comparison to the bell-shaped, trajectory (*RRR=7.0, p<.05*). Youth who had willingly left home before the age of 12 were significantly more likely to be associated with the SRC, in comparison to the bell-shaped, trajectory (*RRR=5.4, p<.01*). In addition, a one-unit increase in number of school changes significantly decreases the odds of being in the SRC, as opposed to the bell-shaped, trajectory (*RRR=.91, p<.05*).

The final model described herein is the result of the general to specific testing methodology mentioned previously. This model was significant ($\chi^2=49.7, p=.000$) and had a McFadden's Pseudo R2 of .08, indicating weak to moderate model fit. Although the pseudo R2 decreased slightly from the full model, the result is a more parsimonious model. A number of significant differences emerged between the RORD and the bell-shaped trajectory and the SRC and the bell-shaped trajectory in the final model.

When comparing the RORD and the bell-shaped trajectories, the following findings emerge. A one-unit increase in self-identity score significantly decreases the odds of being in the RORD, as opposed to the bell-shaped, trajectory (*RRR=.95, p<.01*). This finding suggests that youth with more positive self perceptions are likely to be associated with a bell-shaped pattern of offending. Youth who had left home willingly before the age of 12 were significantly more likely to be associated with the RORD, in comparison to the bell-shaped, trajectory (*RRR=7.6, p=.001*). Further, a one-unit increase in family dysfunction significantly decreases the odds of being in the RORD, as

57

opposed to the bell-shaped, trajectory (*RRR=.73, p<.01*). This finding suggests that youth who experienced a higher level of familial dysfunction were more likely to be associated with the bell-shaped pattern of offending. Last, youth who were attending school prior to incarceration were significantly more likely to be associated with the RORD, in comparison to the bell-shaped, trajectory (*RRR=2.0, p<.05*).

A number of significant differences emerged in the comparison between the SRC and bell-shaped trajectories. In contrast to the full model, there were significant differences between the SRC and the bell-shaped trajectory on the self-identity measure. In the final model a one-unit increase in self-identity score significantly decreased the odds of being in the SRC, in comparison to the bell-shaped, trajectory (*RRR=.95, p<.01*). Unlike the full model, early sexual activity was no longer significant in the final model. Similar to the full model, leaving home before the age of 12 and number of school changes emerged as significant in the comparison of the SRC and bell-shaped trajectories. Youth who willingly left home before the age of 12 were significantly more likely to be associated with the SRC, in comparison to the bell-shaped, trajectory (*RRR=5.8, p=.000*). This finding indicates that the SRC trajectory is characterized by leaving the home before the age of 12. Finally, a one-unit increase in a youth's number of school changes significantly decreased the odds of being associated with the SRC trajectory, as opposed to the bell-shaped, trajectory (*RRR=.92, p<.05*). This finding indicates that issues within the school system do not characterize the SRC trajectory.

To assess the differences between the RORD and SRC trajectory, the reference category was changed to SRC and the full and final models were redone (*Table 9*). In the full model, three variables emerged as significant in the comparison between the RORD and SRC trajectories. A one-unit increase in substance use versatility (i.e., as the number of substances a youth experimented with increased) significantly decreased the odds of being associated with the RORD, in comparison to the SRC, trajectory (*RRR=.80, p<.05*). Youth who were sexually abused were significantly more likely to be associated with the RORD, in comparison to the SRC, trajectory (*RRR=2.3, p<.05*). A one-unit increase in number of school changes (i.e., as the number of schools a youth attended increased) significantly increased the odds of being associated with the RORD, in comparison to SRC, trajectory (*RRR=1.1, p<.05*). These findings suggest that frequent school change was more characteristic of the RORD trajectory than the SRC trajectory. For the final model, only the number of schools a youth attended emerged as

significant. A one-unit increase in number of school changes significantly increased the odds of being associated with the RORD, in comparison to SRC, trajectory (*RRR=1.1, p<.05*).

Table 8.   Multinomial Logistic Regression Models

	Full Model RRR *(95% C.I.)*		Final Model RRR *(95% C.I.)*	
	RORD	**SRC**	**RORD**	**SRC**
Ethnicity (White)				
Indigenous	.69 *(.36-1.3)*	.79 *(.39-1.6)*	.71 *(.37-1.4)*	.75 *(.38-1.5)*
'Other'	.68 *(.22-2.1)*	.33 *(.08-1.4)*	.63 *(.22-1.8)*	.36 *(.10-1.4)*
Early Alcohol	.68 *(.31-1.5)*	.65 *(.28-1.5)*		
Early Drug	1.9 *(.83-4.0)*	1.2 *(.50-2.7)*		
Substance Use Versatility	.86 *(.73-1.0)*	1.1 *(.89-1.3)*		
Self-Identity	**.94 (.90-.98)****	.96 *(.92-1.0)*	**.95 (.92-.99)****	**.95 (.91-.99)****
Other Identity	1.0 *(.98-1.1)*	.99 *(.94-1.0)*		
Fight Weekly	1.3 *(.57-3.2)*	1.5 *(.64-3.6)*		
Physical Abuse	.61 *(.29-1.3)*	1.2 *(.55-2.8)*		
Sexual Abuse	1.2 *(.59-2.4)*	.51 *(.25-1.1)*		
Early Sexual Activity	3.2 *(.51-19.8)*	**7.0 (1.1-44.2)***		
Left Home Before 12	**6.5 (2.5-17)****	**5.4 (1.9-15.3)****	**7.6 (3.2-18.1)****	**5.8 (2.3-14.9)****
Kicked Out Home Before 12	.85 *(.21-3.4)*	.64 *(.13-3.1)*		
Family Dysfunction	**.75 (.59-.96)***	.91 *(.70-1.2)*	**.73 (.59-.91)****	.89 *(.70-1.1)*
Attend School	**2.0 (1.1-3.7)***	1.4 *(.73-2.8)*	**2.0 (1.1–3.6)***	1.2 *(.66-2.3)*
Skip School Before 12	1.7 *(.72-3.9)*	1.2 *(.49-3.0)*		
Number of School Changes	1.0 *(.95-1.1)*	**.91 (.84-1.0)***	1.0 *(.96-1.1)*	**.92 (.84-1.0)***
Constant	65.4	24.7	36.8	45.5
McFadden's Pseudo R2	0.13		0.08	
Log Likelihood	-258.1		-270.1	

Note: Bell-shaped trajectory is the reference category. The reference category for each independent variable is in parentheses. RORD = Rapid Onset, Rapid Desistance, SRC = Slow Rising Chronic
*p < 0.05, **p < 0.01, ***p < 0.001.

Table 9.   Multinomial Regression Models – Changed Reference Category

	Full Model RRR *(95% C.I.)*	Final Model RRR *(95% C.I.)*
	RORD	**RORD**
Ethnicity (White)		
Indigenous	.88 (*.42-1.9*)	.95 (*.47-1.9*)
'Other'	2.0 (*.50-8.2*)	1.8 (*.48-6.4*)
Early Alcohol	1.1 (*.43-2.6*)	
Early Drug	1.6 (*.64-3.9*)	
Substance Use Versatility	**.80 (*.65-.99*)***	
Self-Identity	.98 (*.93-1.0*)	1.0 (*.97-1.0*)
Other Identity	1.0 (*.98-1.1*)	
Fight Weekly	.88 (*.36-2.2*)	
Physical Abuse	.49 (*.21-1.1*)	
Sexual Abuse	**2.3 (*1.1-5.0*)***	
Early Sexual Activity	.46 (*.11-1.9*)	
Left Home Before 12	1.2 (*.48-3.0*)	1.3 (*.60-2.9*)
Kicked Out Home Before 12	1.3 (*.32-5.6*)	
Family Dysfunction	.82 (*.62-1.1*)	.82 (*.65-1.1*)
Attend School	1.4 (*.69-2.8*)	1.6 (*.84–3.1*)
Skip School Before 12	1.4 (*.56-3.4*)	
Number of School Changes	**1.1 (*1.0-1.2*)***	**1.1 (*1.0--1.2*)***
Constant	2.7	.81
McFadden's Pseudo R2	0.13	0.08
Log Likelihood	-258.1	-270.1

Note: The reference category refers to the SRC trajectory. The reference category for each independent variable is in parentheses. RORD = Rapid Onset, Rapid Desistance, SRC = Slow Rising Chronic
*p < 0.05, **p < 0.01, ***p < 0.001.

While relative risk ratios (RRR) provide an indication of relative change, marginal effects provide an indication of absolute change. In essence, marginal effects allow for a more intuitive understanding of statistical results (Williams, 2012). For example, a RRR value of two indicates that an outcome is twice as likely, but this is only in reference to the baseline probability and selected reference category. As such, marginal effects at the mean (MEM) were conducted for the final model to interpret absolute change (*Table 10*). A one unit increase in score on the positive self-identity measure produces a one percent increase in the probability of membership in the bell-shaped trajectory. Significant relationships emerged between leaving home before the age of 12 and trajectory group membership. Leaving home willingly before the age of 12 is associated with an increase in the probability of membership in the RORD and SRC trajectory (*26%*

and 15%, respectively). On the other hand, leaving home before the age of 12 is associated with a 41 percent decrease in the probability of membership in the bell-shaped trajectory. Familial dysfunction also emerged as a significant predictor of trajectory group membership. A one unit increase in family dysfunction produces a five percent increase in the probability of membership in the bell-shaped trajectory. A one unit increase in family dysfunction also produces a five percent decrease in the probability of membership in the RORD trajectory. Risk factors from the school-domain also emerged as significant predictors of trajectory group membership. Attending school prior to incarceration is associated with a 12 percent increase in the probability of membership in the RORD trajectory. A one unit increase in number of school changes produces a two percent decrease in the probability of membership in the SRC trajectory. Results from the marginal effect analyses revealed a number of significant relationships between predictor variables and trajectory group membership. Specifically, marginal effect analyses enabled the identification of the direct effect of risk factor predictors on trajectory group membership.

Table 10.   Marginal Effects – Final Model

	Bell-Shaped	**RORD**	**SRC**
	Marginal Effect *(95% C.I.)*	Marginal Effect *(95% C.I.)*	Marginal Effect *(95% C.I.)*
Ethnicity (White)			
Indigenous	.07 (-*.05-.19*)	-.04 (-*.16-.07*)	.02 (-*.13-.08*)
'Other'	.14 (-*.06-.35*)	-.02 (-*.21-.16*)	-.12 (-*.27-.03*)
Self-Identity	**.01 (*.01-.02*)****	-.01 (-*.01-.00*)	-.01 (-*.01-.00*)
Left Home Before 12	**-.41 (-*.56--.26*)*****	**.26 (*.14-.38*)*****	**.15 (*.03-.27*)****
Family Dysfunction	**.05 (*.01-.09*)***	**-.05 (-*.09--.02*)****	.00 (-*.03-.04*)
Attend School	-.10 (-*.21-.01*)	**.12 (*.02-.22*)***	-.02 (-*.12-.08*)
Number of School Changes	.01 (-*.01-.02*)	.01 (-*.00-.02*)	**-.02 (-*.03--.00*)***

Note: RORD = Rapid Onset, Rapid Desistance, SRC = Slow Rising Chronic
*p < 0.05, **p < 0.01, ***p < 0.001.

Chapter 7.   Discussion

The current study addressed two primary research questions: (1) Can multiple trajectories of offending among a sample of female offenders incarcerated as adolescents be identified? (2) Can these trajectories be distinguished from one another based on key risk factors? In contrast to existing theory, the current study posited greater heterogeneity within female offending patterns than previously expected. Analyses revealed substantial differences in officially recorded offending patterns among a sample of females who had been incarcerated in adolescence. In comparison to existing research on risk factor correlates of male offending trajectories (e.g., as asserted by Wolff et al., 2017), fewer differences between offending patterns emerged than would be expected. Nonetheless, multinomial logistic regression analyses revealed several distinct differences between the trajectories in terms of risk factor profiles. The following section reviews the findings in light of previous research on offending patterns of female offenders and associated risk factor correlates.

7.1. Female Offenders and the "Multi-Problem" Profile

Bivariate analyses between predictor variables revealed a substantial amount of risk factor overlap. The presence of one risk factor was often associated with the presence of another risk factor. This finding was especially prevalent when looking at risk factors that manifested before the age of 12. Early alcohol use, drug use, sexual activity, family conflict before the age of 12 (running away or being kicked out of the home), and skipping school before the age of 12 were significantly associated with one another. These findings indicate that the presence of one risk factor early on in the life course (e.g., leaving home before the age of 12) places females at risk for the development of a number of other risk factors, such as substance use and sexual activity before the age of 12. The co-occurrence of this set of risk factors could be explained as a specific pathway into offending for females.

A number of scholars have asserted that running away from home, and arguably being kicked out of the home, acts as a gendered pathway into delinquency (Chesney-Lind & Shelden, 2014; Huizinga et al., 2013). Running away from home is often associated with the presence of other risk factors (e.g., engaging in sexual activity as a

form of subsistence) (Chesney-Lind & Shelden, 2014). In the current study, both running away and being kicked out of the home before the age of 12 were significantly associated with early alcohol use, early sexual activity, higher levels of family dysfunction, and skipping school before the age of 12. Additionally, youth who ran away from home were significantly more likely to be involved in physical altercations at least once a week. This finding makes intuitive sense because youth who run away from home are at greater risk of experiencing personal victimization (Kim et al., 2009). In turn, these youths may feel a need to resort to physical violence to protect themselves and their personal belongings. A significant body of research asserts a relationship between abuse experiences and running away (e.g., Calhoun et al., 1993; Chesney-Lind & Shelden, 2009; Kim et al., 2009). Conversely, in the current study, bivariate analyses did not reveal a relationship between abuse and running away from home.

Family dysfunction was significantly associated with almost every other risk factor across the individual, family, and school domains. Research suggests that a negative home environment is more characteristic of female delinquents than male delinquents (Belknap & Holsinger, 2006). Indeed, Steketee, Junger, and Junger-Tas (2013) found that family disruption had a stronger impact on delinquency for females than it did for males. Given the existing literature and the current findings, it appears as though family dysfunction acts as a hub through which exposure to other risk factors initiates. For example, girls with higher levels of familial dysfunction are also more likely to drink alcohol, use drugs, engage in early sex, run away from home, be kicked out of the home, and skip school, among others. Risk factor overlap does not occur to the same extent for any other single variable examined in the study. These findings add support to the idea that a negative family environment is not only a key predictor of delinquency, but also a key characteristic of female delinquents.

Within existing literature, experiences of abuse (primarily sexual) are given significant weight in the explanation of offending among females. Bivariate analyses reveal that physical abuse and sexual abuse go hand in hand. Interestingly, physical abuse, in comparison to sexual abuse, tended to correlate more with other risk factors (i.e., sexual abuse was only correlated with family dysfunction and number of school changes, whereas physical abuse was associated with both substance abuse issues and aggression). As such, there is a tendency for youth who are experiencing physical abuse to have a greater number of risk factor correlates. This discovery is important

64

when considering the threshold hypothesis, as it appears that girls who experience physical abuse have more problematic risk factor backgrounds than girls who experience sexual abuse. Additionally, research has posited a relationship between abuse and self-perception (Calhoun et al., 1993). The current study revealed that experiences of physical abuse, but not sexual abuse, were associated with a more negative self-perception.

Bivariate analyses of included risk factors support the assertion that female offenders are characterized by a large number of risk factors, often spanning multiple domains (Corrado et al., 2000; Odgers & Moretti, 2002). Corrado and colleagues (2000) refer to this as the "multi-problem" profile (p. 193). In essence, it appears that the presence of more environmental risk factors is necessary to push a female into crime (Loeber, Capaldi, & Costello, 2015). In a test of the "threshold" hypothesis, Wong et al. (2013) identified a non-linear relationship between the number of risk factors a female has and subsequent delinquency. Essentially, at low risk levels, the addition of a new risk factor has less of an impact on the likelihood of delinquency than it would at high risk levels. Based on these findings, it is important that targeted intervention take place early in the life course to try and prevent the clustering of risk factors for female offenders and, ideally, reduce the likelihood of criminal offending. This assertion is in line with Andrews et al.'s (2007) RNR model. The RNR model posits that criminal justice system interventions are most effective at reducing reoffending when targeted to both the risk and need level of the offender. Identification of different patterns of offending among females would also assist in the identification of those most at risk for disruptive offending across the life course.

7.2. Identification of the Chronic Female Offender

Trajectory analyses revealed greater heterogeneity in female offending patterns than earlier theory would suggest (e.g., Moffitt, 1993; Silverthorn & Frick, 1999). Trajectory analyses identified three distinct offending patterns for female offenders: bell-shaped, rapid onset, rapid desistance (RORD), and slow rising chronic (SRC). The bell-shaped and SRC trajectories, with minor variations, mirror the AL and LCP trajectories posited by Moffitt (1993). According to Piquero (2008), trajectory analyses generally identify both an AL and LCP trajectory. Based on current theoretical assertions, the

RORD trajectory was an unexpected finding. Each of these trajectories will be discussed in turn.

As suggested by Moffitt's (1993) dual taxonomy, a large proportion (*n=124, 43.7%*) of the youth in the current study followed an AL trajectory. These youth had the least problematic offending pattern in adolescence and virtually non-existent offending at the age of 23. This finding is in line with other studies that reported an AL-type trajectory (e.g., Jennings, 2011). It should be noted that identification of an AL trajectory was more common when using a community-based sample (e.g., Ahonen et al., 2016; D'Unger et al., 2002; Lahey et al., 2016; Loeber et al., 2017). Interestingly, a number of trajectory studies using offender-based samples identified a "low" trajectory (e.g., Blokland & Van Os, 2010; Cauffman et al., 2015), which was not identified in the current study. This difference could potentially be explained by the different mechanisms through which females end up in custody in Canada in comparison to other countries. In Canada, the use of custody for youth is extremely restrictive - at least since the 2003 enactment of the Youth Criminal Justice Act. As a result, very few youth ever actually end up in a custodial facility. It could be that the "low" offenders identified in other studies are those diverted from custody by the Canadian Criminal Justice System.

Results from combined male-female trajectory analyses suggest that chronic offending is, by and large, a male phenomenon. Contrary to Corrado et al.'s (2015) combined male and female trajectory analysis, the current study revealed that chronic offending is not a male-only phenomenon. In line with previous research conducting female-only analyses of a high-risk offender-based sample (e.g., Blokland & Van Os, 2010; Cauffman et al., 2015; Jennings, 2011), the current study revealed a subset of female offenders for which offending persisted past adolescence and into emerging adulthood (the SRC trajectory). One important distinction of the chronic trajectory identified in this study is that it was not characterized by the earliest age of onset, yet was the only trajectory still actively offending into emerging adulthood. As will be discussed, it appears that early onset is not a necessary precursor for persistent female offending. Based on trajectory analyses of a female-only sample, Cohen et al. (2010) found that offenders associated with the chronic trajectory accounted for 49 percent of the cost of crime, despite composing less than one percent of the total sample of female offenders. Cohen et al.'s (2010) research has important intervention and treatment implications. Prevention and intervention efforts should be targeted at those most at risk

for offending. If offending among this group can be prevented or reduced, the cost of crime for society will be substantially reduced.

The RORD trajectory was characterized by the earliest age of onset and the highest peak frequency of offending, yet a pattern of desistance that mirrored the bell-shaped trajectory. Consequently, in the current study, an earlier age of onset was not associated with a longer career duration among females. Contrary to expectations of both the criminal career framework and developmental criminology, youth in the RORD trajectory did not exhibit persistent offending into emerging adulthood. In fact, offending outcomes at age 23 were nearly identical for the RORD trajectory and the bell-shaped trajectory. The relationship between an early age of onset and career duration is one of the fundamental assumptions of the criminal career framework and developmental criminology. More specifically, early onset plays a key role in the identification of LCP offenders within Moffitt's (1993) dual taxonomy. While unexpected, similar findings have been reported elsewhere. It is important to note that other studies finding similar results were also derived from a high-risk offender based sample. Andersson et al. (2012) identified a trajectory with an early-onset of offending followed by complete desistance from crime. Additionally, Block et al. (2010) identified an emerging adulthood onset trajectory that, despite displaying low levels of offending throughout adolescence, peaked in offending at the age of 38 with continued offending across adulthood. The identification of the RORD trajectory has implications for the targeted prevention and intervention of female offenders. Because an earlier age of onset may not be indicative of a chronic offending pattern among females, it appears that there may be less continuity in offending over time for females. As such, it could potentially be more fruitful to focus on the presence of psychosocial risk factors in females in general, rather than focusing prevention and intervention programs at those displaying criminal behaviour at an early age. In the current study, both bivariate and multivariate analyses identified key risk factor predictors associated with the different offending patterns identified through trajectory analyses.

7.3. Risk for Female Offending: An Argument for Homogeneity?

The current study revealed how certain risk factor profiles can be associated with different offending patterns among female offenders. At the bivariate level, substance

use versatility, others' perception of self, early sexual activity, leaving home willingly, and an increased number of school changes all emerged as significant. The SRC trajectory (the only trajectory with females offending into adulthood) was characterized by the greatest substance use experimentation, lower scores on the other's perception of self measure, and engaging in consensual sexual activity before the age of 12. Leaving home before the age of 12 and frequent school changes were most problematic for the RORD trajectory (the trajectory with significant disruption in adolescence, but not adulthood).

Given Moffitt's (1993) assertion that both neurological deficits and a criminogenic environment characterize LCP offending, it is interesting that the SRC trajectory (similar to LCP) was not significantly different from the bell-shaped (similar to AL) trajectory on a number of key risk factors. One potential reason as to why this is the case is the "multi-problem" profile of the females in the sample. Prevalence rates on a number of key characteristics between the trajectories are almost indistinguishable (e.g., family dysfunction, self-identity). The females in the sample are characterized by so much risk, as a whole, that it is harder to distinguish between them. In explaining this apparent homogeneity within their own study, Wolff et al. (2017) assert, "there is something unique about female delinquents who enter the system, which in turn seems to lead to less heterogeneity within the group in comparison to males" (p. 191). While few differences emerged at the bivariate level, there were notable differences identified between trajectories at the multivariate level.

In multivariate analyses, while holding all other variables constant, a more negative self-identity, leaving home before the age of 12, and attending school prior to custody were characteristic of the RORD trajectory. Youth who endorsed a more negative self-perception were significantly more likely to be associated with the RORD trajectory. Existing literature has shown that female delinquents, in comparison to male delinquents, are particularly likely to endorse a more negative self-perception and that low self-esteem is linked to delinquency (Belknap & Holsinger, 2006; Mier & Ladny, 2018). The current study extends previous research by establishing that self-esteem is predictive of the more disruptive offending trajectories both in adolescence and adulthood. It is interesting to note that youth associated with the RORD trajectory were significantly more likely to be attending school prior to custody. This result is similar to Catalano et al.'s (2004) findings regarding the effect of school attachment and

commitment on female delinquency. From this perspective, it makes sense that youth associated with the RORD trajectory would desist from crime. Based on this finding, intervention strategies aimed at reducing offending for female offenders could likely promote desistance through the facilitation of attachment and commitment to school. Interestingly, increased levels of family dysfunction were significantly more likely among females in the bell-shaped trajectory. In stark contrast to existing theory (e.g., Moffitt, 1993), higher scores on the familial dysfunction measure were associated with membership in the bell-shaped trajectory. Considering that youth associated with the bell-shaped trajectory had the least problematic offending pattern across adolescence and adulthood, it is surprising that they are characterized by the most familial dysfunction. Existing research shows that parental criminality and substance use are some of the most important predictors of recidivism for females (van der Put et al., 2010). As such, this is an unexpected finding both from a theoretical and empirical standpoint. It is possible that family dysfunction is not exerting as much of an effect on persistent female offenders as initially perceived. It could be that family dysfunction is an important risk factor for the initial onset of offending, but not predictive of disruptive or persistent offending.

When comparing the SRC and bell-shaped trajectory, self-identity, leaving home before the age of 12, and more frequent school changes emerged as significant. Youth associated with the SRC trajectory exhibited a more negative self-perception and left home before the age of 12. Similar to the RORD trajectory, it is not surprising that youth associated with the SRC trajectory endorsed more negative self-perceptions than those associated with the bell-shaped trajectory. Negative self-perception is one of two variables significantly associated with both of the more disruptive offending patterns. As such, programming should focus on increasing the self-esteem of girls at a young age, especially those girls who come from extremely dysfunctional families. Unexpectedly, sexual abuse did not emerge as a significant predictor of trajectory group membership. Given the weight attached to the relationship between sexual abuse and offending, this particular finding needs to be unpacked. In a similar study, Wolff and colleagues (2017) found no significant relationship between adverse childhood experiences and serious, violent, and chronic status among females. In explaining this finding, Wolff et al. (2017) assert that the measurement of abuse could be flawed because it does not include indicators of frequency, severity, or duration. Additionally, greater school disruption (e.g.,

more frequent school changes) was associated with the bell-shaped trajectory, not the SRC trajectory. This result is similar to the comparison between the RORD and bell-shaped trajectories. It appears that detachment from school (e.g., not attending school prior to custody and a greater number of school changes) was most characteristic of the bell-shaped trajectory. This finding is in contrast to Moffitt's (1993) assertion that the LCP group would be characterized by problems in school functioning. It is possible that school disruption is important in pushing a female into offending, but not for more serious and disruptive offending patterns.

In line with the preceding discussion regarding running away from home as a gendered pathway into delinquency and crime, Kim et al. (2009) found a relationship between running away from home and delinquency. In the current study, one of the most consistent findings across both bivariate and multivariate analyses was the impact of running away from home on offending patterns. While scholars have asserted that running away is a gendered pathway into crime (e.g., Chesney-Lind, 2014), the current study found running away from home as one of the most identifiable pathways into more disruptive offending patterns within adolescence and adulthood. In fact, youth who ran away from home were approximately eight times more likely to be associated with the RORD or SRC trajectory (*RRR = 7.6 and 5.8, respectively*). The co-occurrence of running away from home with early substance use, early sexual activity, school truancy before the age of 12, and increased levels of family dysfunction provide strength to this argument. Based on these findings, prevention and intervention strategies should be targeted at females with the most high-risk familial environments.

To target females most at risk for offending into adulthood, intervention programming should concentrate on children and youth that have been exposed to a number of different risk factors affecting different facets of their life (e.g., individual, family, and school). Andrews et al. (2007) suggest that criminal justice system interventions are most effective when targeted to the risk and need level of the offender. As such, identifying risk factor profiles associated with the most disruptive offending patterns better enables more accurate targeting of prevention and intervention strategies to reduce offending. The current study has taken a step forward in terms of identifying high-risk patterns of offending and their risk factor correlates.

7.4. Limitations and Future Directions

There are five primary limitations to the current study. These limitations can be categorized as sample-based and measurement-based. The first sample-based limitation is generalizability. This study uses a sample of youth who have been incarcerated during adolescence, which is a very specific and distinct population. While use of such a sample may limit generalizability, it is also a benefit when conducting analyses of female offenders. Community-based samples are often not able to capture the most serious female offenders and, as such, often prevent advanced statistical analysis (Moffitt & Caspi, 2001; Odgers et al., 2007). For example, Loeber et al. (2017) used a community-based sample of females in which 72.5 percent of the sample had never engaged in crime. Trajectory analyses are conducted to address heterogeneity in offending. Trajectory analyses conducted on community-based samples essentially only provide an offender/non-offender dichotomy, once again ignoring the heterogeneity that exists within female offending. While using an incarcerated sample may hinder generalizability, it enables researchers to explore an understudied population. Additionally, the current study was conducted in BC, Canada and there are a higher percentage of Indigenous offenders than what is typically reported in incarcerated juvenile populations in the US. Therefore, it is possible that the results reported herein are not transferable to incarcerated samples outside of Canada.

The second sample-based limitation revolves around sample size and length of follow-up period. Different sample characteristics can impact the number and shape of trajectories identified through trajectory analysis. According to Piquero (2008), larger sample sizes are conducive to finding more groups. This consideration is especially important when analyzing female offenders because sample sizes are usually small to begin with. The sample size limitation could explain why research generally finds a greater number of offending trajectories for males than females (e.g., Ferrante, 2013). According to Eggleston et al. (2004), the length of follow-up period can also impact the number and shape of identified trajectories. For example, in the current study, we do not know what occurred before the age of 12 or what will occur after the age of 23. What comes before the age of first measurement and after the age of last measurement could significantly alter the shape of the trajectories identified and any subsequent multivariate

analyses. As such, it is important to interpret the findings of this sample with the understanding that they are inherently limited by the sample of study.

The operationalization of offending is the first measure-based limitation. In the current study, offending was operationalized as criminal charges that resulted in a conviction. Consequently, the current study only looks at the most serious form of offending. Research shows that offending outcomes are impacted by the way in which recidivism is measured (e.g., arrests, charges, convictions) (e.g., Bouchard & Wong, 2017). As such, the current study is only capturing a small proportion of actual offending, which could impact the offending patterns identified. The use of self-report data could potentially ameliorate some of these concerns, however, this method also has inherent limitations. While self-report data may allow researchers to capture the full scope of offending, it often underestimates more serious types of offending (Hindelang, Hirschi, & Weis, 1979). Within longitudinal research designs, telescoping is a particularly concerning limitation of self-report data. Telescoping refers to a study participant reporting a factual event as having occurred in the wrong time period (e.g., either earlier or later in time than it actually occurred) (Kirk, 2006). The use of official data, through temporal precision, is able to circumvent this particular limitation inherent to self-report data (Kazemian & Farrington, 2005). Given that the use of semi-parametric group-based modeling is dependent on the accurate temporal reporting of criminal events, official data is particularly well suited for the current study.

The final two measure-based limitations of the current study provide directions for future research endeavours. Analyses from the current study revealed few significant predictors of the more high-risk offending patterns. This finding is in stark contrast to what is known about risk factors for more serious offending patterns among male offenders. One possible reason as to why this is the case is that important variables were not included in the study. For example, Moffitt (1993) asserts that neuropsychological deficits are an important predictor of chronic offending. Data for the current study does not include measures that appropriately reflect neuropsychological deficits. It is possible that the inclusion of such measures could alter the multinomial logistic regression results. Another plausible explanation is in the differences in risk factor profiles between males and females at the deep-end of the criminal justice system (Odgers & Moretti, 2002). The field of developmental criminology has focused heavily on male offending. Measurement of risk is primarily designed for and tested on males, yet

72

applied equally to males and females. It is possible that risk for offending, as it is measured for male youths, is not equally applicable to females (Wolff et al., 2017). Scholars have previously advocated for the use of gender-specific risk factors in the study of female offending (e.g., Odgers et al., 2010). As such, future research assessing the relationship between risk factors and offending patterns should utilize gender-specific risk factors.

Results of the current study revealed, as per developmental theories, that desistance was in fact normative. Both the bell-shaped and RORD trajectories had near zero offending rates by the age of 23. In contrast, youth associated with the SRC trajectory were still actively offending at this time. From a life-course perspective, the current study is limited because it cannot address the key mechanisms that led most girls to desist from crime. While the current study identified risk factor profiles associated with chronic offending, it cannot explain what factors in particular influenced desistance from crime. From a policy perspective, it would be beneficial to know if certain turning points were occurring for the bell-shaped and RORD trajectory in emerging adulthood. If research could identify these turning points, intervention programs could assist in the development of structurally induced turning points. Additionally, while Laub and Sampson (1993) posit marriage, employment, and military service as key turning points for males, it is not clear how well these apply to female offenders.

7.5. Conclusion

The current study revealed important empirical findings in regard to existing theoretical debates. In contrast to assertions by Gottfredson and Hirschi (1990), all offenders in the sample did not follow the age-crime curve pattern of a decline in offending with age. Rather, in line with criminal career and developmental perspectives, the age-crime curve for females reflects an aggregate of a number of distinct offending patterns. Indeed, the current study revealed substantial amounts of heterogeneity within patterns of female offending. In direct contrast to arguments that all offending can be explained through the same causal mechanisms (e.g., Gottfredson & Hirschi [1990]; low self-control), different risk factor correlates were in fact associated with different female offending patterns. However, the number of risk factors that distinguish between offending patterns for females does not resemble that of males. In essence, there is greater homogeneity within the risk factor profiles of incarcerated female adolescents.

The current study revealed heterogeneity within offending patterns, but relative homogeneity within risk factor background. This indicates that by the time young female offenders reach a custodial institution they are, as a whole, characterized by so much disadvantage that they are nearly indistinguishable from one another. As such, existing theoretical models should be adapted, or new models developed, to account for the relative homogeneity within female offenders at the "deep-end" of the system.

References

Ahonen, L., Jennings, W. G., Loeber, R., & Farrington, D. P. (2016). The relationship between developmental trajectories of girls' offending and police charges: Results from the Pittsburgh Girls Study. *Journal of Developmental and Life-Course Criminology, 2*(3), 262-274.

Andersson, F., Sten, L., & Svensson, R., & Torstensson, M. (2012). Sex differences in offending trajectories in a Swedish cohort. *Criminal Behaviour and Mental Health, 22*(2), 108-121.

Andrews, D. A., Bonta, J., & Hoge, R. D. (2007). Classification for effective rehabilitation: Rediscovering psychology. *Criminal Justice and Behavior, 17*(1), 19-52.

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*(5), 469-480.

Baskin-Sommers, A., & Baskin, D. (2016). Psychopathic traits mediate the relationship between exposure to violence and violent juvenile offending. *Journal of Psychpathology and Behavioral Assessment, 38*(3), 341-349.

Belknap, J. (1996). *The Invisible Woman: Gender, Crime, and Justice.* Belmont, CA: Wadsworth Publishing Company

Belknap, J., & Holsinger, K. (2006). The gendered nature of risk factors for delinquency. *Feminist Criminology*, *1*(1), 48-71.

Bennett, T., Holloway, K., & Farrington, D. P. (2008). The statistical association between drug misuse and crime: A meta-analysis. *Aggression and Violent Behavior, 13*(2), 107-118.

Block, C. R., Blokland, A. A. J., van der Werff, C., van Os, R., & Nieuwbeerta, P. (2010). *Feminist Criminology, 5*(1), 73-107.

Blokland, A. A. J., Nagin, D., & Nieuwbeerta, P. (2005). Life span offending trajectories of a Dutch conviction cohort. *Criminology, 43*(4), 919-954.

Blokland, A., & van Os, R. (2010). Life span offending trajectories of convicted Dutch women. *International Criminal Justice Review, 20*(2), 169-187.

Blumstein, A., Cohen, J., & Farrington, D. P. (1988). Criminal career research: Its value for criminology. *Criminology, 26*(1), 1-35.

Bongers, I. L., Koot, H. M., van der Ende, J., & Verhulst, F. C. (2004). Developmental trajectories of externalizing behaviors in childhood and adolescence. *Child Development, 75*(5), 1523-1537.

Bouchard, J., & Wong, J. S. (2017). Examining the effects of intensive supervision and aftercare programs for at-risk youth: A systematic review and meta-analysis. *International Journal of Offender Therapy and Comparative Criminology, 62*(6), 1509-1534.

Broidy, L. M., Tremblay, R. E., Brame, B., Fergusson, D., Horwood, J. L., Laird, R., Moffitt, T. E., Nagin, D. S., Bates, J. E., Dodge, K. A., Loeber, R., Lynam, D. R., Pettit, G. S., & Vitaro, F. (2003). Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six-site, cross-national study. *Developmental Psychology, 39*(2), 222-245.

Calhoun, G., Jurgens, J., & Chen, F. (1993). The neophyte female delinquent: A review of the literature. *Adolescence, 28*(110), 461-471.

Catalano, R. F., Haggerty, K. P., Oesterle, C. B., Fleming, C. B., & Hawkins, J. D. (2004). The importance of bonding to school for healthy development: Findings from the Social Development Research Group. *Journal of School Health, 74*(7), 252-261.

Catalano, R. F., & Hawkins, J. D. (1996). The Social Development Model: A theory of antisocial behavior. In Hawkins, J. D. (Ed.), *Delinquency and Crime: Current Theories* (149-197). Cambridge, ENG: Cambridge University Press.

Cauffman, E., Monahan, K. C., & Thomas, A. G. (2015). Pathways to persistence: Female offending from 14 to 25. *Journal of Developmental and Life-Course Criminology, 1*(3), 236-268.

Chesney-Lind, M., & Shelden, R. G. (2014). *Girls, Delinquency, and Juvenile Justice*. Chichester, UK: Wiley Blackwell.

Chung, I., Hill, K. G., Hawkins, J. D., Gilchrist, L. D., & Nagin, D. S. (2002). Childhood predictors of offense trajectories. *Journal of Research in Crime and Delinquency, 39*(1), 60-90.

Cohen, M. A., Piquero, A. R., & Jennings, W. G. (2010). Monetary costs of gender and ethnicity disaggregated group-based offending. *American Journal of Criminal Justice, 35*(3), 159-172.

Collins, L. M., & Lanza, S. T. (2010). *Latent Class and Latent Transition Analysis: With Applications in the Social, Behavioral, and Health Science*. Hoboken, NJ: John Wiley & Sons.

Corrado, R. R., McCuish, E. C., Hart, S. D., & DeLisi, M. (2015). The role of psychopathic traits and developmental risk factors on offending trajectories from early adolescence to adulthood: A prospective study of incarcerated youth. *Journal of Criminal Justice, 43*(4), 357-368.

Corrado, R. R., Odgers, C., & Cohen, I. M. (2000). Incarceration of female young offenders: Protection for whom. *Canadian Journal of Criminology, 42*(2), 189-207.

Crick, N. R., & Grotpeter, J. K. (1995). Relational aggression, gender, and social-psychological adjustment. *Child Development, 66*(3), 710-722.

DeHart, D. D., & Moran, R. (2015). Poly-victimization among girls in the justice system: Trajectories of risk and associations to juvenile offending. *Violence Against Women, 21*(3), 291-312.

DeLisi, M. (2002). Not just a boy's club: An empirical assessment of female career criminals. *Women & Criminal Justice, 13*(4), 27-45.

D'Unger, A. V., Land, K. C., & McCall, P. L. (2002). Sex differences in age patterns of delinquent/criminal careers: Results from Poisson Latent Class Analyses of the Philadelphia Cohort Study. *Journal of Quantitative Criminology, 18*(4), 349-375.

Eggleston, E. P., Laub, J. H., & Sampson, R. J. (2004). Methodological sensitivities to latent class analysis of long-term criminal trajectories. *Journal of Quantitative Criminology, 20*(1), 1-26.

Elder, G. H. (1998). The life course as developmental theory. *Child Development, 69*(1), 1-12.

Farrington, D. P. (2005). Introduction to integrated developmental and life-course theories of offending. In Farrington, D. P. (Ed.), *Integrated Developmental & Life-Course Theories of Offending* (1-14). Piscataway, NJ: Transaction Publishers.

Farrington, D. P., & Painter, K. (2004). *Gender differences in risk factors for offending*. Great Britain Home Office Research Development and Statistics Directorate. Retrieved from http://www.crim.cam.ac.uk/people/academic_research/david_farrington/hofind196.pdf

Ferrante, A. M. (2013). Assessing gender and ethnic differences in developmental trajectories of offending. *Australian & New Zealand Journal of Criminology, 46*(3), 379-402.

Fergusson, D. M., & Horwood, L. J. (2002). Male and female offending trajectories. *Development and Psychopathology, 14*, 159-177.

Fergusson, D. M., Horwood, L. J., & Nagin, D. S. (2000). Offending trajectories in a New Zealand birth cohort. *Criminology, 38*(2), 525-552.

Finkelhor, D., Ormrod, R., Turner, H., & Hamby, S. L. (2005). The victimization of children and youth: A comprehensive, national survey. *Child Maltreatment, 10*(1), 5-25.

Fleming, C. B., Catalano, R. F., Oxford, M. L., & Harachi, T. W. (2002). A test of generalizability of the social development model across gender and income groups with longitudinal data from the elementary school developmental period. *Journal of Quantitative Criminology, 18*(4), 423–437.

Fontaine, N., Carbonneau, R., Vitaro, F., Barker, E. D., Tremblay, R. E. (2009). Research review: A critical review of studies on the developmental trajectories of antisocial behavior in females. *The Journal of Child Psychology and Psychiatry, 50*(4), 363-385.

Gadermann, A. M., Guhn, M., & Zumbo, B. D. (2012). Estimating ordinal reliability for Likert-type and ordinal item response data: A conceptual, empirical, and practical guide. *Practical Assessment, Research, & Evaluation, 17*(3), 1-13.

Garson, D. G. (2016). *Logistic Regression: Binary & Multinomial.* Asheboro, NC: Statistical Publishing Associates.

Garson, D. G. (2015). *Missing Values Analysis & Data Imputation.* Asheboro, NC: Statistical Publishing Associates.

Gottfredson, M. R., & Hirschi, T. (1990). *A General Theory of Crime.* Stanford, CA: Stanford University Press.

Gottfredson, M., & Hirschi, T. (1987). The methodological adequacy of longitudinal research on crime. *Criminology, 25*(3), 581-614.

Graham, J. W., Olchowski, A., & Gilreath, T. (2007). How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science, 8*(3), 206–213.

Hindelang, M. J., Hirschi, T., & Weis, J. G. (1979). Correlates of delinquency: The illusion of discrepancy between self-report and official measures. *American Sociological Review, 44*(6), 995-1014.

Huizinga, D., Miller, S., & the Conduct Problems Prevention Research Group. (2013). *Girls Study Group: Understanding and Responding to Girls' Delinquency.* Washington, DC: Department of Justice.

Jang, S. J., & Krohn, M. D. (1995). Developmental patterns of sex differences in delinquency among African American adolescents: A test of the sex-invariance hypothesis. *Journal of Quantitative Criminology, 11*(2), 195-222.

Jennings, W. G. (2011). Sex disaggregated trajectories of status offenders: Does CINS/FINS status prevent male and female youth from becoming labeled delinquent. *American Journal of Criminal Justice, 36*(2), 177-187.

Jennings, W. G., Maldonado-Molina, M. M., Piquero, A. R., Odgers, C. L., Bird, H., & Canino, G. (2010). Sex differences in trajectories of offending among Puerto Rican youth. *Crime & Delinquency, 56*(3), 327-357.

Jennings, W. G., & Reingle, J. M. (2012). On the number and shape of developmental/life-course violence, aggression, and delinquency trajectories: A state-of-the-art review. *Journal of Criminal Justice, 40*, 472-489.

Johansson, P., & Kempf-Leonard, K. (2009). A gender-specific pathway to serious, violent, and chronic offending? Exploring Howell's risk factors for serious delinquency. *Crime & Delinquency, 55*(2), 216-240.

Jones, B. L., & Nagin, D. S. (2013). A note on a Stata plugin for estimating group-based trajectory models. *Sociological Methods & Research, 42*(4), 608-613.

Kazemian, L., & Farrington, D. P. (2005). Comparing the validity of prospective, retrospective, and official onset for different offending categories. *Journal of Quantitative Criminology, 21*(2), 127-147.

Kim, M. J., Tajima, E. A., Herrenkohl, T. I., & Huang, B. (2009). Early child maltreatment, runaway youths, and risk of delinquency and victimization in adolescence: A mediational model. *Social Work Research*, *33*(1), 19-28.

Kirk, D. S. (2006). Examining the divergence across self-report and official data sources on inferences about the adolescent life-course of crime. *Journal of Quantitative Criminology, 22*(2), 107-129.

Lahey, B. B., Van Hulle, C. A., Waldman, I. D., Rodgers, J. L., D'Onofrio, B. M., Pedlow, S., Rathouz, P., & Kennan, K. (2006). Testing descriptive hypotheses regarding sex differences in the development of conduct problems and delinquency. *Journal of Abnormal Child Psychology, 34*(5), 730-748.

Laub, J. H., & Sampson, R. J. (1993). Turning points in the life course: Why change matters to the study of crime. *Criminology, 31*(3), 301-325.

Laub, J. H., & Sampson, R. J. (2001). Understanding desistance from crime. *Crime and Justice, 28*, 1-69.

LeBlanc, M., & Loeber, R. (1998). Developmental criminology updated*. Crime & Justice, 23*, 115-198.

Leve, L. D., & Chamberlain, P. (2004). Female juvenile offenders: Defining an early-onset pathway for delinquency. *Journal of Child and Family Studies, 13*(4), 439-452.

Livingston, M., Stewart, A., Allard, T., & Ogilvie, J. (2008). Understanding juvenile offending trajectories. *The Australian and New Zealand Journal of Criminology, 41*(3), 345-363.

Loeber, R., Capaldi, D. M., & Costello, E. (2013). Gender and the development of aggression, disruptive behavior, and delinquency from childhood to early adulthood. In Tolan, P. H., & Leventhal, B. L. (Eds.), *Disruptive Behavior Disorders* (137-160). New York, NY: Springer.

Loeber, R., & LeBlanc, M. (1990). Toward a developmental criminology. *Crime and Justice, 12*, 375-473.

Loeber, R., Farrington, D. P., Hipwell, A. E., Stepp, S. D., Pardini, D., & Ahonen, L. (2015). Constancy and change in the prevalence and frequency of offending when based on longitudinal self-reports or official records: Comparisons by gender, race, and crime type. *Journal of Developmental and Life-Course Criminology, 1*(2), 150-168.

Loeber, R., Jennings, W. G., Ahonen, L., Piquero, A. R., & Farrington, D. P. (2017). *Female Delinquency from Childhood to Young Adulthood: Recent Results from the Pittsburgh Girls Study*. Cham, CH: Springer International Publishing.

McCabe, K., Lansing, A. E., Garland, A., & Hough, R. (2002). Gender differences in psychopathology, functional impairment, and familial risk factors among adjudicated delinquents. *Journal of the American Academy of Child & Adolescent, 41*(7), 860-867.

Mier, C., & Ladny, R. T. (2018). Does self-esteem negatively impact crime and delinquency? A meta-analytic review of 25 years of evidence. *Deviant Behavior, 39*(8), 1006-1022.

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behaviour: A developmental taxonomy. *Psychological Review, 100*(4), 674-701.

Moffitt, T. E., & Caspi, A. (2001). Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Development and Psychopathology, 13*, 355-375.

Moretti, M. M., Catchpole, R. E. H., & Odgers, C. (2005). The dark side of girlhood: Recent trends, risk factors and trajectories to aggression and violence. *The Canadian Child and Adolescent Psychiatry Review, 14*(1), 21-25.

Moretti, M. M., & Odgers, C. (2002). Aggressive and violent girls: Prevalence, profiles and contributing factors. In Corrado, R. R., Roesch, R., Hart, S. D., Gierowski, J. K. (Eds.), *Multi-Problem Violent Youth: A Foundation for Comparative Research on Needs, Interventions, and Outcomes* (116-129). Amsterdam, NL: IOS Press.

Nagin, D. S. (2005). Group-based modeling of development. Cambridge, MA: Harvard University Press.

Nagin D. S. (2010) Group-based trajectory modeling: An overview. In Piquero A. R., & Weisburd, D. (Eds.), *Handbook of Quantitative Criminology* (53-68). New York, NY: Springer.

Nagin, D. S., Farrington, D. P., & Moffitt, T. E. (1995). Life-course trajectories of different types of offenders. *Criminology, 33*(1), 111-139.

Nagin, D. S., & Land, K. C. (1993). Age, criminal careers, and population heterogeneity: Specification and estimation of a nonparametric, mixed Poisson model. *Criminology, 31*(3), 327-362.

Nagin, D. S., & Tremblay, R. E. (2005). Developmental trajectory groups: Fact or a useful statistical fiction? *Criminology, 43*(4), 873-904.

Odgers, C. L., Moffitt, T. E., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., Poulton, R., Sears, M. R., Thomson, W. M., & Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and Psychopathology, 20*, 673-716.

Odgers, C. L., & Moretti, M. M. (2002). Aggressive and antisocial girls: Research update and challenges. *International Journal of Forensic Mental Health, 1*(2), 103-119.

Odgers, C. K., Moretti, M. M., Burnette, M. L., Chauhan, P., Waite, D., & Repucci, N. D. (2007). A latent variable modeling approach to identifying subtypes of serious and violent female juvenile offenders. *Aggressive Behavior, 33*, 339-352.

Odgers, C. L., Moretti, M. M., & Repucci, N. D. (2010). A review of findings from the "Gender and Aggression Project" informing juvenile justice policy and practice through gender-sensitive research. *Court Review: The Journal of the American Judges Association, 46*, 5-8.

Piquero, A. R. (2008). Taking stock of developmental trajectories of criminal activity over the life course. In Liberman, A. M. (Ed.), *The Long View of Crime: A Synthesis of Longitudinal Research* (23-78). New York, NY: Springer.

Piquero, A. R., Blumstein, A., Brame, R., Haapanen, R., Mulvey, E. P., & Nagin, D. S. (2001). Assessing the impact of exposure time and incapacitation on longitudinal trajectories of criminal offending. *Journal of Adolescent Research, 16*(1), 54-74.

Piquero, A. R., Brame, R., Mazerole, P., & Haapanen, R. (2002). Crime in emerging adulthood. *Criminology, 40*(1), 137-170.

Piquero, A. R., & Moffitt, T. E. (2010). Life-course persistent offending. In Adler, J. R., & Gray, J. M. (Eds.), *Forensic Psychology: Concepts, debates and practice* (2nd ed.) (201-222). New York, NY: Willan Publishing.

Rosenbaum, J. L. (1989). Family dysfunction and female delinquency. *Crime & Delinquency, 35*(1), 31-44.

Rubin, D. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association, 91*(434), 473-489.

Savoie, J. (1999). *Youth Violent Crime*. (Catalogue Number 85-002-XPE). Retrieved from the Statistics Canada website: http://publications.gc.ca/collections/Collection-R/Statcan/85-002-XIE/0139985-002-XIE.pdf

Schneider, A.L. (1990). *Deterrence and juvenile crime*. New York, NY: Springer.

Silverthorn, P., & Frick, P. J. (1999). Developmental pathways to antisocial behavior: The delayed-onset pathway in girls. *Development and Psychopathology, 11*, 101-126.

Simourd, L., & Andrews, D. A. (1994). Correlates of delinquency: A look at gender differences. *Forum of Corrections Research, 6*(1), 26-31.

Skardhamar, T. (2010). Distinguishing facts and artifacts in group-based modeling. *Criminology, 48*(1), 295-320.

Smith, D. K., Leve, L. D., & Chamberlain, P. (2006). Adolescent girls' offending and health-risking sexual behavior: The predictive role of trauma. *Child Maltreatment, 11*(4), 346-353.

Smith, A., Stewart, D., Poon, C., Peled, M., Saewyc, E., & McCreary Centre Society. (2014). *From Hastings Street to Haida Gwaii: Provincial results of the 2013 BC Adolescent Health Survey*. Vancouver, BC: McCreary Centre Society.

Statistics Canada. (2013). *British Columbia (Code 59) (table). National Household Survey Aboriginal Population Profile*. Ottawa, Ontario: Author. Available from www.statcan.gc.ca

Steketee, M., Junger, M., & Junger-Tas, J. (2013). Sex differences in the predictors of juvenile delinquency: Females are more susceptible to poor environments; Males are influenced more by low self-control. *Journal of Contemporary Criminal Justice, 29*(1), 88-105.

Tibbetts, S. G., & Hemmens, C. (2010). *Criminological Theory: A Text/Reader*. Thousand Oaks, CA: SAGE Publications, Inc

Van der Geest, V., Blokland, A., & Bijleveld, C. (2009). Delinquent development in a sample of high-risk youth: Shape, content, and predictors of delinquent trajectories from age 12 to 32. *Journal of Research in Crime and Delinquency, 46*(2), 111-143.

Van der Put, C. E., Dekovic, M., Hoeve, M., Stams, G. J. J. M., van der Laan, P. H., & Langewouters, F. E. M. (2010). Risk assessment of girls: Are there any sex differences in risk factors for re-offending and in risk profiles? *Crime & Delinquency, 60*(7), 1033-1056.

Weaver, C. (2010). *Identifying gendered trajectories of offending for a panel of first time youth offenders: Exploring the influence of time-stable covariates* (Unpublished doctoral dissertation). University of Alabama, Alabama.

Welch-Brewer, C. (2017). Risk-need profiles of serious and chronic female juvenile offenders: Implications for female juvenile correctional programming. *International Journal of Offender Therapy and Comparative Criminology*, 1-17.

Welch-Brewer, C., Stoddard-Dare, P., & Mallett, C. (2011). Race, substance abuse, and mental health disorders as predictors of juvenile court outcomes: Do they vary by gender? *Child and Adolescent Social Work, 28*(3), 229-241.

Whitbeck, L., & Simons, R. (1993). A comparison of adaptive strategies and patterns of victimization among homeless adolescents and adults. *Violence and Victims, 8*(2), 135-152.

White, N. A., & Piquero, A. R. (2004). A preliminary empirical test of Silverthorn and Frick's delayed-onset pathway in girls using an urban, African-American, US-based sample. *Criminal Behaviour and Mental Health, 14*(4), 291-309.

Wiesner, M., & Windle, M. (2004). Assessing covariates of adolescent delinquency trajectories: A latent growth mixture modeling approach. *Journal of Youth and Adolescence, 33*(5), 431-442.

Williams, R. (2012). Using the margins command to estimate and interpret adjusted predictions and marginal effects. *The Stata Journal, 12*(2), 308-331.

Wolff, K. T., Baglivio, M. T., Vaughn, M. G., DeLisi, M., & Piquero, A. R. (2017). For males only? The search for serious, violent, and chronic female juvenile offenders. *Journal of Developmental and Life Course Criminology, 3*(2), 168-195.

Wong, T. M. L., Loeber, R., Slotboom, A-M., Bijleveld, C. C. J. H., Hipwell, A. E., Stepp, S. D., & Koot, H. M. (2013). Sex and age differences in the risk threshold for delinquency. *Journal of Abnormal Child Psychology, 41*(4), 641-652.

Yessine, A. K., & Bonta, J. (2008). *Pathways to Serious Offending*. Ottawa, ON: Public Safety Canada.