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Race as a Predictor of Recidivism Risk: An Epidemiological Analysis

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Abstract

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Femi Folorunsho

MS, Walden University, 2013

BS, University of Phoenix, 2010

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Prisoner recidivism is a problem of great social importance, as recidivism represents a failure of the rehabilitative goal of incarceration. The problem addressed in this study was the lack of accurate estimates of race as a predictor of recidivism risk in the United States, after taking demographics and criminal variables into account. Applying the life-course theory of recidivism, the purpose of this archival, epidemiological study was to calculate whether recidivism risk varied based on race, across different seriousness levels of commitment offense and number of prior arrests, among a sample of male federal prisoners released from custody. A Cox proportional hazards ratio was applied to determine both the statistical significance and the magnitude of being Black, rather than White, as a predictor of recidivism in six distinct scenarios. Analysis indicated that Black prisoners were more likely to recidivate in some instances, whereas White prisoners were more likely to recidivate in other instances. The results of the study can assist psychologists, parole boards, and other stakeholders in more accurately estimating the role of race in recidivism risk. The results of the study were that race is a significant risk factor in some kinds of recidivism, but not in others, and also that being African-American is not universally associated with higher recidivism risk. The results suggest that race might be a less prominent recidivism factor than previously thought.

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Dedication

I would like to dedicate this dissertation to my family for always being there for me.

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I acknowledge the tireless and timely work of my supervisor,

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Chapter 1: Introduction to the Study

Background

One of the tasks of forensic psychology is to provide risk of recidivism assessment for various stakeholders in the judicial system (Rogers, 2000). Often, the purpose of such risk assessment is to measure stress factors related to criminal behavior (Rogers, 2000). According to the American Psychological Association, risk assessment in forensic psychology is particularly appropriate for "individuals who may present with a psychiatric diagnosis or may have other characteristics that are relevant to a clinical legal decision…" (APA, 2017, p. 1). In addition to mental health status, demographic factors such as race and gender can also be relevant to risk assessments (Schmidt, Lien, Vaughan, & Huss, 2017).

Regardless of how many characteristics forensic psychologists take into account when carrying out risk assessment, risk assessment is always focused on the prediction of future behavior as a function of present knowledge (Douglas, Pugh, Singh, Savulescu, & Fazel, 2017). In the context of criminal recidivism—that is, the phenomenon of a released criminal's re-offending—forensic psychologists often work with parole officers in constructing risk models (Jones, Brown, & Zamble, 2010). According to the APA, the reason for the involvement of forensic psychologists in the particular form of risk assessment known as recidivism analysis is forensic psychologists also work on behalf of individuals who seek to "reintegrate safely into the community" (APA, 2017, p. 1). Reintegration is the alternative to recidivism; in other words, once released into the

community, ex-prisoners either recidivate (that is, commit another crime) or are able to reintegrate into a community (Vidal, Oudekerk, Reppucci, & Woolard, 2015).

Recidivism has been an important theme in American criminological research for several decades, particularly because recidivism reduction is a leading social and bureaucratic goal (Andrews, Bonta, & Wormith, 2006; Berg & Huebner, 2011; Corbett Jr, 2014; Miller & Spillane, 2012; Mitchell, Wilson, & MacKenzie, 2007; Visher, Debus-Sherrill, & Yahner, 2011). Recidivism represents a failure of the correctional system insofar as the system is unable to de-criminalize the people who pass through it; as such, recidivism represents a waste of money and other resources invested into the transformational capabilities of the correctional system (Fazel & Wolf, 2015). Recidivism also extracts important social costs, as every act of recidivism extracts a toll from communities (Andrews et al., 2006; Berg & Huebner, 2011; Corbett Jr, 2014; Miller & Spillane, 2012; Mitchell et al., 2007; Visher et al., 2011). For these reasons, policy-makers, scholars, and other stakeholders have placed substantial emphasis on trying to understand and reduce recidivism (Andrews et al., 2006; Berg & Huebner, 2011; Corbett Jr, 2014; Fazel & Wolf, 2015; Miller & Spillane, 2012; Mitchell et al., 2007; Visher et al., 2011).

Despite the attention paid to understanding and reducing recidivism, recidivism remains high. Longitudinal analysis (Durose, Cooper, & Snyder, 2014, p. 8) has found that 76.6% of American prisoners released from prison by 2005 had recidivated within five years of their release, a very high level of prisoner re-entry failure in comparison to international recidivism rates. Because of the vast size of the American prisoner

population, as well as the fact that America has the highest percentage of its citizens behind bars in comparison to any other country (Lee & Wildeman, 2013), even a moderately high recidivism rate means that hundreds of thousands of former criminals are committing crimes and going back to jail (Andrews et al., 2006; Berg & Huebner, 2011; Corbett Jr, 2014; Miller & Spillane, 2012; Mitchell et al., 2007; Visher et al., 2011).

The number of American prisoners re-entering society is growing in both absolute and relative terms. In 2012, the latest year for which the Bureau of Justice Statistics provided relevant data, there were 609,781 prison admissions as compared to 637,411 prison releases (Carson & Golinelli, 2014). An analysis of the data indicates that, from 1982 to 1990, the number of American prison admissions increased from 171,884 to 465,500, an increase of slightly over 269% possibly in part representing the impact of the so-called War on Drugs and its rapid expansion of the American prisoner population (Kerr & Jackson, 2016). However, in each year from 2006 to 2012, there was an annual decline in the number of prisoners admitted to American correctional facilities, while existing prisoners were freed at a higher rate.

Therefore, the data suggest that, after two and a half decades in which the American prisoner population expanded rapidly, the American prisoner population is shrinking again, meaning that large numbers of former prisoners are re-entering society (Andrews et al., 2006; Berg & Huebner, 2011; Corbett Jr, 2014; Miller & Spillane, 2012; Mitchell et al., 2007; Visher et al., 2011). One of the implications of the increased tempo of prisoner re-entry is the need to better understand and reduce recidivism (Johnson,

2012). Since at least the 1970s, the American institutional climate has been better-suited to processing prison entries as opposed to prison releases (Johnson, 2012); however, the general decline of crime and the dissipation of the War on Drugs now mean that American institutions, and their underlying policies, must become better at facilitating the re-entry of former prisoners (Andrews et al., 2006; Berg & Huebner, 2011; Corbett Jr, 2014; Miller & Spillane, 2012; Mitchell et al., 2007; Visher et al., 2011).

Parole officers, parole boards, and mental health professionals are among the personnel responsible for ensuring the successful integration of released criminals into the community—that is, for ensuring that recidivism remains low (Vîlcică, 2016). These individuals are informal risk assessors in that they informally evaluate the recidivism likelihood of parolees. Personnel who work closely with released prisoners also assess risk as part of their jobs (Kim, Ji, & Kao, 2011). For parole officers, for example, recidivism risk assessment is a necessary precursor to determining how much oversight a particular parolee might need at a specific point in time (Vidal et al., 2015). For social workers and mental health personnel, recidivism risk assessment is part of identifying the kinds of services and social support an ex-prisoner might require to reduce his or her risk of returning to prison (Kim et al., 2011).

Despite the centrality of risk assessment in recidivism reduction, many personnel who work closely with ex-prisoners in the United States do not tend to be formally trained in risk assessment (Jones et al., 2010; Vidal et al., 2015). However, forensic psychologists often possess training in risk assessment (Jones et al., 2010). For this reason, forensic psychologists often provide risk assessments that are directly or

indirectly utilized by parole officers, social workers, police departments, and other stakeholders in policy matters related to released prisoners (Jones et al., 2010).

Forensic psychologists can make two basic kinds of contributions to recidivism risk analysis. One approach is to work closely with parole officers, social workers, police departments, or other stakeholders in a specific region (Jones et al., 2010). Another approach is for forensic psychologists to provide more general estimates of recidivism risk (Jones et al., 2010). General estimates of recidivism risk serve three of the responsibilities of forensic psychology identified by the APA (2017). Recidivism risk estimates (a) provide information about how well ex-prisoners are reintegrating or failing to reintegrate with communities, (b) assess the possible roles of mental health diagnoses in predicting re-offense, and (c) equip various legal personnel with data analyses pertinent to the execution of their jobs. Therefore, recidivism risk analysis is a valid focus area for forensic psychology.

In the United States, there are numerous recidivism risk estimates (Andrews et al., 2006; Berg & Huebner, 2011; Corbett Jr, 2014; Miller & Spillane, 2012; Mitchell et al., 2007; Visher et al., 2011). Each of these prior estimates is based on data provided by federal and state governments, which regularly gather and release information on the post-release outcomes of ex-prisoners. Researchers also provide recidivism risk analyses based on data analyses of their own, as in the case of Andrews et al.'s (2006) work. Thus, recidivism is an extremely well-quantified phenomenon (Andrews et al., 2006; Berg & Huebner, 2011; Corbett Jr, 2014; Miller & Spillane, 2012; Mitchell et al., 2007; Visher et al., 2011). However, the existence of numerous recidivism risk estimates and datasets

constitutes a problem. Because recidivism risk estimates vary widely—depending, for example, on the population sampled, the size of samples, the time period covered, and the geographical delimitations of analysis—there is no consensus estimate of recidivism risk in the United States.

Even though parole officers might not be familiar with the mathematical terminology of risk, they informally practice what mathematicians term (Bender, Augustin, & Blettner, 2005; Miladinovic et al., 2012; Royston & Parmar, 2002) risk analysis. In risk analysis, the unit of analysis is an individual (Bender et al., 2005; Miladinovic et al., 2012; Royston & Parmar, 2002); in the context of recidivism risk, a hazard model is one that can, for instance, inform a parole officer, parole board, or mental health workers about the odds of a particular parolee recidivating based on any number of factors, such as (a) prisoner's age at release, (b) prisoner's gender, (c) prisoner's race, (d) prisoner's prior arrest history, and (e) prisoner's sentencing offense. In practice, parole officers judge the recidivism risk of parolees on the basis of intuition, past experience, and inductive reasoning (Bender et al., 2005). However, risk analysis is also a formal mathematical task. Mathematical risk analysis is more accurate than informal risk analysis carried out on the basis of intuition and induction (Wald, 1945).

Analyses of recidivism risks generate estimates of the recidivism rate that apply to entire populations. For example, an estimate of a 5-year recidivism rate of 58% indicates only that 58% of all ex-prisoners will commit another crime and be sent back to prison within five years. However, the practical need of parole officers is to be able to calculate risk on level of an individual, not an entire population (Jones et al., 2010). As numerous

researchers have noted, parole officers make estimates about the chances of specific individuals recidivating (Dagan & Segev, 2015; Jones et al., 2010; Marlow et al., 2012; Vidal et al., 2015; Vîlcică, 2016). Aggregated estimates of population-level recidivism are inapplicable to individuals. For instance, an estimate of a 5-year recidivism rate of 58% does not inform a parole officer as to (a) the likelihood of a particular parolee, with a particular set of characteristics and circumstances, committing a crime; or (b) an estimate as to the likelihood of recidivism occurring within a particular timespan, such as 6 to 24 weeks after release from prison. In the absence of such models, parole officers have to continue to rely on the imperfect tools of intuition and induction based on personal experience (Bender et al., 2005). Accordingly, the focus of this quantitative, archival study is on the estimation of hazard ratios for recidivism based on (a) an individual ex-prisoner's characteristics (age at release, gender, race, prior arrest history, and sentencing offense); and (b) the specific time (measured up to 60 months after release) at which an individual is being assessed for risk.

Problem

Over three-quarters of all Americans released from prison recidivate (commit another offense) within 60 months of their release (Durose et al., 2014, p. 8). High recidivism rates suggest the possible failure of mental health professionals, parole officers, and others tasked with keeping released Americans away from re-offending (Durose et al., 2014).

The problem of focus is, in the absence of more reliable information on factors associated with recidivism risk, parole officers and other stakeholders lack the

information necessary to properly allocate their limited resources on the objective of

managing the outcomes of ex-prisoners. Within the scope of this general problem, the

specific problem is, in the absence of more detailed risk analyses based on time to

recidivism, parole officers, parole boards, mental health professionals, and other

stakeholders do not know which parolees present more risk of recidivism and should

therefore receive enhanced oversight or attention to prevent against re-offending. In the

absence of such information, parole officers, parole boards, mental health professionals,

and other relevant stakeholders might fail to apply appropriate, timely resources to

intervention or oversight, resulting in preventable criminal activity. In particular, relevant

stakeholders need to be able to answer the following question: What is the risk of a

parolee recidivating at a specific time? This question is typically answered through a

qualitative analysis of parolee risk (Berg & Huebner, 2011), but it can also be answered

by calculating Kaplan-Meier (1958) or Cox proportional hazards estimates (Cox, 2018)

for parolees based on demographic and prior history factors such as those used in survival

analysis. Of particular interest, given previous analyses of race as a significant factor in

both crime and recidivism (see Table 1 in Chapter 2 for an overview of recent and

relevant studies), is the question of whether, if other aspects of demographics and

criminal history are held constant, race is a significant predictor of recidivism.

Purpose

The purpose of this archival study using secondary data is to estimate monthly

recidivism hazard rates for individuals released from prison on the basis of variation in

race (African American and White), after controlling for gender, across various

combinations of number of prior arrests, and most serious arresting offense, and to test

for significant differences based on race in recidivism hazard rates. In practical terms, the

purpose of the quantitative analyses of the study is to furnish parole officers, parole

boards, mental health professionals, and other relevant stakeholders with a statistically

reliable model of predicting the recidivism of individual clients and, in the present study,

on the basis of race, which, as discussed in the literature review, continues to be an

important factor in the identification of recidivism risk and the allocation of rehabilitative

or recidivism-preventative resources. If race fails to be a significant predictor of

recidivism risk, then the findings of the study might be of practical importance in terms

of directing both future researchers and current decision-makers (for example, on parole

boards) away from race as a predictor of recidivism and toward a better model of risk.

Framework

The theoretical framework of the study is the life-course theory of recidivism

(Resig, Holtfreter, & Morash, 2006). According to this theory, recidivism risk is not the

same for all prisoners. Rather, recidivism risk differs based on the age, gender, and other

characteristics of the released prisoner as well as on the time that has elapsed since

release. The life-course theory of recidivism suggests that recidivism risks and hazards

will vary depending on the specific characteristics of the prisoner, and at the time at

which risk is being assessed; these assumptions align with the use of the Cox (2018) risk

estimate.

Significance

The study's significance is based in its provision of information that is highly relevant to parole officers, parole boards, mental health professionals, and other personnel who rely on the ability of forensic psychologists to provide risk assessments levels to the legal system, in keeping with the APA's (2017) discussion of the responsibilities of forensic psychology. By estimating hazard rates, it will be possible to offer parole officers more information about recidivism risks at an individual level of analysis while also identifying specific timeframes in which the provision of oversight and support are most likely to be useful in reducing recidivism risk.

Research Questions

The data source for the study will be the Prisoner Recidivism Analysis Tool (PRAT) (BJS, 2018), which consists of 2,430 possible demographic and arrest combinations for released prisoners. Each of these combinations could be a possible basis for a hazard estimate calculation. However, the research questions of the present study focus on whether, when PRAT variables except race are held constant, race is a significant predictor of recidivism. Research—albeit research that is not based on carefully controlled survival models and therefore perhaps lacking in reliability—suggests that both race and seriousness of the initial criminal offense appear to predict recidivism (Durose et al., 2014). If so, then the relationship between race and recidivism can be analyzed more reliably when examined across various combinations of the variables (a) number of prior arrests (10 or more arrests and four or fewer arrests) and (b)

most serious commitment offense (homicide, rape/sexual assault, and robbery). On that

basis, the following research questions and hypotheses can be proposed:

RQ1: For males whose most serious commitment offense was homicide, and who

had 10 or more prior arrests, does race (African American vs. White) significantly differ

as a predictor of recidivism?

H1_0: For males whose most serious commitment offense was homicide, and who

had 10 or more prior arrests, race does not significantly differ as a predictor of

recidivism.

H1_A: For males whose most serious commitment offense was homicide, and who

had 10 or more prior arrests, race does significantly differ as a predictor of recidivism.

RQ2: For males whose most serious commitment offense was rape / sexual

assault, and who had 10 or more prior arrests, does race (African American vs. White)

significantly differ as a predictor of recidivism?

H2_0: For males whose most serious commitment offense was rape / sexual assault,

and who had 10 or more prior arrests, race does not significantly differ as a predictor of

recidivism.

H2_A: For males whose most serious commitment offense was rape / sexual

assault, and who had 10 or more prior arrests, race does significantly differ as a predictor

of recidivism.

RQ3: For males whose most serious commitment offense was robbery, and who

had 10 or more prior arrests, does race (African American vs. White) significantly differ

as a predictor of recidivism?

H3_0: For males whose most serious commitment offense was robbery, and who had 10 or more prior arrests, race does not significantly differ as a predictor of recidivism.

H3_A: For males whose most serious commitment offense was robbery, and who had 10 or more prior arrests, race does significantly differ as a predictor of recidivism.

RQ4: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

H4_0: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.

H4_A: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, race does significantly differ as a predictor of recidivism.

RQ5: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

H5_0: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.

H5_A: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, race does significantly differ as a predictor of recidivism.

RQ6: For males whose most serious commitment offense was robbery, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

H6_0: For males whose most serious commitment offense was robbery, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.

H6_A: For males whose most serious commitment offense was robbery, and who had 6 or more prior arrests, race does significantly differ as a predictor of recidivism.

The research questions cover three major types of crime (homicide, rape / assault, and robbery) as well as two potential types of criminals (habitual offenders with 10 or more prior arrests and more sporadic offenders with 4 or fewer prior arrests). In each research question, seriousness of arresting offense, number of prior arrests, and gender are controlled for in order to better isolate the relationship, if any, between race and the risk of recidivism.

Nature of the Study

The study is secondary in nature. No primary data collection or analysis will be carried out in this study. Only existing data will be analyzed in order to answer the research questions of the study. The study will be based in the Cox (2018) proportional hazards model. The study's orientation is archival, quantitative, and post-positivistic.

Assumptions, Limitations, and Delimitations

The study is delimited to data provided by the federal government of the United States, as discussed at greater length below. The Cox (2018) proportional hazards model is robust to non-parametric data and therefore does not assume any particular distribution

of the data. However, Cox's model assumes that there is independence between residuals and time, an independent that will have to be checked in Chapter 4 for each research question. The study is limited by its geographical restriction to the United States and by the Cox model's collapse of risk into a single estimate for a given period of time. The results of the study will offer insight into the risk of individuals who fall into specific groups (with the group membership characteristics defined in the research questions of the study). The study is limited in that the Cox model cannot as applied to the research questions cannot estimate risks who do not share all of the characteristics of any of the groups invoked in the research questions.

Types and Sources of Data

PRAT is based on data from prisoners released from 30 states in 1994 as well as 2005 and is made freely available to researchers and the public by the Bureau of Justice Statistics (BJS, 2018). The 2005 version of the PRAT tracks outcomes from month 0 (at which time prisoners are released from prison) to month 60 (being the 60th month after release from prison). During the 60-month period, the PRAT for 2005 provides data for re-arrest as the only available measure of recidivism.

The PRAT provides month-by-month data on re-incarceration, but these data are rates based on the entire sample of prisoners released at month 0. These data are not in a format that could allow computer-based calculation of hazard rates of recidivism at any month, x, between 1 and 60, and based on the available data factors of age at release, gender, race, prior arrest history, and sentencing offense. However, using Stata or equivalent software, the PRAT data, which are for aggregate populations, can be

transformed into an individual risk table, using the Kaplan-Meier method, that allows the calculation of hazard rates of recidivism at any month, x, between 1 and 60, and based on the available data factors as specified in the research questions.

Conclusion

Chapter 1 provided a review of the problem of recidivism in the context of race and predictive risk forecasting. Based on this review, it is important for forensic psychologists and other professionals to measure recidivism risk, which is a metric in which numerous stakeholders, as well as the public at large, are interested. In order to better facilitate the discussion and presentation of an estimate of recidivism risk by race, the remainder of the thesis has been structured as follows. Chapter 2 contains the literature review of the study, which includes a historical perspective on recidivism, a discussion of previous studies that either provide recidivism risks by race or from which recidivism risks can be extracted, and a note on the gaps in the literature justifying further empirical analysis. Chapter 3 contains the methodology of the study, comprising a discussion and justification of all relevant aspects of research methodology as well as study design. Chapter 4 contains a presentation of the findings of the study. Chapter 5 is the conclusion of the study, inclusive of a summary of the findings, a discussion of the findings with respect to past theories and empirical estimates of recidivism risk by race, an acknowledgement of the limitations of the study, recommendations for practice, recommendations for future scholarship, and a summative conclusion.

Chapter 2: Literature Review

Introduction

The main purpose of this chapter is to present, describe, critically analyze, and synthesize previous empirical studies on recidivism, particularly studies in which race is a predictive factor. The secondary purpose of this chapter is to present a discussion of theoretical frameworks that can account for recidivism, and, in particular, for the existence of statistically significant differences in recidivism levels between races. The chapter has been subdivided into four main sections. First, a historical overview of the phenomena of incarceration and recidivism in the United States is provided. Second, theories relevant to recidivism are discussed. Third, relevant empirical studies are described, analyzed, and synthesized. Fourth, gaps in the empirical literature are noted.

The primarily statistical focus of the discussion of studies on race and recidivism is justified not only by the specific topic of the dissertation but also by the increasing prominence of mathematical modeling in all domains of criminal justice. As Eaglin has noted,

> Predictive technologies increasingly appear at every stage of the criminal justice process. From predictive policing to pretrial bail to sentencing, public and private entities outside the justice system now construct policy-laden evidence of recidivism risk to facilitate the administration of justice. (Eaglin, 2017, p. 61).

Recidivism risk analyses are statistical estimates. Therefore, particularly in studies that have reported recidivism risks without accompanying, necessary statistical information, such as confidence intervals, there is a need to extract and discuss the

appropriate mathematical content from empirical articles. However, in other portions of the literature review, an attempt has also been made to discuss the historical and conceptual bases of recidivism risk in the United States.

Historical Overview of Incarceration and Recidivism

In the United States, the emergence of recidivism as a specific and important concern in the theory and practice of incarceration dates to the very beginning of the country. In Great Britain, the reformist John Howard testified before the House of Commons in 1774 as to the inadequacy of British penal conditions, which, he argued, were perpetuating crime rather than rehabilitating criminals (Bryan, Haldipur, Martin, & Ullrich, 2015). By 1779, Parliament passed the Penitentiary Act (Powell, 2018) and Great Britain began to construct new prisons designed more for rehabilitative than punitive purposes, with one of the explicit objectives being to reduce the recidivism of prisoners (Latessa, Listwan, & Koetzle, 2014).

Both the individual states and the federal government of the United States were guided by Howard's model in the development of an American penal system, particularly with respect to the overall objective of lowering the recidivism of prisoners. The early nineteenth-century consensus among American policy-makers, prison wardens, and other stakeholders that a prisoner "should be dismissed under such circumstances as will be most likely to encourage and sustain him in a course of well-doing" (Packard, 1839, p. 4). This phrase explicitly invoked recidivism reduction as one of the guiding principles of American penology, a principle that, by 1839, had already become a centerpiece of practice. Admittedly, there were competing ideas about how penology could achieve the

goal of recidivism reduction. The Auburn System, which began at the Auburn State Prison in Auburn, New York, emphasized group work, silence during daylight, and group labor (Rubin, 2015). The Pennsylvania System emphasized separate cells for prisoners and did not promote collective work (Rubin, 2017). Both the Auburn and Pennsylvania Systems included Christian morality and instruction as the core of their rehabilitative philosophy (Avramenko & Gingerich, 2014).

The phenomena of punishment, rehabilitation, and recidivism continued to be discussed extensively in American periodicals, scholarly journals, meetings of local governments, and other venues throughout the nineteenth century (Avramenko & Gingerich, 2014; Rubin, 2015, 2017). During this time, discussions of rehabilitation in particular were limited by the fact that the mathematical branch of statistics was not well-developed. Recidivism is a phenomenon that is particularly suited to mathematical modeling (Duwe & Johnson, 2016; Rettenberger, Briken, Turner, & Eher, 2015; Steiner, Makarios, & Travis III, 2015) in that recidivism is a binary outcome (someone either recidivates or does not recidivate) that unfolds in objectively measured units of time. However, by the end of the nineteenth century, time-series statistics had not yet been developed (Bleikh & Young, 2016; Box, Jenkins, & Reinsel, 2011; Shumway & Stoffer, 2013), and the bases of cross-sectional statistics—including techniques such as Pearson correlation, ordinary least squares regression, and the *t*-test were still novel (Gorroochurn, 2016). It would not be until the 1970s, with Cox's publication of the Cox regression model (Cox, 2018) and several other seminal papers—briefly noted in Bleikh and

Young's (2016) history of time-series analysis—that scholars, policy-makers, and other stakeholders possessed tools capably of thoroughly examining recidivism risk.

Thus, there are two historical eras in the discourse on recidivism—the era from the late 18th century to the 1960s, when recidivism and rehabilitation were discussed more in terms of moral philosophy (Duwe & Johnson, 2016; Rettenberger et al., 2015; Steiner et al., 2015); and the period from the 1970s onward, when recidivism entered the professional-technical domain of discourse made possible by the development and popularization of statistical techniques in time-series analysis and related branches of statistics (Bleikh & Young, 2016; Box et al., 2011; Shumway & Stoffer, 2013).

In the first era of discourse, the concept that a prisoner "should be dismissed under such circumstances as will be most likely to encourage and sustain him in a course of well-doing" (Packard, 1839, p. 4) resonated positively with reformist currents in Christianity (Duwe & Johnson, 2016; Rettenberger et al., 2015; Steiner et al., 2015) and the rise of a more liberal attitude to punishment exemplified by Howard's proposed reforms in Great Britain (Latessa et al., 2014; Powell, 2018). However, there was also resistance to the goal of designing prisons to reduce recidivism. Nineteenth-century America saw a massive demographic shift from the countryside to the city (Hareven & Vinovskis, 2015) and, particularly toward the end of the century, a shift from the native-born to the immigrant population (Abramitzky & Boustan, 2017). In this environment, cities such as New York, Boston, Baltimore, and Chicago became incubators of both social unrest and crime, particularly as they struggled to assimilate rural and immigrant Americans (Song, Andresen, Brantingham, & Spicer, 2017).

Another important theme in the discussion of recidivism during this period was race. In the late 18th century, Howard and other reformers in the United Kingdom insisted that race was not a precipitating factor in either crime or recidivism (Ryan & Ward, 2015). The United Kingdom banned the slave trade in 1807 and was substantially more progressive than the United States in terms of views of race (Fenske & Kala, 2017). In the United States, the persistence of slavery and the hardening of racial attitudes meant that African Americans in particular were frequently portrayed as criminally inclined and immune to rehabilitation (Walton, Smith, & Wallace, 2017).

Race has become a particularly important theme in discussions of recidivism in the United States after the Civil Rights Era, which introduced extensive critiques of racial injustice in American life to scholarly and policy-making agenda (Munger & Seron, 2017). There are several distinct themes in contemporary American discussions of recidivism. One sub-theme is that of racial equity in both (a) services to prisoners and (b) services to released prisoners (Amaro & Black, 2017; Newton et al., 2018; Wolff et al., 2015). In prison, extending services such as education, professional training, drug and alcohol counseling, and general therapy to incarcerated individuals are documented (Amaro & Black, 2017; Newton et al., 2018; Wolff et al., 2015) means of reducing the recidivism of these individuals after their release. To the extent that African American prisoners and other racial minorities are excluded from such programs—whether because of formal or informal quotas, resource limitations, the inability of service workers to interface successfully with minority clients, or minority clients' own unpreparedness for,

or unwillingness to, engage in rehabilitation while incarcerated—they experience race-based inequity (Amaro & Black, 2017; Newton et al., 2018; Wolff et al., 2015).

Another sub-theme is that of socio-environmental risk factors for African Americans in particular. When African American are released from prison, they might continue to engage in differential association (Burgess & Akers, 1966; Waller, Hyde, Grabell, Alves, & Olson, 2015) with other individuals who are more likely to commit or encourage crime, and they might continue to live in so-called 'broken windows' (Wilson & Kelling, 1982, p. 395) environments that encourage crime in the absence of both pro-social collective behavior and police response (Brantingham & Brantingham, 1993). Therefore, higher recidivism rates among African Americans could mean the persistence of collective failure to resolve the socio-environmental incitements to crime—and therefore to recidivism—in African American neighborhoods.

A third sub-theme is that of the failure of post-release institutions. When African Americans are released from prison, they might return directly to society, or they might experience some form of transition as represented by a halfway house, parole supervision, or other form of supervision (Jones et al., 2010; Marlow et al., 2012; Vidal et al., 2015). Therefore, higher recidivism rates among African Americans could indicate the failure of post-release supervision to adequately address the needs of released individuals—or, considered from another point of view, the failure of released prisoners to adequately engage with their post-release supervision.

There is an ongoing debate about racial equity and racial dynamics in recidivism, particularly with respect to African Americans. However, the empirical basis for this

debate is whether the recidivism rates of African Americans are in fact different, particularly from White releasees who can be matched to African Americans in terms of the seriousness of their crimes, arrest history, and other relevant factors. If African Americans are more likely to recidivate than White releasees, after controlling for factors related to their crimes, then it is justified to suggest the existence of a racialized problem of recidivism, meaning the existence of circumstances that result in greater recidivism for African Americans,

Historically, the discussion of recidivism and race among scholars examining circumstances in the United States assumes the greater recidivism vulnerability of African American releasees (Gallagher et al., 2015; Sitney, Caldwell, & Caldwell, 2016; Skinner-Osei & Stepteau-Watson, 2018). However, the determination of whether African Americans are genuinely more likely to recidivate than, for example, White releasees with similar criminal profiles is a statistical question that has not been adequately settled in the literature. If African American releasees are not more likely to recidivate than White releasees with similar criminal profiles, then the problem of recidivism can be foregrounded and examined in terms of factors that are common to releasees across races—for example, factors such as poverty or mental health. If African American releasees are more likely to recidivate than White releasees with similar criminal profiles, then it is empirically justified to examine the mechanisms of in-prison services, socio-environmental risk factors, and post-release institutions from the perspective of racial equity. However, in the current era of discussion of race and recidivism in the United States, the focus remains on exploring recidivism as a racialized problem (Gallagher et

al., 2015; Sitney et al., 2016; Skinner-Osei & Stepteau-Watson, 2018) without adequate empirical justification.

Theories of Recidivism

The previous sub-section of the literature review identified three possible reasons for recidivism, each of which constitutes the core of a theory of recidivism. One possible reason is the insufficiency or unavailability of services such as education, professional training, drug and alcohol counseling, and general therapy to incarcerated individuals (Amaro & Black, 2017; Newton et al., 2018; Wolff et al., 2015). Another possible reason is that there are greater socio-environmental risk factors, including differential association (Burgess & Akers, 1966; Waller et al., 2015), life in antisocial and unpoliced communities (Wilson & Kelling, 1982), and crime-promoting physical environments (Brantingham & Brantingham, 1993). A third possible reason is the insufficiency or absence of post-release management in the form of halfway houses, parole supervision, or other forms of supervision (Jones et al., 2010; Marlow et al., 2012; Vidal et al., 2015).

Theories explain, describe, and predict phenomena (Henderikus, 2010). The three theories briefly described above help to (a) explain the problem of recidivism in terms of why recidivism takes place, (b) describe the phenomenon of recidivism in terms of the failure of specific institutions, and (c) predict that recidivism will be greater for those people who are exposed to certain risk factors.

The focus of this study is not on determining why African Americans might recidivate at higher rates. Rather, the focus of this study is on empirically determining whether African Americans are at greater risk for recidivism after controlling for aspects

of criminal behavior among releasees. Nonetheless, the findings of the study will address the theories described above. If race does not significantly increase the odds of recidivism, then one plausible conclusion is that forces such as (a) differential association (Burgess & Akers, 1966; Waller et al., 2015), (b) life in antisocial and unpoliced communities (Wilson & Kelling, 1982) and crime-promoting physical environments (Brantingham & Brantingham, 1993); and (c) the insufficiency or absence of post-release management in the form of halfway houses, parole supervision, or other forms of supervision (Jones et al., 2010; Marlow et al., 2012; Vidal et al., 2015) exercise equal effect on releasees of different races. Conversely, if race significantly increases the odds of recidivism, then one plausible conclusion is that forces such as (a) differential association (Burgess & Akers, 1966; Waller et al., 2015), (b) life in antisocial and unpoliced communities (Wilson & Kelling, 1982) and crime-promoting physical environments (Brantingham & Brantingham, 1993); and (c) the insufficiency or absence of post-release management in the form of halfway houses, parole supervision, or other forms of supervision (Jones et al., 2010; Marlow et al., 2012; Vidal et al., 2015) exercise unequal effect on releasees of different races.

According to previous research (Gallagher et al., 2015; Sitney et al., 2016; Skinner-Osei & Stepteau-Watson, 2018), African Americans are disproportionately likely to recidivate because of each of these factors. In other words, African American releasees are insufficiently rehabilitated while in prison, insufficiently supported by post-release institutions when outside prison, and disproportionately likely to return to crime-promoting social association and physical environments (Gallagher et al., 2015; Sitney et

al., 2016; Skinner-Osei & Stepteau-Watson, 2018). The empirical finding supported by these claims—which are quantitative in nature—is that, after controlling for aspects of crime, African Americans are significantly more likely to recidivate than White releasees in particular (Gallagher et al., 2015). However, in the absence of a formal method of odds measurement, such as the statistical technique of Cox regression (Cox, 2018), it cannot be concluded that African Americans are more likely to recidivate, because the hazard rations generated by Cox regression are considered to be a suitable inferential method of analyzing risk across groups (Cox, 2018). An empirical analysis of recidivism by race is therefore necessary, and the findings can cast new light on how theories of differential association, life in antisocial and unpoliced communities and crime-promoting physical environments, and the insufficiency or absence of post-release management in the form of halfway houses, parole supervision, or other forms of supervision might apply to African American releasees in particular. The general implications of the empirical findings of the study for the theories noted in this sub-section of the literature review will be discussed at greater length in Chapter 5.

Review of Empirical Studies

There are numerous recent and seminal empirical studies on the phenomenon of recidivism, particularly recidivism risk as a factor of race (Aldigé Hiday, Ray, & Wales, 2015; Durose et al., 2014; Flores, Holsinger, Lowenkamp, & Cohen, 2017; Lockwood, Nally, Ho, & Knutson, 2015; Olson, Stalans, & Escobar, 2016; Skeem & Lowenkamp, 2016; Skinner-Osei & Stepteau-Watson, 2018). This research review has been divided into several sub-sections. First, the search strategy to identify empirical articles is

discussed. Second, seminal and government-sponsored studies of recidivism are discussed and analyzed. Third, studies on race and recidivism in particular are discussed and analyzed. This sub-section of the review of empirical studies is subdivided into further sub-sections based on (a) studies that discovered a greater likelihood of African American recidivism and (b) studies that did not discover a greater likelihood of African American recidivism.

Search Strategy

The following academic databases served as sources for empirical articles to include in the study: Academic Search Direct, EBSCO Host, JSTOR, Web of Science, PsycINFO, and Google Scholar. The following search terms were applied:

- "Recidivism risk" AND "race"

- "Recidivism risk" AND "race" AND "African American"

- "Recidivism risk" AND "race" AND "African American" AND "Cox regression"

- "Recidivism" AND "race"

- "Recidivism" AND "race" AND "African American"

- "Recidivism" AND "race" AND "African American" AND "Cox regression"

- "Recidivism risk" AND "race" AND "odds ratio"

- "Recidivism risk" AND "race" AND "African American" AND "odds ratio"

- "Recidivism risk" AND "race" AND "African American" AND "Cox regression" AND "odds ratio"

- "Recidivism" AND "race" AND "odds ratio"

- "Recidivism" AND "race" AND "African American" AND "odds ratio"

- "Recidivism" AND "race" AND "African American" AND "Cox regression" AND "odds ratio"

The search terms were specified to encompass both general studies on recidivism and race as well as more specialized studies that included odds ratios for recidivism. The following procedures were applied. First, each set of results was filtered to include only peer-reviewed articles in English. Second, a time filter was applied to identify those studies published from 2014 to the present; however, the time filter was also removed in order to facilitate the identification of seminal studies. Third, the first five pages of every database's results were read, and the abstracts of articles that appeared to be directly relevant to the study were read. If the abstracts confirmed the relevance of an article to the study, then that article was read in full and integrated into the literature review. Empirical articles (Aldigé Hiday et al., 2015; Durose et al., 2014; Flores et al., 2017; Lockwood et al., 2015; Olson et al., 2016; Skeem & Lowenkamp, 2016; Skinner-Osei & Stepteau-Watson, 2018) selected for detailed analysis were chosen on the basis of being highly relevant to the current study's data analysis model and topical focus areas as well as being recent. The literature review also included relevant references included in the studies selected based on the disclosed search criteria.

Race and Recidivism Risk

One manner of subdividing studies on race and recidivism risk is to differentiate between epidemiological studies and explanatory studies. Epidemiological studies are studies that report on population differences as predictors of recidivism risk variation.

Explanatory studies are studies that attempt to further explain observed differences or similarities between White and Black recidivism as functions of other variables.

Epidemiological studies. Skeem and Lowenkamp (2016) conducted a study on race, post-conviction risk assessment, and future arrest. The main purpose of Skeem and Lowenkamp's study was to compare the predictive utility of a post-conviction risk assessment in terms of re-arrest outcomes. This post-conviction risk assessment tool, known simply as the Post-Conviction Risk Assessment (PCRA), is applied to all prisoners who are federal offenders in the United States. The purpose of administering the PCRA, according to Skeem and Lowenkamp, is not to inform sentencing after conviction, but to sort prisoners according to their re-offending risk so that the highest-risk prisoners can receive more intensive services while incarcerated and also during probation. Skeem and Lowenkamp were particularly interested in whether the PCRA is similarly predictive of recidivism for White and Black prisoners. In answering this research question, Skeem and Lowenkamp gathered data and performed analyses that are relevant to the general theme of race as a predictor of recidivism risk.

Skeem and Lowenkamp (2016) began by collecting data on 150,614 federal offenders who had undergone the PCRA assessment at some point between August, 2010 and November, 2013. After cleansing the dataset by (a) removing missing or incomplete answers and (b) delimiting the dataset to those individuals who had at least a 12-month post-release history, Skeem and Lowenkamp were left with 48,475 offenders. Next, Skeem and Lowenkamp applied statistical matching techniques to assemble a final dataset of 33,074 offenders, exactly half of whom were White and the other half of whom

were Black. These offenders were matched on the basis of sex, age, and nature of

offense. Thus, Skeem and Lowenkamp controlled for the possible influences of sex, age,

and nature of offense in their analysis of the recidivism risk of White and Black federal

offenders; in theory, the findings should have reflected race effects rather than, for

example, sex, age, and offense effects that might have been confused for race effects.

The PCRA has a scoring range of 0 to 15, with 0 representing the lowest level of

recidivism risk and 15 representing the highest level of recidivism risk (Skeem &

Lowenkamp, 2016). Skeem and Lowenkamp treated the PCRA as the independent

variable and re-arrest (a form of recidivism) as the dependent variable. Subsequently,

Skeem and Lowenkamp compared the likelihood of a PCRA score predicting the re-arrest

(over a 12-month period) of both White and Black offenders who had been released.

Using 99% confidence intervals of the *b* coefficient value of PCRA score, and presenting

separate confidence intervals for White and Black subjects, Skeem and Lowenkamp

established that PCRA scores were similarly predictive of White and Black recidivism.

Skeem and Lowenkamp (2016) thus concluded that PCRA scores were equally

accurate predictors of recidivism risk in both White and Black ex-offenders, at least those

ex-offenders who were released from federal custody. In reaching this conclusion, Skeem

and Lowenkamp presented a chart of recidivism rates as a function of both race and

PCRA score. Skeem and Lowenkamp's graph provided visual confirmation of the results

of the logistic regression model, which also indicated that the risks of recidivism were

very similar for both White and Black prisoners.

If the PCRA variable is ignored, Skeem and Lowenkamp's (2016) study is still of interest as a comparison of White and Black recidivism rates after controlling for the possible confounding effects of age, race, and offense type. Skeem and Lowenkamp's findings that White and Black ex-offenders were just as likely to recidivate, regardless of their PCRA score, strongly suggests that the recidivism rates for Black and White ex-offenders are equal. However, Skeem and Lowenkamp's study contained several deficits that limit the strength of this inference. First, Skeem and Lowenkamp only studied the first 12 months after release; it is possible that, in the early period of release, recidivism risks are similar for White and Black ex-offenders, but that the recidivism risk increases significantly for either race after one year. Second, although Skeem and Lowenkamp controlled for the influences of sex, age, and offense type in creating a matched-subjects dataset, they omitted another variable that might have influenced their findings, that of the previous number of arrests of an ex-offender. Third, the logistic regression coefficients provided by Skeem and Lowenkamp were not translated into odds ratios or hazard ratios, meaning that the coefficients are difficult to interpret in a practical way. Had Skeem and Lowenkamp provided odds ratios, their findings would have been more easily interpreted in terms of the comparative odds of White and Black ex-offenders recidivating. These three limitations (the omission of number of past arrests as part of data-matching, the termination of the study period at 12 months after release, and the absence of odds ratios or hazard ratios) indicate the necessity for additional empirical analysis. However, Skeem and Lowenkamp's study is still notable for indicating that race-based recidivism risk is a legitimate policy and scholarly concern and also for

relating this issue to the task faced by probation officers. Skeem and Lowenkamp stated that recidivism risk measurement, by race, is an important form of decision support to probation officers, thus validating the usefulness of scholarly work on this topic.

Olson et al. (2016) conducted a study on the recidivism rates, measured as hazard ratios, of male and female detainees and also subcategorized their results by race. Olson et al.'s sample consisted of all adult inmates released by the state of Illinois in the fiscal year of 2007. During this time period, Illinois state prisons released 3,014 women and 23,520 men from incarceration. Thus, Olson et al.'s total sample size was 26,534; no individual records were dropped from analysis. The follow-up period in Olson et al.'s study was 3.4 years; thus, Olson et al. drew records from Illinois in 2010 to determine the recidivism outcomes of the 26.534 individuals in the dataset. The follow-up period in Olson et al.'s study was substantially longer than the 12-month follow-up period utilized by Skeem and Lowenkamp (2016). However, Flores et al. (2017), whose study is discussed in next sub-section of the literature review, utilized a follow-up period of nine years. Thus, one of the possible weaknesses of Olson et al.'s study was the possibly inadequate length of the follow-up period in terms of measuring recidivism outcomes.

Olson et al.'s (2016) main findings, relevant to race and recidivism risk, were as follows. First, Olson et al. found that black female ex-offenders were not significantly more likely to recidivate than white female ex-offenders, $OR = 1.03$, $p > .05$. This odds ratio indicates that black female offenders were 3% more likely to be re-arrested—for any offense—in comparison to white female offenders, but this difference was not statistically significant at $p < .05$. However, Olson et al. found that black male ex-

offenders were significantly more likely to recidivate than white male ex-offenders, $OR =$ 1.51, $p < .001$. This odds ratio indicates that black male offenders were 51% more likely to be re-arrested—for any offense—in comparison to white male offenders, and this difference was not statistically significant at $p < .001$.

Olson et al.'s (2016) finding that black males were more likely to be re-arrested for any crime than white males, but that black females were not more likely to be re-arrested for any crime than white females was reversed when the authors focused solely on re-arrest for violent crimes. Specifically, Olson et al. found that black female ex-offenders were significantly more likely to recidivate violently than white female ex-offenders, $OR = 1.46$, $p < .01$. This odds ratio indicates that black female offenders were 43% more likely to be re-arrested—for violent offenses—in comparison to white female offenders, and this difference was statistically significant at $p < .05$. Next, Olson et al. found that black male ex-offenders were not significantly more likely to recidivate violently than white male ex-offenders, $OR = 1.23$, $p > .05$. This odds ratio indicates that black male offenders were 23% more likely to be re-arrested—for violent offenses—in comparison to white male offenders, but this difference was not statistically significant at $p < .05$.

Therefore, while Olson et al. (2016) found that recidivism risk varied by rate, this variation was itself partly a function of both gender and the nature of the recidivating offense. Overall, Olson et al.'s findings provided some support for the possibility that black ex-offenders are more likely to recidivate. However, as Olson et al.'s results

suggest, analyses of recidivism risk by race should take the gender and re-arrest crime of the recidivating individual into consideration.

While Olson et al. (2016) examined recidivism risk as a hazard ratio, and Skeem and Lowenkamp (2016) examined recidivism risk as an unadjusted logistic regression coefficient, a study conducted by Lockwood et al. (2015) presented descriptive statistics of recidivism risk that can be transformed into 95% confidence intervals and compared in order to examine whether Black ex-offenders are at greater risk for recidivism than White ex-offenders. Lockwood et al.'s dataset consisted of 6,394 released prisoners, of whom 3,863 were Black and 2.531 were white. Lockwood et al. applied a five-year follow-up period to track the recidivism outcomes of this sample, which was drawn solely from prisoners released by the Indiana Department of Correction.

One of the stated purposes of Lockwood et al.'s (2015) study was to measure potential disparities between the recidivism rates of Black and White ex-offenders. However, Lockwood et al. did not present their results in terms of odds ratios, hazard ratios, or logistic regression coefficients. Rather, Lockwood et al. presented several tables comparing the recidivism outcomes, expressed as percentages, of Black and White prisoners based on factors such as their employment status and educational history. In addition, Lockwood et al. presented summary statistics for the recidivism rate of all Black ex-prisoners and all White ex-prisoners in their sample.

Although Lockwood et al. (2015) provided only descriptive statistics for recidivism outcomes by race, these descriptive statistics can be turned into inferential statistics through the mathematical construct known as binomial proportion confidence

interval. A binomial proportion confidence interval is a combination of a proportion, its lower bound, and its upper bound; thus, for example, a binomial confidence interval of 0.45, 0.75, with 0.60 as the point estimate, would indicate that 60% of ex-prisoners are estimated to recidivate, with a 95% likelihood that the true percentage of recidivating prisoners in the entire population is between 45% and 75%.

Numerous mathematicians were responsible for the development of the binomial proportion confidence interval as it is currently known. The concept of a confidence interval for a population with some normally distributed characteristic was first refined by Laplace in 1812 (Laplace, 1812). However, the method of using *z* scores to calculate a confidence interval was developed by Wald (Wald, 1945), and Central Limit Theorem— to which the first seminal contributor, in terms of the analysis of binomial outcomes such as coin tosses or recidivism outcomes, was de Moivre (de Moivre, 1730)—provides the overall mathematical justification for estimating a confidence interval on the assumption of normal distribution and a sufficiently large sample size.

The formula for a binomial confidence interval is as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \tag{1}$$

In this formula, p-hat (denoted as $\hat{p}$) is the proportion calculated from summary statistics. For example, if 48 out 100 individuals recidivate, and if recidivism (rather than non-recidivism) is the phenomenon of interest, then p-hat is simply $48 / 100 = 0.48$. The variable *n* indicates the number of the people in the sample for which a binomial proportion confidence interval is being calculated; in the example noted earlier, *n* would

be 100. Finally, the *z* score is a multiplier that takes on a standard value based on the

desired confidence interval. For a 95% confidence interval, the *z* multiplier is 1.96.

Using the formula for a binomial proportion confidence interval, summary data

such as those provided by Lockwood et al. (2015) can be converted into confidence

intervals that allow more exact comparisons between two sub-samples—in the context of

Lockwood et al.'s analysis, Black and White ex-prisoners measured in terms of their

recidivism rates. Once binomial confidence intervals are calculated, they can be

compared to determine whether there are statistically significant differences in the

various recidivism rates reported by Lockwood et al. in their analysis. An examination of

the overlap or lack of overlap in 95% confidence intervals can provide a means of

determining whether there are statistically significant differences in White and Black

recidivism rates based on Lockwood et al.'s data.

To begin with, Lockwood et al. (2015, p. 21) noted that, over a five-year follow-

up period, 1,135 out of 2,531 White ex-prisoners had recidivated, as compared to 1,953

out of 3,864 Black ex-prisoners. Because the number of events of interest (re-arrests,

taken as a measure of recidivism) and sample sizes for each group are known, the

binomial proportion confidence interval formula can be applied to Lockwood et al.'s

findings to calculate the overall risks of Black and White ex-prisoners recidivating.

For White ex-prisoners whose recidivism outcomes were analyzed by Lockwood

et al. (2015), the 95% binomial proportion confidence interval and point estimate can be

derived in the following manner (note that 0.448 is simply 1,135 / 2,531, or the

proportion of White ex-prisoners who were released):

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.448 \pm 1.96\sqrt{\frac{0.448(1-0.448)}{2531}} =$$

$$0.448 \pm 1.96\sqrt{\frac{0.448(0.552)}{2531}} =$$

$$0.448 \pm 1.96\sqrt{\frac{0.24796}{2531}} =$$

$$0.448 \pm 1.96\sqrt{\frac{0.24796}{2531}} =$$

$$0.448 \pm 1.96(0.00989793816) =$$

$$0.448 \pm 0.0194 = 0.4286, 0.4674$$

Thus, there is a 95% likelihood that the true percentage of White ex-prisoners who recidivated in Lockwood et al.'s (2015) study was between 42.86% and 46.74%, with a point estimate of 44.80%. This point estimate and 95% confidence interval can be contrasted with the point estimate and 95% confidence interval for Black ex-prisoners whose outcomes were tracked in Lockwood et al.'s study (note that 0.5054 is simply 1,953 / 3,864, or the proportion of White ex-prisoners who were released):

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.5054 \pm 1.96\sqrt{\frac{0.5054(1-0.5054)}{3864}} =$$

$$0.5054 \pm 1.96\sqrt{\frac{0.5054(0.4946)}{3864}} =$$

$$0.5054 \pm 1.96\sqrt{\frac{0.250}{3864}} =$$

$$0.5054 \pm 1.96\sqrt{0.0000647} =$$

$$0.5054 \pm 1.96(0.008) =$$

$$0.5054 \pm 0.01568 = 0.48972, 0.52108$$

Thus, there is a 95% likelihood that the true percentage of Black ex-prisoners who recidivated in Lockwood et al.'s (2015) study was between 48.97% and 52.11%, with a point estimate of 50.54%. It will be recalled that there is a 95% likelihood that the true percentage of White ex-prisoners who recidivated in Lockwood et al.'s study was between 42.86% and 46.74%, with a point estimate of 44.80%. Thus, the entirety of the 95% confidence interval for the likelihood of Black recidivism was higher than the entirety of the 95% confidence for the likelihood of White recidivism, suggesting that, among the ex-prisoners analyzed by Lockwood et al., Black ex-prisoners were significantly more likely to recidivate than White ex-prisoners.

Whereas Lockwood et al. (2015) analyzed ex-prisoner outcomes from Indiana and Olson et al. (2016) analyzed outcomes from Illinois, the epidemiological analysis carried out by Durose et al. (2014) was based on prisoner outcomes from 30 states and is there likely to constitute a more accurate estimate of recidivism risk. Durose et al. analyzed government data on the outcomes of hundreds of thousands of prisoners who were

released in both 1994 and 2005, with a follow-up period of five years. The large sample size of Durose et al.'s analysis was a strength of this study—which, however, was published by the United States Department of Justice rather than in a peer-reviewed scholarly journal, a possible weakness of the study.

The descriptive statistics reported by Durose et al. (2014) can be converted into binomial proportion estimates and confidence interval proportions in the same manner applied to the descriptive statistics reported by Lockwood et al. (2015). Thus, even though the purpose of Durose et al.'s study was not to report recidivism risk as a function of risk, the thorough descriptive statistics collected by Durose et al. can still be utilized for this purpose.

Durose et al. (2014) reported that, in their dataset, there were records for 286,829 prisoners released in 2005. Of these released individuals, 40.5% were African American and 35.40% were White. These percentages can be utilized to estimate that (0.405)(286,829), or 116,166 of the prisoners released in 2005 were Black, whereas (0.354)(286,829), or 101,537 of the prisoners released in 2005 were White. Next, Durose et al. reported three-year recidivism (measured as re-arrest for any reason) outcomes, indicating that 74% of African American prisoners released in 2005 had recidivated within 36 months of their release, whereas 68.80% of White prisoners released in 2005 had recidivated within 36 months of their release. Because of the earlier calculation of sample sizes for White released prisoners ($n = 101,537$) and Black released prisoners ($n = 116,166$), the binomial proportion point estimate and confidence interval formula can be

applied to Durose et al.'s data in the same manner that it was applied to Lockwood et

al.'s (2015) data.

For White ex-prisoners in Durose et al.'s (2014) dataset, the binomial proportion

point estimate was given as 68.80%, or 0.688, and the calculations for the 95%

confidence interval of this point estimate have been provided below. The analysis

indicates that there is a 95% likelihood that the true proportion of White ex-prisoners

released in 2005 who recidivated within 36 months was between 68.52% and 69.09%.

Because of the very large sample size of White ex-prisoners in Durose et al.'s dataset, the

95% confidence interval was very narrow, an obvious mathematical result of a large n in

the denominator for the formula.

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.63 \pm 1.96\sqrt{\frac{0.63(1-0.63)}{22}} =$$

$$0.63 \pm 1.96\sqrt{\frac{0.63(0.37)}{22}} =$$

$$0.63 \pm 1.96\sqrt{\frac{0.2331)}{22}} \approx$$

$$0.63 \pm 1.96\sqrt{0.01059} \approx$$

$$0.63 \pm 1.96(0.1029) \approx$$

$$0.63 \pm 0.20 \approx 0.43, 0.83$$

For Black ex-prisoners in Durose et al.'s (2014) dataset, the binomial proportion

point estimate was given as 74.00%, or 0.74, and the calculations for the 95% confidence

interval of this point estimate have been provided below. The analysis indicates that there

is a 95% likelihood that the true proportion of Black ex-prisoners released in 2005 who

recidivated within 36 months was between 73.75% and 74.25%.

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.253 \pm 1.96\sqrt{\frac{0.253(1-0.253)}{116166}} =$$

$$0.253 \pm 1.96\sqrt{\frac{0.253(0.747)}{116166}} =$$

$$0.253 \pm 1.96\sqrt{\frac{0.188991)}{116166}} =$$

$$0.253 \pm 1.96\sqrt{0.0000016269} =$$

$$0.253 \pm 1.96(0.001275) =$$

$$0.253 \pm 0.00249 = 0.25051, 0.25499$$

Thus, the entirety of the 95% confidence interval for the likelihood of Black

recidivism was higher than the entirety of the 95% confidence for the likelihood of White

recidivism, suggesting that, among the ex-prisoners analyzed by Durose et al. (2014),

Black ex-prisoners were significantly more likely to recidivate than White ex-prisoners.

Durose et al.'s (2014) study provided descriptive statistics not only for all cases of

recidivism but also for certain cases of recidivism. The analyses above are binomial point

estimate and confidence interval statistics for all cases of recidivism. In addition, Durose

et al. provided statistics about violent recidivism that can also be utilized to determine

whether there was a statistically significant difference between the percentage of White

ex-prisoners who recidivated violently and Black ex-prisoners who recidivated violently.

Durose et al. (2014) indicated that 19.36% of White ex-prisoners released in 2005

had recidivated violently within 36 months of release. By contrast, 25.30% of Black ex-

prisoners released in 2005 had recidivated violently within 36 months of release. These percentages can be applied to the reported sample sizes for White ex-prisoners ($n =$ 101,537) and Black released prisoners ($n = 116,166$) in Durose et al.'s study. For White prisoners, the analysis was as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.193 \pm 1.96\sqrt{\frac{0.193(1-0.193)}{101537}} =$$

$$0.193 \pm 1.96\sqrt{\frac{0.193(0.807)}{101537}} =$$

$$0.193 \pm 1.96\sqrt{\frac{0.1555751)}{101537}} =$$

$$0.193 \pm 1.96\sqrt{0.0000015339} =$$

$$0.193 \pm 1.96(0.001238) =$$

$$0.193 \pm 0.00243 = 0.19057, 0.19543$$

Thus, according to Durose et al.'s (2014) findings, there is a 95% likelihood that between 19.057% and 19.543% of White prisoners released from 30 states in 2005 had recidivated violently within 36 months of their release. This confidence interval can be calculated for Black ex-prisoners as well:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.397 \pm 1.96\sqrt{\frac{0.397(1-0.397)}{8879}} =$$

$$0.397 \pm 1.96\sqrt{\frac{0.397(0.603)}{8879}} =$$

$$0.397 \pm 1.96\sqrt{\frac{0.239391)}{8879}} =$$

$$0.397 \pm 1.96\sqrt{0.000026961} =$$

$$0.397 \pm 1.96(0.005192) =$$

$$0.397 \pm 0.01017 = 0.38683, 0.40717$$

Thus, according to Durose et al.'s (2014) findings, there is a 95% likelihood that between 25.051% and 25.499% of Black prisoners released from 30 states in 2005 had recidivated violently within 36 months of their release. Notably, the entire 95% confidence interval for the likelihood of Black ex-prisoners recidivating violently within 36 months of their release was above the entire 95% confidence interval for the likelihood of White ex-prisoners recidivating violently within 36 months of their release. Therefore, just as it was concluded that Black ex-prisoners were more likely than White ex-prisoners to recidivate for any reason, Durose et al.'s reported statistics also support the conclusion that Black ex-prisoners were more likely than White ex-prisoners to recidivate violently. Overall, therefore, it seems plausible that, on the basis of data from prisoners released in 2005, Black ex-prisoners were more likely to recidivate than White ex-prisoners. The very large sample sizes in Durose et al.'s study suggest that this finding has strong internal validity.

Another large-sample study of recidivism risk was conducted by Markman et al. (Markman, Durose, Rantala, & Tiedt, 2016). Markman et al.'s study, like that of Durose et al. (2014), was not specifically designed to measure recidivism risk as a function of race, but the descriptive statistics provided by Markman et al. allowed a binominal point estimate and 95% confidence interval to be calculated. One point of interest in Markman et al.'s study was the delimitation of the sample to individuals released (from both federal and state prisons) into community supervision. Thus, whereas Durose et al.'s sample treated all released prisoners as part of a single category, Markman et al. only studied the recidivism outcomes of prisoners released into community supervision. In addition, Markman et al. measured two kinds of recidivism, re-arrest and return to prison. Therefore, Markman et al.'s study was a rich source of data for better understanding recidivism risk as a function of race in the context of prisoners released into community supervision in particular.

Markman et al.'s (2016) sample consisted of 43,000 federal and state prisoners released into community supervision. Of these prisoners, 41.3% ($n = 17,759$) were White, whereas 31.2% ($n = 13,416$) were Black. The sample was equally divided into 21,500 individuals released from federal custody and 21,500 individuals released from state custody. These descriptive statistics provided both *p-hat* and *n* values for the calculation of binomial proportion estimates and 95% confidence intervals.

Markman et al. (2016) indicated that 39.7% of White ex-prisoners released from federal prisons recidivated by re-arrest in the 60 months after their release as part of the cohort of prisoners released in 2005. During the same observation period, 55.7% of Black

ex-prisoners released from federal prisons recidivated by re-arrest. Further, 26.2% of White ex-prisoners released from federal custody had returned to prison within 5 years, and 35.7% of Black ex-prisoners released from federal custody had returned to prison within 5 years.

Markman et al. also provided recidivism data for individuals released from state custody. In the 60-month observation period from 2005 to 2010, 73.1% of White ex-prisoners released from state prisons recidivated by re-arrest in the period from 2005 to 2010, whereas, in the same observation period, 80.6% of Black ex-prisoners released from state prisons recidivated by re-arrest. Further, 53.2% of White ex-prisoners released from state prisons had returned to prison within 5 years, and 55.6% of Black ex-prisoners released from state prisons had returned to prison within 5 years. Based on these descriptive statistics and the *n* and proportion values noted above, it was possible to calculate binomial point estimate and 95% confidence interval proportions for the following instances:

- The recidivism rate, by re-arrest, of White ex-prisoners released from federal custody into community supervision.

- The recidivism rate, by re-imprisonment, of White ex-prisoners released from federal custody into community supervision.

- The recidivism rate, by re-arrest, of White ex-prisoners released from state prisons into community supervision.

- The recidivism rate, by re-imprisonment, of White ex-prisoners released from state prisons into community supervision.

- The recidivism rate, by re-arrest, of Black ex-prisoners released from federal custody into community supervision.

- The recidivism rate, by re-imprisonment, of Black ex-prisoners released from federal custody into community supervision.

- The recidivism rate, by re-arrest, of Black ex-prisoners released from state prisons into community supervision.

- The recidivism rate, by re-imprisonment, of Black ex-prisoners released from state prisons into community supervision.

The first risk calculation carried out on Markman et al.'s (2016) dataset was on the recidivism rate, by re-arrest, of White ex-prisoners released from federal custody into community supervision; this recidivism rate was then compared to the recidivism rate, by re-arrest, of Black ex-prisoners released from federal custody into community supervision. It was noted that 39.7% of White ex-prisoners released from federal prisons recidivated by re-arrest in the 60 months, and that there were 8,879 total White ex-prisoners released from federal prisons. Next, it was noted that 55.7% of Black ex-prisoners released from federal prisons recidivated by re-arrest in the 60 months, and that there were 6,708 total Black ex-prisoners released from federal prisons.

For the recidivism rate, by re-arrest, of White ex-prisoners released from federal custody into community supervision, the binominal proportion and 95% confidence interval were calculated as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.397 \pm 1.96\sqrt{\frac{0.397(1-0.397)}{8879}} =$$

$$0.397 \pm 1.96\sqrt{\frac{0.397(0.603)}{8879}} =$$

$$0.397 \pm 1.96\sqrt{\frac{0.239391}{8879}} =$$

$$0.397 \pm 1.96\sqrt{0.000026961} =$$

$$0.397 \pm 1.96(0.005192) =$$

$$0.397 \pm 0.01017 = 0.38683, 0.40717$$

Therefore, there was a 95% likelihood that between 38.683% and 40.717% of White ex-prisoners released from federal prisons would recidivate by re-arrest. This confidence interval was compared to the binomial proportion and 95% confidence interval for the Black ex-prisoners released from federal prisons who recidivated by re-arrest.

For the recidivism rate, by re-arrest, of Black ex-prisoners released from federal custody into community supervision, the binominal proportion and 95% confidence interval were calculated as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.557 \pm 1.96\sqrt{\frac{0.557(1-0.557)}{6708}} =$$

$$0.557 \pm 1.96\sqrt{\frac{0.557(0.443)}{6708}} =$$

$$0.557 \pm 1.96\sqrt{\frac{0.246751}{6708}} =$$

$$0.557 \pm 1.96\sqrt{0.006065} =$$

$$0.557 \pm 1.96(0.07787) =$$

$$0.557 \pm 0.15264 = 0.40436, 0.70964$$

Therefore, there was a 95% likelihood that between 40.436% and 70.964% of Black ex-prisoners released from federal prisons would recidivate by re-arrest. There was an extremely narrow overlap between the upper bound of the binomial 95% confidence interval for White ex-prisoners released from federal prisons recidivating by re-arrest and the lower bound of the binomial 95% confidence interval for Black ex-prisoners released from federal prisons recidivating by re-arrest.

The second risk calculation carried out on Markman et al.'s (2016) dataset was on the recidivism rate, by re-imprisonment, of White ex-prisoners released from federal custody into community supervision; this recidivism rate was then compared to the recidivism rate, by re-imprisonment, of Black ex-prisoners released from federal custody into community supervision.

It was noted that 26.2% of White ex-prisoners released from federal prisons recidivated by re-imprisonment in the 60 months, and that there were 8,879 total White ex-prisoners released from federal prisons. Next, it was noted that 35.7% of Black ex-

prisoners released from federal prisons recidivated by re-imprisonment in the 60 months, and that there were 6,708 total Black ex-prisoners released from federal prisons.

For the recidivism rate, by re-imprisonment, of White ex-prisoners released from federal custody into community supervision, the binominal proportion and 95% confidence interval were calculated as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.262 \pm 1.96\sqrt{\frac{0.262(1-0.262)}{8879}} =$$

$$0.262 \pm 1.96\sqrt{\frac{0.262(0.738)}{8879}} =$$

$$0.262 \pm 1.96\sqrt{\frac{0.193356}{8879}} =$$

$$0.262 \pm 1.96\sqrt{0.000021776} =$$

$$0.262 \pm 1.96(0.009146) =$$

$$0.262 \pm 0.01792 = 0.24408, 0.27992$$

Therefore, there was a 95% likelihood that between 24.408% and 27.992% of White ex-prisoners released from federal prisons would recidivate by re-imprisonment. This confidence interval was compared to the binomial proportion and 95% confidence interval for the Black ex-prisoners released from federal prisons who recidivated by re-imprisonment.

For the recidivism rate, by re-imprisonment, of Black ex-prisoners released from federal custody into community supervision, the binominal proportion and 95% confidence interval were calculated as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.357 \pm 1.96\sqrt{\frac{0.357(1-0.357)}{6708}} =$$

$$0.357 \pm 1.96\sqrt{\frac{0.357(0.643)}{6708}} =$$

$$0.357 \pm 1.96\sqrt{\frac{0.229551}{6708}} =$$

$$0.357 \pm 1.96\sqrt{0.00003422} =$$

$$0.357 \pm 1.96(0.00585) =$$

$$0.357 \pm 0.11465 = 0.24235, 0.47165$$

Therefore, there was a 95% likelihood that between 24.235% and 47.165% of

Black ex-prisoners released from federal prisons would recidivate by re-imprisonment.

There was an extremely narrow overlap between the upper bound of the binomial 95%

confidence interval for White ex-prisoners released from federal prisons recidivating by

re-imprisonment and the lower bound of the binomial 95% confidence interval for Black

ex-prisoners released from federal prisons recidivating by re-imprisonment.

The third risk calculation carried out on Markman et al.'s (2016) dataset was on

the recidivism rate, by re-arrest, of White ex-prisoners released from state prisons into

community supervision; this recidivism rate was then compared to the recidivism rate, by

re-arrest, of Black ex-prisoners released from state prisons into community supervision. It

was noted that 73.1% of White ex-prisoners released from state prisons recidivated by re-

arrest in the 60 months, and that there were 8,880 total White ex-prisoners released from

state prisons. Next, it was noted that 80.6% of Black ex-prisoners released from state

prisons recidivated by re-arrest in the 60 months, and that there were 6,708 total Black ex-prisoners released from state prisons.

For the recidivism rate, by re-arrest, of White ex-prisoners released from state prisons into community supervision, the binominal proportion and 95% confidence interval were calculated as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.731 \pm 1.96\sqrt{\frac{0.731(1-0.731)}{8880}} =$$

$$0.731 \pm 1.96\sqrt{\frac{0.731(0.269)}{8880}} =$$

$$0.731 \pm 1.96\sqrt{\frac{0.196639}{8880}} =$$

$$0.731 \pm 1.96\sqrt{0.000022155} =$$

$$0.731 \pm 1.96(0.004706) =$$

$$0.731 \pm 0.00922 = 0.72178, 0.74022$$

Therefore, there was a 95% likelihood that between 72.178% and 74.022% of White ex-prisoners released from state prisons would recidivate by re-arrest. This confidence interval was compared to the binomial proportion and 95% confidence interval for the Black ex-prisoners released from state prisons who recidivated by re-arrest.

For the recidivism rate, by re-arrest, of Black ex-prisoners released from state prisons into community supervision, the binominal proportion and 95% confidence interval were calculated as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.806 \pm 1.96\sqrt{\frac{0.806(1-0.806)}{6708}} =$$

$$0.806 \pm 1.96\sqrt{\frac{0.806(0.194)}{6708}} =$$

$$0.806 \pm 1.96\sqrt{\frac{0.156364}{6708}} =$$

$$0.806 \pm 1.96\sqrt{0.00002331} =$$

$$0.806 \pm 1.96(0.00482) =$$

$$0.806 \pm 0.00946 = 0.79654, 0.81546$$

Therefore, there was a 95% likelihood that between 79.654% and 81.546% of

Black ex-prisoners released from state prisons would recidivate by re-arrest. Notably, the

entirety of the 95% confidence interval for the re-arrest recidivism rate of Black prisoners

released from state prisons was above the entirety of the 95% confidence interval for the

re-arrest recidivism rate of White prisoners released from state prisons.

The fourth risk calculation carried out on Markman et al.'s (2016) dataset was on

the recidivism rate, by re-imprisonment, of White ex-prisoners released from state

prisons into community supervision; this recidivism rate was then compared to the

recidivism rate, by re-imprisonment, of Black ex-prisoners released from state prisons

into community supervision.

It was noted that 53.2% of White ex-prisoners released from state prisons recidivated by

re-imprisonment in the 60 months, and that there were 8,880 total White ex-prisoners

released from state prisons. Next, it was noted that 55.6% of Black ex-prisoners released

from state prisons recidivated by re-imprisonment in the 60 months, and that there were

6,708 total Black ex-prisoners released from state prisons.

For the recidivism rate, by re-imprisonment, of White ex-prisoners released from

state prisons into community supervision, the binominal proportion and 95% confidence

interval were calculated as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.532 \pm 1.96\sqrt{\frac{0.532(1-0.532)}{8880}} =$$

$$0.532 \pm 1.96\sqrt{\frac{0.532(0.468)}{8880}} =$$

$$0.532 \pm 1.96\sqrt{\frac{0.248976}{8880}} =$$

$$0.532 \pm 1.96\sqrt{0.000028037} =$$

$$0.532 \pm 1.96(0.005295) =$$

$$0.532 \pm 0.01037 = 0.52163, 0.54237$$

Therefore, there was a 95% likelihood that between 52.163% and 54.237% of

White ex-prisoners released from state prisons would recidivate by re-imprisonment. This

confidence interval was compared to the binomial proportion and 95% confidence

interval for the Black ex-prisoners released from state prisons who recidivated by re-

imprisonment.

For the recidivism rate, by re-imprisonment, of Black ex-prisoners released from

state prisons into community supervision, the binominal proportion and 95% confidence

interval were calculated as follows:

$$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} =$$

$$0.556 \pm 1.96\sqrt{\frac{0.357(1-0.357)}{6708}} =$$

$$0.556 \pm 1.96\sqrt{\frac{0.357(0.643)}{6708}} =$$

$$0.556 \pm 1.96\sqrt{\frac{0.229551}{6708}} =$$

$$0.556 \pm 1.96\sqrt{0.00003422} =$$

$$0.556 \pm 1.96(0.00585) =$$

$$0.556 \pm 0.11465 = 0.44135, 0.67065$$

Therefore, there was a 95% likelihood that between 44.135% and 67.065% of Black ex-prisoners released from state prisons would recidivate by re-imprisonment. It should be noted that much of the 95% confidence interval of Black ex-prisoners released from state prisons recidivating by re-imprisonment fell within the 95% confidence interval of White ex-prisoners released from state prisons recidivating by re-imprisonment.

Explanatory studies. Explanatory studies of race and recidivism risk in which differences or similarities between White and Black recidivism are explained through the analysis of variables other that race. Aldigé Hiday et al. (2015) conducted one such study. Specifically, Aldigé Hiday et al. calculated the recidivism risk of minority status (that is, not being White) only for individuals who had participated in mental health courts and after controlling for the possible influence of gender, age, drug use history, and number of prior arrests. After delimiting analysis to individuals who had attended mental health courts, and after controlling for the covariates of interest, Aldigé Hiday et al. found that

not being White was not a significant predictor of recidivism, $HR = 0.77 \ (0.47, 1.27)$, $p >$ .05. Aldigé Hiday et al.'s study thus offered some confirmation for the hypothesis that race is no longer a significant predictor of recidivism given the sentencing pathway (for example, through the use of mental health courts or drug courts) through which an offender enters the criminal justice system. More specifically, Aldigé Hiday et al.'s findings suggest that there is no intrinsic element of race that is associated with greater or lesser likelihood of recidivism; once the proper covariates are accounted for, race is no longer a significant predictor.

Skinner-Otei and Stepteau-Watson (2018) conducted a qualitative study on the experiences of a subgroup, that of African American fathers, after release from prison. Although the work of Skinner-Otei and Stepteau-Watson was not statistical in nature, the findings of these researchers are still relevant explanations of the phenomenon of recidivism as it influences African American males in particular. Specifically, Skinner-Otei and Stepteau-Watson found that, after their release from prison, African American fathers experience high levels of social stress, ongoing self-identification with behaviors or social affiliations that constitute crime risks, and unaddressed childhood trauma. Skinner-Otei and Stepteau-Watson speculated that, if estimates of higher recidivism risk among African American in particular are accurate, then one possible reason for this population's higher vulnerability to recidivism is high post-release stress, destructive self-identification, and unaddressed childhood trauma. If Skinner-Otei and Stepteau-Watson's qualitative findings can indeed be generalized to African American fathers, then, translated into statistical terms, post-release stress, destructive self-identification,

and unaddressed childhood trauma could be the mediators of higher recidivism risk in this population.

One possible explanation of higher recidivism rates for ex-Black prisoners is psychological in nature. If, for example, Black prisoners possess significantly higher levels of a particular psychological trait, such as psychopathy, that is more likely to predict recidivism (Anderson, Walsh, & Kosson, 2018), then one possible explanation of racial differences in recidivism rates can be based in psychological attributes that are differentially distributed by race. Anderson et al.'s study quantitative study was based on comparing the relationship between psychopathy and recidivism in three distinct racial groups of ex-prisoners. Anderson et al.'s analysis provided two potential explanations of the role of psychopathy in recidivism. First, had Anderson et al. found that levels of psychopathy differed significantly across races, and that there was a statistically significant and positive relationship between psychopathy and recidivism, then it could be included that an apparent effect of race on recidivism might actually be the disguised effect of psychopathy. Second, had Anderson et al. found that levels of psychopathy did not differ significantly between the races, but the strength of the relationship between psychopathy and recidivism risk differed between the races, one possible conclusion could be that criminally psychotic behaviors are more likely to be punished (via re-arrest, re-imprisonment, or other means) for members of certain races. Therefore, the inclusion of psychopathy in an otherwise race-based analysis of recidivism offers opportunities for further explanation and analysis of the race-recidivism link.

Anderson et al. (2018) measured psychopathy on the Hare Psychopathy Checklist-Revised (PCL-R) (Hare, 1991). Anderson reported distributional statistics on the PCL-R for White ex-prisoners ($M = 23.38$, $SD = 6.96$), Black ex-prisoners ($M = 22.99$, $SD = 7.32$), and Latino ex-prisoners ($M = 23.25$, $SD = 7.16$). Anderson et al. did not conduct an analysis of variance (ANOVA) to formally measure the effect of race on psychopathy scores, but the descriptive statistics and sample sizes for White ex-prisoners ($n = 163$) and Black ex-prisoners ($n = 172$) provided by Anderson et al. allow the calculation of a t statistic and corresponding p value to determine whether the psychopathy rates of Black and White ex-prisoners were similar. The t statistic of comparison between White and Black psychopathy scores is 0.50, $p = .6180$, $df = 333$. Therefore, Anderson et al.'s data suggested the absence of a statistically significant difference in Black and White psychopathy scores, which, in turn, suggests that racial differences in mean psychopathy cannot account for race-based variation in the recidivism rate.

Next, Anderson et al. (2018) reported the same logistic regression exponent value, 1.03, as a predictor of White and Black ex-prisoners' recidivism as a function of psychopathy. The practical interpretation of this finding is that both the strength and statistical significance of the link between psychopathy and recidivism were essentially the same regardless of whether ex-prisoners were Black or White. Therefore, based on Anderson et al.'s finding, it appears that neither greater levels of psychopathy or a stronger link between psychopathy and recidivism risk can explain the presence or

absence of the kinds of race-based effects of recidivism that are summarized in Table 1 below.

Another possible reason for racial differences in recidivism rates is trauma (Maschi, Morgen, Leibowitz, & Rees, 2018). Maschi et al. hypothesized that recidivism among older ex-prisoners could be modeled through the interaction between two variables, minority status and objective trauma. The conceptual basis for Maschi et al.'s work is the well-documented history of structural racism in the United States, which has imposed greater psychological, socioeconomic, and physiological strains on Black Americans in particular (Bass, 2014; Gibson, Wilson, Haight, Kayama, & Marshall, 2014; Graham, West, & Roemer, 2013; Greer, Brondolo, & Brown, 2014; Han et al., 2015; Inwood, 2015; Stevens-Watkins, Perry, Pullen, Jewell, & Oser, 2014). Maschi et al. theorized that all minorities, but perhaps Black Americans in particular, would, through a combination of greater trauma accumulation and other social and individual factors, be likely to recidivate. However, Maschi et al. found that the interaction variable of trauma and minority status was not a statistically significant predictor of higher recidivism risk among older American ex-prisoners. Because Maschi et al.'s results were delimited to older ex-prisoners, the empirical findings did not necessarily invalidate Maschi et al.'s claim. It might be the case that trauma has a differential effect on the recidivism rates of, for example, younger ex-prisoners than those included in Maschi et al.'s dataset.

Time and Recidivism Risk

One of the potential predictors of variation in recidivism risk is that of race, a hypothesis tested by Skeem and Lowenkamp (2016). However, race is one of several possible predictors of variable recidivism risk. There is also evidence that time is a predictor of variability in recidivism risk, such that ex-offenders are at progressively lower risks of recidivating the longer they are released.

Flores et al. (2017) carried out a study that applied hazard ratios to the analysis of recidivism risk. Specifically, Flores et al. examined a cohort of 27,156 federal prisoners, each of whom had been released at least 10 years before Flores et al.'s study. Thus, one of the strengths of Flores et al.'s study was the ability of the authors to measure recidivism risk not merely in the short term, but also in the long term. For example, whereas Skeem and Lowenkamp (2016) measured recidivism risk across a period of only 12 months, Flores et al. were able to measure recidivism risk across a period of nine years. Flores et al. provided separate risk estimates for each month from one month to twelve months, then risk estimates in increments of one year until nine years. Using a Cox regression framework accompanied by 95% confidence intervals, Flores et al. found that almost half (48.7%) of the cohort had been re-arrested within nine years and also presented separate hazard ratio estimates for each month (in the first 12 months) and years (for years two through nine) in the model.

Gaps in the Empirical Research

Flores et al. (2017, p. 130) provided a hazard ratio table, including both points and 95% confidence intervals, of the kind briefly described in Chapter 1 and discussed in

detail in Chapter 3. This hazard ratio table provided estimated a simply interpreted measure of risk that can be applied by probation officers and other administrative personnel with the responsibility for assessing, and attempting to reduce, the risk of ex-offenders. However, the hazard ratio table generated by Flores et al. was not sorted by race; it applied to an entire cohort of offenders. On the other hand, Skeem and Lowenkamp (2016) analyzed recidivism risk as a function of race, but did not render this recidivism risk into either odds ratios or hazard ratios; in addition, Skeem and Lowenkamp's data analysis ceased analysis at month 12 after release. Therefore, the main gap in the existing research is the absence of combined hazard ratio and long-observation period analyses. However, even if existing studies presented hazard ratios extracted from longer observation periods, both the substantial disagreement between current studies and the absence of properly accommodated covariates (such as most serious arrest offense) justify further empirical analysis.

Summary of Relevant Findings

Table 1 below contains an overview of findings on White and Black ex-prisoners' recidivism risks.

Table 1

Summary of Key Empirical Findings on Race and Recidivism Risk

Study	White Recidivism Risk	Black Recidivism Risk	Statistically Significant Difference at $p < .05$?	Measure of Recidivism	Population
Olson et al. (2016)	0.97 of Black recidivism risk	1.03 of White recidivism risk	No	Re-arrest	Females, Illinois state prisons
Olson et al. (2016)	0.49 of Black recidivism risk	1.51 of White recidivism risk	Yes	Re-arrest	Males, Illinois state prisons
Olson et al. (2016)	0.54 of Black recidivism risk	1.46 of White recidivism risk	Yes	Re-arrest (for violent offense)	Females, Illinois state prisons
Olson et al. (2016)	0.77 of Black recidivism risk	1.23 of White recidivism risk	No	Re-arrest (for violent offense)	Males, Illinois state prisons
Lockwood et al. (2015)	Between 42.86% and 46.74%	Between 48.97% and 52.11%	No	Re-arrest	Indiana state prisons
Durose et al. (2014)	Between 68,52% and 69.09%	Between 73,75% and 74.25%	Yes	Re-arrest	Federal prison and prisons from 30 states
Durose et al. (2014)	Between 19.06% and 19.54%	Between 38,68% and 40.72%	Yes	Re-arrest (for violent offense)	Federal prison and prisons from 30 states
Markman et al. (2016)	Between 38.68% and 40.72%	Between 40.44% and 70.96%	Yes	Re-arrest	Federal prisons, released into community supervision
Markman et al. (2016)	Between 72.18% and 74.02%	Between 79.65% and 81.55%	No	Re-arrest	Prisons from 30 states, released into community supervision
Markman et al. (2016)	Between 24.41% and 28.00%	Between 24.23% and 47.16%	No	Re-imprisonment	Federal prisons, released into community supervision
Markman et al. (2016)	Between 52.16% and 54.24%	Between 44.14% and 67.07%	No	Re-imprisonment	Prisons from 30 states, released into community supervision

Conclusion

The main purpose of this chapter was to present, describe, critically analyze, and synthesize previous empirical studies on recidivism, particularly studies in which race is a predictive factor. The secondary purpose of this chapter was to present a discussion of theoretical frameworks that can account for recidivism, and, in particular, for the existence of statistically significant differences in recidivism levels between races. The chapter was subdivided into four main sections. First, a historical overview of the phenomena of incarceration and recidivism in the United States was provided. Second, theories relevant to recidivism were discussed. Third, relevant empirical studies were described, analyzed, and synthesized. Fourth, gaps in the empirical literature were noted.

Expressed in terms of the previous literature, the purpose of the current study, as discussed and justified in greater detail in Chapter 3, is to generate Flores et al.'s (2017, p. 130) hazard rates table, except on the basis of race. Flores et al. generated a single hazard rate table for all offenders in their sample, whereas, in the current study, the hazard rate tables will compare Black and White ex-offenders. In its emphasis on both race and race-matching, the current study builds upon the framework utilized by Skeem and Lowenkamp (2016). Skeem and Lowenkamp noted both the policy and the practical necessity of treating race as a potential differential factor in recidivism risk, given the social justice ramifications of disproportionate representative of Black people in the American criminal justice system. In addition, Skeem and Lowenkamp demonstrated methods of matching White and Black cohorts so that, when attempting to measure the possible effect of race on recidivism risk, the possible statistical influence of variables

such as age, gender, and arresting offense is already controlled for. By providing a new

estimate of *OR*s, the study also contributes to the ongoing determination of whether

Black and White recidivism rates are statistically significant, an assessment that (see

Table 1) is not yet the subject of consensus in the empirical literature.

Chapter 3: Research Method

Introduction

The purpose of Chapter 3 is to present the methodology of the study. The chapter has been structured as follows. First, the quantitative research methodology utilized for the study has been described and justified in comparison to the use of qualitative and mixed-methods approaches. Second, the research design of the study and corresponding rationale has been described. Third, the research questions and hypotheses of the study have been restated. Fourth, there is a discussion of instrumentation and measurement. Fifth, data collection procedures have been discussed. Sixth, the data analysis plan for the study has been explained and justified. Seventh, there is a discussion of the ethical components of the study. Eighth, the validity and reliability of the study design have been addressed.

Research Methodology

There are three commonly recognized approaches to research methodology: Quantitative, qualitative, and mixed methods. The main hallmarks of quantitative methodology are: (a) The mathematical operationalization of a variable or variables, (b) the use of statistical techniques to measure the magnitude and significance of variable measurements and relationships between variables, and (c) the methodological assumption that reality is measurable (Creswell, 2015). The main hallmarks of qualitative methodology are: (a) An exploration of subjective realities, (b) an assumption that the measurement of reality depends on the variable and non-mathematically analyzable perspectives of people, and (c) the use of context-dependent forms of data collection and

analysis rather than context-free approaches such as those found in quantitative analysis (Creswell, 2015). Finally, mixed-methods studies combine the orientations of quantitative and qualitative analysis (Creswell, 2015).

The research method chosen for this study was quantitative. The quantitative method was chosen because the identified problem is a lack of knowledge of the odds of risk of recidivism for released prisoners. Because odds are mathematical concepts and require calculation (Szumilas, 2010), only quantitative methods can address the problem identified in the study.

Research Design

The research design is correlational in nature. Correlational research design has been defined as follows:

> The variables included in correlational research are isolated and measured by the investigator, but they are characteristics that occur naturally in the subjects…a correlation study consists of establishing a relationship between variations in the *X* variable to variations in the *Y* variable. (Keppel, Saufley, & Tokunaga, 1992, p. 460).

In this study, recidivism is the *Y* (criterion) variable, race is the main *X* (predictor) variable, and both recidivism and race are naturally occurring and subject to neither experimental nor quasi-experimental manipulation. Therefore, the study cannot be structured as an experiment or quasi-experiment. In the absence of a survey, the study also cannot apply a survey design. Only a correlational study design corresponds to the characteristics of the study. The research design is, additionally, both secondary and

archival (Creswell, 2015) in nature. The design is secondary because the data are not original. The design is archival because the secondary data are maintained in a publicly accessible data archive by the government of the United States.

Restatement of Research Questions and Hypotheses

The research questions and hypotheses of the study have been restated below. The level of statistical significance chosen in the study is .05. The means of collecting and analyzing data relevant to the research questions have been discussed below.

RQ1: For males whose most serious commitment offense was homicide, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

HI_0: For males whose most serious commitment offense was homicide, and who had 10 or more prior arrests, race does not significantly differ as a predictor of recidivism.

HI_A: For males whose most serious commitment offense was homicide, and who had 10 or more prior arrests, race does significantly differ as a predictor of recidivism.

RQ2: For males whose most serious commitment offense was rape / sexual assault, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

H2_0: For males whose most serious commitment offense was rape / sexual assault, and who had 10 or more prior arrests, race does not significantly differ as a predictor of recidivism.

H2_A: For males whose most serious commitment offense was rape / sexual assault, and who had 10 or more prior arrests, race does significantly differ as a predictor of recidivism.

RQ3: For males whose most serious commitment offense was robbery, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

H3_0: For males whose most serious commitment offense was robbery, and who had 10 or more prior arrests, race does not significantly differ as a predictor of recidivism.

H3_A: For males whose most serious commitment offense was robbery, and who had 10 or more prior arrests, race does significantly differ as a predictor of recidivism.

RQ4: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

H4_0: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.

H4_A: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, race does significantly differ as a predictor of recidivism.

RQ5: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

H5_0: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.

H5_A: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, race does significantly differ as a predictor of recidivism.

RQ6: For males whose most serious commitment offense was robbery, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?

H6_0: For males whose most serious commitment offense was robbery, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.

H6_A: For males whose most serious commitment offense was robbery, and who had 6 or more prior arrests, race does significantly differ as a predictor of recidivism.

Instrumentation and Measurement

The instrument of the study is the PRAT database (BJS, 2018). The PRAT database tracks recidivism outcomes as well as other variables related to individual offenders. PRAT tracks the outcomes of over 100,000 individuals released from prison in 30 states in 2005 and tracked for their recidivism status over the next 60 months, on a month-by-month basis. PRAT defines recidivism in terms of being re-arrested, regardless of the offense. PRAT, access to which is open to the public, sorts recidivism data by the following categories:

- Age at Release: Divided into 24 or younger, 25 to 29, 30 to 34, 35 to 39, 40 or older, and missing.

- Sex: Divided into male, female, and missing.

- Race / Hispanic Origin: Divided into White, Black / African American, Hispanic / Latino, and Other.

- Number of Prior Arrests: Divided into 4 or fewer, 5 to 9, and 10 or more.

- Most Serious Commitment Offense: Divided into homicide, assault, larceny and motor vehicle theft, drug trafficking, weapons, rape / sexual assault, other violent crime, fraud / forgery, drug possession, DUI, robbery, burglary, other property crime, other drug crime, and other public order crime.

Recidivism is reported as a percentage of prisoners in a total category recidivating by month. For example, if none of the PRAT characteristics are selected, then the database will return 60-month recidivism outcomes for all prisoners. PRAT also returns recidivism data based on any conceivable combination of the ex-prisoner characteristics disclosed above. Data extracted from PRAT in Excel format will be copy-and-pasted into Stata for analysis utilizing the code and analytical strategy subsequently discussed in this chapter.

Data Collection

Data will be collected from PRAT (BJS, 2018). Table 2 indicates how data will be collected for each of the research questions of the study.

Table 2

Data Collection Plan

Research Question	Data Collection Plan: Group A	Data Collection Plan: Group B
RQ1: For males whose most serious commitment offense was homicide, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?	• Whites • Males • Committers of homicide • 10 or more arrests	• African Americans • Males • Committers of homicide • 10 or more arrests
RQ2: For males whose most serious commitment offense was rape / sexual assault, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?	• Whites • Males • Committers of rape / sexual assault • 10 or more arrests	• African Americans • Males • Committers of rape / sexual assault • 10 or more arrests
RQ3: For males whose most serious commitment offense was robbery, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?	• Whites • Males • Committers of robbery • 10 or more arrests	• African Americans • Males • Committers of robbery • 10 or more arrests
RQ4: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?	• Whites • Males • Committers of homicide • 4 or fewer arrests	• African Americans • Males • Committers of homicide • 4 or fewer arrests
RQ5: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?	• Whites • Males • Committers of rape / sexual assault • 4 or fewer arrests	• African Americans • Males • Committers of rape / sexual assault • 4 or fewer arrests
RQ6: For males whose most serious commitment offense was robbery, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism?	• Whites • Males • Committers of robbery • 4 or fewer arrests	• African Americans • Males • Committers of robbery • 4 or fewer arrests

Data Analysis

The same form of data analysis, that of hazard rate calculation, will be applied to each of the research questions of the study. A hazard rate is an estimate of the likelihood of an event of interest (typically, a negative event, such as recidivism or death) evaluated from the perspective of a comparison (Cox, 2018). The Cox proportional hazards model (Cox, 2018) reports a coefficient value that represents the rate of a hazard in one group in comparison to another group. The concept of comparison underlying the Cox proportional model is based on the coefficient value of 1. When a Cox proportional hazard is 1, the interpretation is that the hazard of a particular event is exactly the same between comparison groups. A Cox proportional hazards coefficient of 2 suggests that a particular hazard is 2 times as likely to afflict one group in comparison to another group. Finally, a Cox proportional hazards coefficient of 0.5 suggests that a particular hazard is 0.5 times as likely to afflict one group in comparison to another group. Whatever value a Cox hazards coefficient—which can also be defined as the *OR* of an event—takes, it is accompanied by a *p* value indicating whether, at a chosen Alpha, the estimate is significant (Cox, 2018).

The analytical logic of the research questions of the study is based on assembling groups for comparison based on a 60-month comparison of recidivism. For RQ1, Group A consists of African American males whose most serious commitment offense was homicide and who had 10 or more prior arrests, and Group B consists of White males whose most serious commitment offense was homicide and who had 10 or more prior

arrests. For RQ1, the two groups have been matched by gender, most serious commitment offense, and number of prior arrests; the only variable that differs between the groups is race. Therefore, for RQ1, the Cox proportional hazards coefficient will determine whether there is a statistically significant difference in recidivism risk between (a) African American males whose most serious commitment offense was homicide and who had 10 or more prior arrests and (b) White males whose most serious commitment offense was homicide and who had 10 or more prior arrests.

The first step in analyzing RQ1 is to utilize the PRAT database to generate 60-month recidivism estimates for (a) African American males whose most serious commitment offense was homicide and who had 10 or more prior arrests and (b) White males whose most serious commitment offense was homicide and who had 10 or more prior arrests. For RQ1, PRAT generates the number of people, in each group, who recidivated in each of months 1-60 after their release from prison. The same procedure will be applied to each of the RQs, assembling the race-differing comparison groups described in the research groups and tabulated in Table 2 above. After obtaining the data, they will be fit a Cox proportional hazards ratio in Stata, using the following variable names; this procedure will be repeated separately for RQs 1-6:

time: The month in which recidivism was observed to take place or not take place

nrecid: The percentage of individuals who recidivated in each month

race: The race of recidivists, coded as 0 for White and 1 for African American

The Stata code for analysis will be as follows:

ct

cttost
stcox i.race

The first command, ct, signals Stata that count data (that is, data on the percentage or number of individuals in each month rather than data on individuals) are at the basis of the Cox regression. The second command, cttost, converts the data into a format suitable for survival analysis commands. Finally, stcox i.race calculates the hazard ratio of recidivism on the basis of race. If the hazard ratio is significant, at $p < .05$, and the hazard ratio is greater than 1 (note that Cox regression will return a p value for hazard ratios), it can be concluded that African Americans are at greater cumulative risk of recidivating than Whites. The reason that the hazard ratio has to be over 1 is that, (a) in the coding for race, African American is coded as 1, and White is coded as 0; and (b) in the coding for recidivism, 1 is recidivism and 0 is non-recidivism. In this context, a hazard ratio greater than 1 means that African Americans are more likely to recidivate than Whites. Had the coding been changed to White = 1, African American = 0, while keeping the coding for recidivism the same, then a hazard ratio below 1 (assuming $p < .05$) would indicate that African Americans were likely to recidivate. The hazard ratio of 1 is therefore merely a statistical artifact of deciding to code African Americans and recidivism as 1 and Whites and non-recidivism as 0. Again, because the other characteristics of prisoner comparison groups are kept equal (see Table 2), the Cox regression will calculate the extent to which race is a significant factor in recidivism.

Ethical Concerns

The ethical concerns of the study are minimal. The data are not from identifiable subjects and already exist in the public domain. The only applicable ethical concern is responsible use of the available data to generate scholarship that can be of practical use in law enforcement contexts, in alignment with the APA Ethics Code 's (APA, 2019) research and publication section. IRB approval will be obtained from Walden University before data collection.

Reliability and Validity

Both the reliability and validity of the study are bolstered through the existence of a very large-sample PRAT (BJS, 2018) dataset. PRAT tracked the outcome of over 100,000 Americans released from 30 states' prisons in 2005, suggesting the likelihood that this database represents a true cross-section of American prisoners. Findings based on PRAT are likely to be reliable in terms of yielding estimates that are similar to those yielded by other large-sample studies. The validity of PRAT is somewhat limited by the fact that only one type of recidivism (re-arrest) is tracked. However, this particular limitation cannot be avoided.

Conclusion

The purpose of Chapter 3 was to present and describe the rationale of the methodology of the study. Chapter 3 was structured as follows. First, the quantitative research methodology utilized for the study was described and justified in comparison to the use of qualitative and mixed-methods approaches. The identified research problem, that of ignorance of the odds of recidivism risk for specific individuals, was highlighted

as the primary justification for the choice of quantitative methods Second, the research

design of the study was described and defended. A secondary, correlational design was

identified as being suited to the study. Third, the research questions and hypotheses of

the study were restated. Fourth, there was a discussion of instrumentation and

measurement with an emphasis on units of measurement and an identification of

variables. Fifth, data collection procedures were discussed with specific reference to the

PRAT database. Sixth, the data analysis plan for the study was explained and justified,

including a discussion of the specific approaches to testing the hypotheses, the chosen

statistical method of hazard ratio calculation, and the necessary Stata syntax to be applied

to the raw data. Seventh, there was a discussion of the ethical components of the study,

with specific emphasis on the lack of human subjects and the archival nature of the

research. Eighth, the validity and reliability of the study design were addressed with

reference to both the dataset and the statistical procedures applied to the dataset. Chapter

4 will present the findings aligned with the research methods and designs described and

justified in Chapter 3.

Chapter 4: Results

Introduction

The specific problem identified in the study was, in the absence of more detailed risk analyses based on time to recidivism, parole officers, parole boards, and mental health professionals may be somewhat limited in determining risk of recidivism. The purpose of this archival study using secondary data was to estimate monthly recidivism hazard rates for individuals released from prison on the basis of variation in race (African American and White), after controlling for gender, across various combinations of number of prior arrests, and most serious arresting offense, and to test for significant differences based on race in recidivism hazard rates. The purpose of Chapter 4 is to analyze and report the results of recidivism risk analysis on the basis of six research questions.

In order to achieve its purpose, Chapter 4 has been structured as follows. First, each of the research questions of the study has been answered in sequence and with accompanying graphical and statistical support. Second, the results of the study have been summarized.

Results

The results of the study have been presented in order of the research questions. Each research question has been answered by means of a calculation and evaluation of Cox proportional hazards ratios. For each research question, comparative hazard graphics are provided.

RQ1 Results

RQ1 was as follows: For males whose most serious commitment offense was homicide, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism? Figure 1 is a visual representation of the proportional hazard estimate for RQ1. Figure 1 plots the cumulative hazard of recidivating as a function of (a) race and (b) months since release. African American males with 10 or more prior arrests and who had committed homicide were significantly more likely to recidivate than White males with 10 or more prior arrests and who had committed homicide, *Cox hazard ratio* = 1.29, *p* < .001.
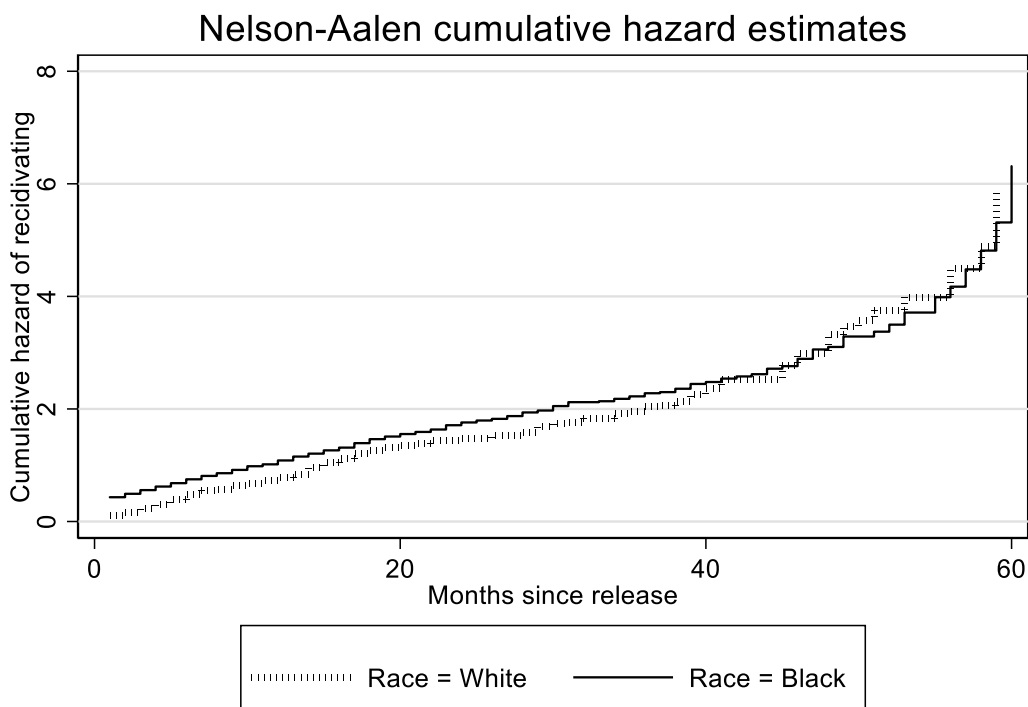

Figure 1. Cumulative hazard graph, RQ1. *Note*: The cumulative hazard of recidivating is plotted as a function of both race and months since release.

The Cox proportional hazard statistic for African Americans in RQ1 was 1.29 (with a 95% *CI* between 1.17 and 1.41), indicating that, over a 60-month period, African American males with 10 or more prior arrests and who had committed homicide were 1.29 times as likely to recidivate as White males with 10 or more prior arrests and who had committed homicide. For males whose most serious commitment offense was homicide, and who had 10 or more prior arrests, race may serve as a predictor of recidivism. The risk of recidivism for the White subgroup was below that of the African American subgroup until month 47, after which the risk of recidivism for the White subgroup outstripped that of the African American subgroup.

RQ2 Results

RQ2 was as follows: For males whose most serious commitment offense was rape / sexual assault, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism? Figure 2 is a visual representation of the proportional hazard estimate for RQ2. Figure 2 plots the cumulative hazard of recidivating as a function of (a) race and (b) months since release. African American males with 10 or more prior arrests and who had committed rape / sexual assault were significantly less likely to recidivate than White males with 10 or more prior arrests and who had committed rape / sexual assault, *Cox hazard ratio* = 0.87, *p* < .001.
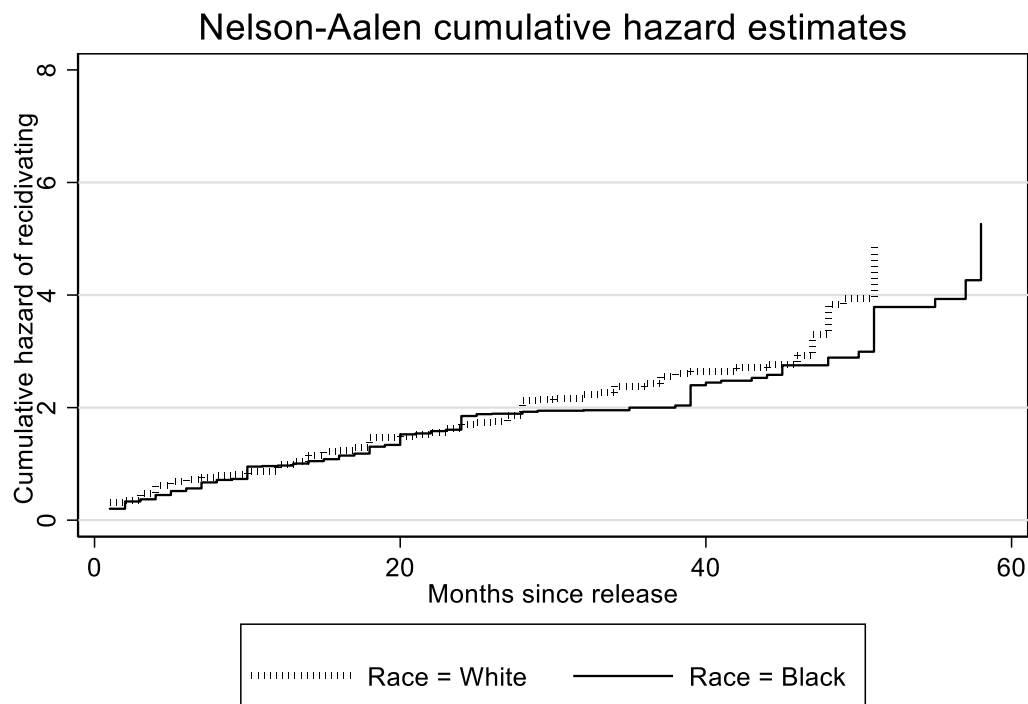
Figure 2. Cumulative hazard graph, RQ2. *Note*: The cumulative hazard of recidivating is plotted as a function of both race and months since release.

The Cox proportional hazard statistic for African Americans in RQ2 was 0.87 (with a 95% *CI* between 0.81 and 0.86), indicating that, over a 60-month period, African American males with 10 or more prior arrests and who had committed rape / sexual assault were only 0.87 times as likely as White males with 10 or more prior arrests and who had committed rape / sexual assault to recidivate. For males whose most serious commitment offense was rape / sexual assault, and who had 10 or more prior arrests, race may serve as a predictor of recidivism. The risk of recidivism for the White subgroup was below that of the African American subgroup until month 29, after which the risk of recidivism for the White subgroup outstripped that of the African American subgroup.

RQ3 Results

RQ3 was as follows: For males whose most serious commitment offense was robbery, and who had 10 or more prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism? The null hypothesis for RQ3, that of a non-significant difference between the two comparison groups, could not be rejected, *Cox hazard ratio* = 0.98, *p* = .744. Because of the absence of a significant difference, no cumulative hazard plot was generated for RQ3, as such a plot would not have been informative.

RQ4 Results

RQ4 was as follows: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism? Figure 3 is a visual representation of the proportional hazard estimate for RQ4. Figure 3 plots the cumulative hazard of recidivating as a function of (a) race and (b) months since release. African American males with 4 or fewer prior arrests and who had committed homicide were significantly less likely to recidivate than White males with 4 or fewer prior arrests and who had committed homicide, *Cox hazard ratio* = 0.84, *p* = .009.
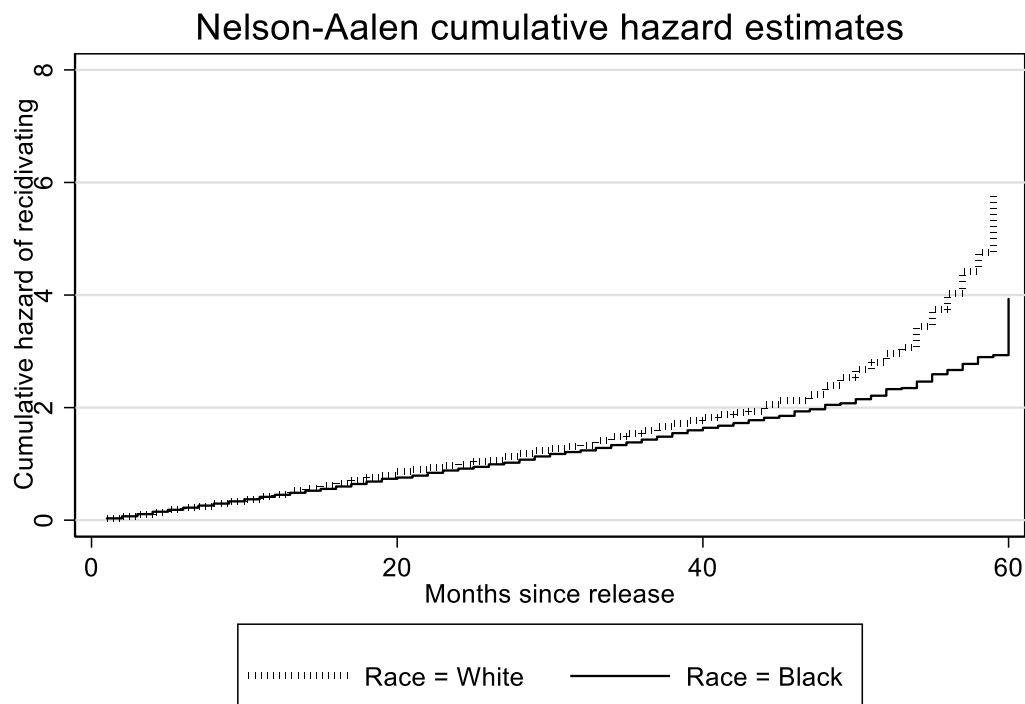
Nelson-Aalen cumulative hazard estimates

Figure 3. Cumulative hazard graph, RQ4. *Note*: The cumulative hazard of recidivating is plotted as a function of both race and months since release.

The Cox proportional hazard statistic for African Americans in RQ4 was 0.84 (with a 95% *CI* between 0.74 and 0.96), indicating that, over a 60-month period, African American males with 10 or more prior arrests and who had committed homicide were only 0.84 times as likely as White males with 10 or more prior arrests and who had committed homicide to recidivate. For males whose most serious commitment offense was homicide, and who had 4 or more prior arrests, race may serve as a predictor of recidivism. The risk of recidivism for the White subgroup was below that of the African American subgroup until month 17, after which the risk of recidivism for the White subgroup outstripped that of the African American subgroup.

RQ5 Results

RQ5 was as follows: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism? The null hypothesis for RQ5, that of a non-significant difference between the two comparison groups, could not be rejected, *Cox hazard ratio* = 0.97, *p* = .585. Because of the absence of a significant difference, no cumulative hazard plot was generated for RQ5, as such a plot would not have been informative.

RQ6 Results

RQ6 was as follows: For males whose most serious commitment offense was robbery, and who had 4 or fewer prior arrests, does race (African American vs. White) significantly differ as a predictor of recidivism? The null hypothesis for RQ6, that of a non-significant difference between the two comparison groups, could not be rejected, *Cox hazard ratio* = 1.01, *p* = .775. Because of the absence of a significant difference, no cumulative hazard plot was generated for RQ6, as such a plot would not have been informative.

Summary of Results

The results of the study have been summarized in Table 3 below. The results can be synopsized as follows. First, male African Americans were more likely than male Whites to recidivate when having 10 arrests and having committed homicide. Second, male African Americans were less likely than male Whites to recidivate when (a) having 10 or more prior arrests and having committed rape / sexual assault or (b) having 4 or

fewer arrests and having committed homicide. Finally, there were three cases in which

recidivism risk was identical for male African Americans and male Whites: (a) Having

10 or more prior arrests and having committed robbery, (b) having 4 or fewer arrests and

having committed rape / sexual assault, and (c) having 4 or fewer arrests and having

committed robbery. These results add to the hitherto limited empirical literature on

recidivism risk as a function of race after controlling for criminal history and have been

discussed in detail in Chapter 5.

Table 3

Summary of Results

RQ #	Null Hypothesis	Results
1	H1_0: For males whose most serious commitment offense was homicide, and who had 10 or more prior arrests, race does not significantly differ as a predictor of recidivism.	*Null rejected*; African American males with 10 or more prior arrests and who had committed homicide were significantly more likely to recidivate than White males with 10 or more prior arrests and who had committed homicide, *Cox hazard ratio* = 1.29, *p* < .001.
2	H2_0: For males whose most serious commitment offense was rape / sexual assault, and who had 10 or more prior arrests, race does not significantly differ as a predictor of recidivism.	*Null rejected;* African American males with 10 or more prior arrests and who had committed rape / sexual assault were significantly less likely to recidivate than White males with 10 or more prior arrests and who had committed rape / sexual assault, *Cox hazard ratio* = 0.87, *p* < .001.
3	H3_0: For males whose most serious commitment offense was robbery, and who had 10 or more prior arrests, race does not significantly differ as a predictor of recidivism.	*Null not rejected;* African American males with 10 or more prior arrests and who had committed robbery were as likely to recidivate as White males with 10 or more prior arrests and who had committed robbery, *Cox hazard ratio* = 0.98, *p* = .744.
4	H4_0: For males whose most serious commitment offense was homicide, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.	*Null rejected;* African American males with 4 or fewer prior arrests and who had committed homicide were significantly less likely to recidivate than White males with 4 or fewer prior arrests and who had committed homicide, *Cox hazard ratio* = 0.84, *p* = .009.
5	H5_0: For males whose most serious commitment offense was rape / sexual assault, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.	*Null not rejected;* African American males with 4 or fewer prior arrests and who had committed rape / sexual assault were as likely to recidivate as White males with 4 or fewer prior arrests and who had committed rape / sexual assault, *Cox hazard ratio* = 0.97, *p* = .585.
6	H6_0: For males whose most serious commitment offense was robbery, and who had 4 or fewer prior arrests, race does not significantly differ as a predictor of recidivism.	*Null not rejected;* African American males with 4 or fewer prior arrests and who had committed robbery were as likely to recidivate as White males with 4 or fewer prior arrests and who had committed robbery, *Cox hazard ratio* = 1.01, *p* = .775.

Chapter 5: Conclusion

Introduction

The purpose of this archival study using secondary data is to estimate monthly recidivism hazard rates for individuals released from prison on the basis of variation in race (African American and White), after controlling for gender, across various combinations of number of prior arrests, and most serious arresting offense, and to test for significant differences based on race in recidivism hazard rates. The purposes of the concluding chapter are to discuss the findings of the study as they relate to past theories and empirical findings, present the implications of the findings, make recommendations for practice and future scholarship, and acknowledge the limitations of the study. Each of these purposes have been addressed separately.

Discussion of Findings

According to analysis of hazard ratios in Chapter 4 (Cox, 2018), recidivism risk as a function of race was shown to be non-monolithic as indicated by rejection of the null hypothesis in only some cases. For example, among those who have committed homicide and who have been arrested 10 or more times, African-American men were shown to be more likely to recidivate than White men, yet among those who have committed rape and who have been arrested 10 or more times African-American men were shown to be less likely to recidivate than White men.

Previous empirical findings discussed in Chapter 2 indicated differing assessments of recidivism risk as a function of race. In some findings, being African-American was associated with a higher risk of recidivism; in other findings, being White

was associated with a higher risk of recidivism. For example, Olson et al. (2016) found

that, among males who were released from Illinois state prisons, being African-American

was associated with 1.51 times the recidivism risk of being White. However, in the same

study, Olson et al. found that race was not a significant predictor of recidivism risk for

female prisoners released from Illinois state prisons. Markman et al. (2016) also reached

mixed findings about the significance of race as a predictor of recidivism risk.

        In none of the previous studies summarized in Chapter 2 did researchers create

the kinds of clusters that were utilized in the current study; instead, all available African-

American recidivism outcomes were compared to all available White recidivism

outcomes. As noted in Chapter 2, the existence of disparate findings on the topic of race

as a predictor of recidivism risk is somewhat confusing, because the theoretical and

criminological literature suggests that African-American rates of arrest and re-arrest are

higher, whether because of factors such as institutional racism and selective law

enforcement or socio-behavioral factors documented in the existing literature (Bass,

2014; Gibson et al., 2014; Graham et al., 2013; Greer et al., 2014; Han et al., 2015;

Inwood, 2015; Stevens et al., 2014).

        The findings provided in Chapter 4 offer a means to reconcile the previous

empirical findings indicating race is an unstable predictor of recidivism risk. Specifically,

the findings in Chapter 4 indicate that race might be a factor in certain types of recidivism

and not others. Examination of Cox hazard ratios showed, for H1, that African American

males with 10 or more prior arrests and who had committed homicide were significantly

more likely to recidivate than White males with 10 or more prior arrests and who had

committed homicide. Therefore, among men who have committed homicide and been arrested many times, being African-American is an independent risk factor in recidivism. For H2, it was found that African American males with 10 or more prior arrests and who had committed rape / sexual assault were significantly less likely to recidivate than White males with 10 or more prior arrests and who had committed rape / sexual assault. Therefore, among men who have committed rape and been arrested many times, being White is an independent risk factor in recidivism. For H4, it was found that African American males with 4 or fewer prior arrests and who had committed homicide were significantly less likely to recidivate than White males with 4 or fewer prior arrests and who had committed homicide. Therefore, among men with relatively few arrests who have committed homicide, being White is an independent risk factor in recidivism. For men who (a) had 10 or more prior arrests and had committed robbery (H3); (b) had 4 or fewer arrests and had committed rape (H5); and (c) had 4 or fewer arrests and had committed robbery (H6), race was not an independent predictor of recidivism risk.

<div align="center">**Assumptions and Limitations**</div>

Assumptions

One assumption was that the data were properly collected and recorded by BJS (2018). As the researcher did not collect the data or observe the manner in which the data were collected, it is not clear whether the data in PRAT were assembled according to best practices in research. Another assumption is that the data were appropriately inclusive of all individuals released from federal prisons in the United States in the time period in question.

Limitations

The study was limited by its covariates, which failed to include possible explanatory factors such as education level, age, and location. The study was also limited by its sample, which reflected a cross-section of the American federal prison population at a specific period in time. The study was also subject to the statistical limitations noted in Chapter 3. As a quantitative study, the study was limited by the inability to examine or explore possible reasons for racial disparities in recidivism rates.

Suggestions for Future Scholarship

If the findings of the current study are reliable and valid, then future scholars should attempt to explore and explain possible reasons for race as a predictor of recidivism risk based on type of criminal behavior. For example, it is unclear why, after crime- and arrest-matching, African-American males who have committed homicide, but not African-Americans who have committed sexual assault, should be more likely than White males to recidivate. Qualitative and case study research might be able to answer the question of why African-American males who have committed murder are more likely than White males to recidivate, yet African-Americans who have committed rape are less likely than White males to recidivate.

The use of different time-series analyses than those used here might assist future researchers in estimating risk at a point in time. As subsequently acknowledged, one of the limitations of the current study was the use of a hazards model that generates an aggregate assessment of risk across a particular period of time, beginning with the time of release and ending at 60 months after release. Parole officers in particular might benefit

from the existence of statistical models that can provide a recidivism risk estimate at a specific point in time (for example, between 12 and 13 months after release). Although the cumulative hazard graphs provided in Chapter 4 provide a rough assessment of recidivism risk at a specific period in time, these analyses cannot substitute for more robust time-series assessments of time-specific risk.

One approach that future researchers can utilize to provide point estimates of risk is to treat recidivism as a distribution. If the x axis of the distribution of recidivism outcomes is time in months after release, and if the y axis represents the proportion of people in a sample who recidivate, then a simple alternative to more formal time-based estimates of risk is to apply basic mathematics to the distribution. For example, assuming that (a) 67% of all released prisoners recidivate and (b) 3% of people who recidivate do so between months 3 and 4 after release, then the rough likelihood of recidivating between 3 and 4 months after release is simply (0.67)(0.03), or 2.01%.

However, this approach to generating a point estimate of risk (that is, an estimate of recidivism risk at a particular point in time) is rudimentary. Relatively extensive calculations would be required to generate different point estimates of risk for different profiles (for example, for White men with 10 or more arrests whose most serious previous offense was rape). One project that future researchers can consider is the creation of a Web interface that might allow users such as parole officers the ability to enter demographic information about a particular person (such as gender, number of previous arrests, and most serious previous crime, among other variables) and receive both a point estimate and cumulative risk estimate of that person's recidivism likelihood.

Suggestions for Practice

Some general suggestions for practice can be made on the basis of this study. First, parole officers and other stakeholders in the post-release outcomes of prisoners should not assume that individuals of one race are uniformly at greater risk of recidivating than individuals of another race. The present findings indicate race may be a factor for recidivism of some types of criminal behavior, but not others. Moreover, depending on past crimes and arrest records, being African-American can be associated with a lower recidivism risk than being White. Although the facts of structural inequality and racism create particularly challenging conditions for African-Americans who have been released from prison (Bass, 2014; Gibson et al., 2014; Graham et al., 2013; Greer et al., 2014; Han et al., 2015; Inwood, 2015; Stevens et al., 2014), taking an individual view of parolees and other ex-prisoners might be recommended for parole officers rather than ascribing a blanket risk value based on a single demographic factor such as race.

Second, the data analyses presented in Chapter 4 confirmed that, as noted in the previous literature (Durose et al., 2014), the risk for recidivism tends to be greatest soon after release. Parole officers and other stakeholders in the criminal justice system should therefore concentrate their anti-recidivism efforts on this period of time. In addition, parole officers can benefit from the time-based risk graphs presented in Chapter 4 to better pinpoint the periods during which relevant factors such as race might be a risk factor for the elevated risk of recidivism.

Overall, the present findings indicate race is likely to be a factor, but whether a substantial or monolithic factor in the determination of recidivism risk is undetermined.

Therefore, for any purpose of determining/reducing recidivism risk, race ought to be included in risk analyses and the relative predictability of other possible covariates of recidivism risk such as age, location, and education, should be further investigated. Moreover, the present findings indicate individuals who forecast recidivism risk, work directly with released prisoners, or advise the criminal justice system should be mindful of the variable roles of several factors, such as race, as a determinant of recidivism risk.

Limitations of the Study

This study was based on aggregate data and cannot explain or illuminate the reasons for race being or not being a risk factor in recidivism. In addition, only the variables of gender, number of previous arrests, and most serious previous crime were included as covariates in the study. It is likely that many other covariates help to explain the risk of recidivism, and possibly to the degree differences across race in recidivism risk might be a statistical artifact that disappears with the inclusion of more explanatorily powerful covariates. In addition, the Cox proportional hazards model is itself limited by the provision of a single estimate of risk aggregated across a particular period of time. Finally, the analysis was limited by the possibility that the methods of recording recidivism data by BJS (2018) changed over time.

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