DEPRIVATION, IMPORTATION, AND PRISON SUICIDE: THE COMBINED EFFECTS OF INSTITUTIONAL CONDITIONS AND INMATE COMPOSITION

by

MEREDITH P. HUEY

(Under the Direction of Thomas L. McNulty)

ABSTRACT

Previous research on suicide in U.S. prisons has focused the characteristics of inmates who commit suicide. These studies are largely descriptive, conducted within a single institution or department of correction, and overemphasize psychological explanations for suicide while ignoring the role of the prison environment. As a departure from prior research, this dissertation uses national data on 1,082 U.S. state prisons to examine how prison conditions, inmate composition, and their interaction predict prison suicide. More theoretically, the dissertation tests the deprivation and importation models of prison suicide. These historically competing perspectives respectively attribute suicide to either factors specific to the prison (deprivations) or characteristics that inmates bring with them (import) to prison. In testing these models, two analytic strategies are employed. First, prison suicide rates for each state are compared with the corresponding state rates for U.S. residents. Comparisons revealed that overall suicide rates in prison were slightly higher than those for the general community, but the difference was not statistically significant. Female inmate suicide rates, though, were substantially higher than the comparison rates for female U.S. residents (11.71 versus 5.03 per 100,000 population). Further analysis determined that prisons that experience female suicides were characterized by greater levels of deprivation (e.g., increased security levels, overcrowding, and violence) than those without suicide. In the second analytic approach, a series of negative binomial regression models are estimated, which capture the relative and combined effects of deprivation and importation indicators on the prison suicide count. The number of suicides was significantly increased in supermaximum and maximum security prisons (relative to minimum), under conditions of overcrowding and high levels of violence, and in prisons where a greater proportion of inmates received mental health services. Results of these analyses pointed to the combined effects of institutional conditions (security level, overcrowding, and violence) and inmate composition (mental health) on suicide. Deprivation variables were overwhelmingly predictive of suicide confirming the role of the prison environment in suicide. Theoretical and practical implications of these findings are discussed. Suggestions for future research on the topic are proposed.

INDEX WORDS: Prison, Suicide, Deprivation, Importation, Prison conditions, *Census of State and Federal Adult Correctional Facilities,* Count Models

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A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial

Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2008

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August 2008

DEDICATION

I dedicate this dissertation to my daughter Piper Rae—just in case you ever wonder.

ACKNOWLEDGEMENTS

The completion of my dissertation would not have been possible without the assistance of my committee members and my friends and family. I would like to take this opportunity to acknowledge the unique contribution of each and to say a work of thanks.

First, I would like to acknowledge each of my committee members, Tom McNulty, Paul Roman, and Ron Simons. Tom advised me throughout my graduate career at UGA, co-authored my first published paper on prison suicide, supported me through the comps process, the dissertation proposal and dissertation completion award, numerous presentations, and my job search. Thank you, Tom, for your feedback, your statistical know-how, and your willingness to work me. Paul, your research shop has been invaluable for my professional development. You, along with Aaron Johnson, Lori Ducharme, Hannah Knudsen, Sarah Henderson, the National Treatment Center Study and the Institute for Behavioral Research largely shaped my graduate career at the University of Georgia. Ron, it was in your classroom that I was most inspired to think critically about criminology. You always provided the encouragement I needed and as a result bolstered my confidence in my writing and research. Thank you all for your willingness to work with me on the dissertation project. You are all true academics and my professional role models.

I would also like to thank Jack Humphrey for his continued support and confidence in me, Jennifer McMahon for listening and babysitting, April Brown for being there (literally, right down the street) whenever I needed anything, and my dissertation support group, Liz, Abbi, and Meredith Welch-Devine. In addition, I would like to thank my graduate coordinator, Jody Clay-

Warner. Jody, your guidance in Pro-Seminar and Job Market Seminar made the difference for me and I am sure for many others.

Finally, I must thank my friends and family who helped me see this through. First, Jerry Anne Cofer, you always had a word of encouragement for me that made me want to succeed. You were there for me in a major way before and after Piper Rae entered my world. Next, my parents, Harry and Nancy Huey, my in-laws, Gary and Linda Dye, and my sister, Elizabeth Huey Moss—you all have supported me tremendously as I finished my dissertation, obtained a new job, had a baby, and moved to Tennessee. These life-changing events that most people experience one at a time would not have happened all at once for me if you had not been there financially, emotionally, and spiritually. You drove many hours and miles to physically be with me when I needed anything. Daddy, you especially were there to watch Piper Rae when I needed to write, when I needed help moving, and when I needed you the most. I can't thank you enough. Lastly, my husband, Dwight, I don't know where I would be without you. Your devotion to me for the past seven year of marriage amazes me. I love you and will never take for granted how truly blessed we are.

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CHAPTER ONE

INTRODUCTION

Suicide in prison is a relatively rare event. Yet, rates of suicide are reportedly higher in prison than for the U.S. population in general. As shown in Table 1.1, the number of suicides in U.S. state prisons ranged from 168 in 2002 to 215 in 2005. Representing roughly six percent of all deaths in custody, suicide is currently ranked as the second leading cause of death in prison following only deaths due to natural causes.

According to a Bureau of Justice Statistics report (Mumola 2005), the rate of suicide per 100,000 inmates declined from 34 in 1980 to 16 in 1990, and has since remained fairly stable. For the years 2001 to 2005, the suicide rate ranged from 14 to 17 suicides per 100,000 inmates (Mumola 2005). Figure 1.1 shows how the suicide rate for U.S. residents has consistently remained between 10 and 12 suicides per 100,000 population. In recent years, prison suicide rates—as shown in Figure 1.1—have been slightly higher than rates for the U.S. population.

The notion that rates of suicide are higher in prison than the general community implies that something specific to the prison—either the prison itself or the prisoners within—accounts for the elevated suicide rates. One objective of this dissertation is a comparison of suicide rates by state (chapter four). The primary purpose of this dissertation is to test two theoretical explanations for prison suicide (chapter five). The deprivation perspective holds that prison suicide is a product of the restrictive prison milieu. Loss of freedom, isolation, and conditions of the prison increase the likelihood of suicide in prison. The importation model suggests that the demographic, social, and psychological characteristics of inmates explain suicide. From this perspective, predictors of suicide operate the same both in prison and in the general community.

Table 1.1 Suicide in State Prisons 2001 – 2005

	Number of Suicides	Rate (per 100,000 inmates)	Percentage of Deaths in Custody	Rank
2001	169	14	5.9%	3rd
2002	168	14	5.7%	3rd
2003	200	16	6.3%	2nd
2004	200	16	6.4%	2nd
2005	215	17	6.8%	2nd

Source: Deaths in Custody Reporting Program. Web Posted at http://www.ojp.usdoj.gov/bjs/dcrp/dictabs.htm

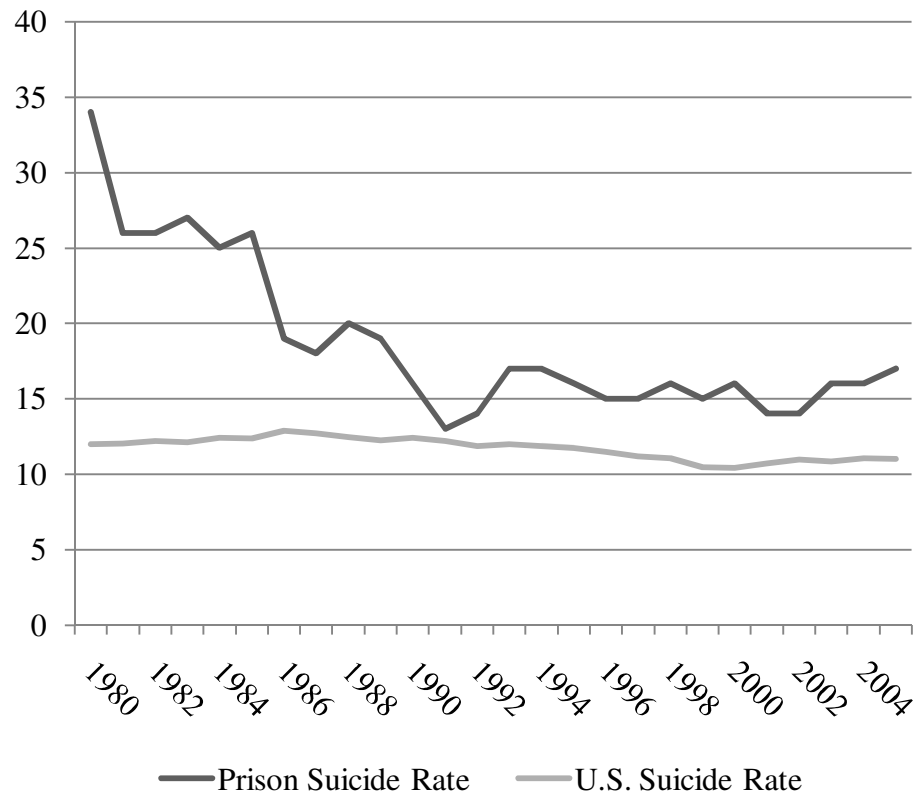

Figure 1.1 Prison and U.S. Suicide Rates 1980-2005

Source: Prison Rates from Deaths in Custody Reporting Program.
Web Posted at http://www.ojp.usdoj.gov/bjs/dcrp/dictabs.htm.
Source: U.S. Rates from Center for Disease Control and Prevention.
Web posted at http://www.cdc.gov/ncipc/wisqars/default.htm.

Using this theoretical framework, this dissertation addresses two research questions. 1) To what extent do prison conditions promote/restrict suicide? 2) In what ways do the characteristics of inmates predict prison suicide?

Motivations of Current Study

While documented cases of suicide in prison are certainly evident in the historical literature on the prison (Brockway 1969; Morris & Rothman 1995; Stern 1998), prison suicide research is a relatively young field of inquiry. Bruce Danto's *Jail House Blues* (1973) represents the first serious attempt to understand prison suicide. This edited volume of writings by concerned correctional psychologists, social workers, criminologists, and former inmates is a collection of the extant research on prison suicide available at that time. In addition to aiding the suicidal inmate, the contributing authors concerns were with the larger problem of the prison.

Twenty years after the publication of *Jail House Blues*, Danto published a second book on prison suicide with David Lester (Lester and Danto 1993). *Suicide Behind Bars: Prediction and Prevention* summarized the theoretical explanations for prison suicide (sociological and psychological) as well as the extant research on the topic—a few dozen research articles on prison suicide were published in the 1980s and 1990s (Anno 1985; Anson 1983; Anson and Cole 1984; Batten 1992; Cox, Landsberg, & Paravati 1989; Haycock 1989; Haycock 1993; Hayes 1995; Jones 1986; Lester 1982; Lester 1987; O'Leary 1989; Rakis & Monroe 1989; Salive, Smith and Brewer 1989; and Sherman & Morschauser 1989). The text, however, focused on the prevention of suicide in prison and functioned as a "how to" guide for correctional officials.

Over the past four decades, scholarly interest in the topic of prison suicide has waxed and waned, especially among researchers in the U.S. Following the 1980s and 1990s prisoner rights and litigation movements, prisons came under attack from inmate interest groups, civilian

workers (i.e., psychologists, criminologists), and the courts as being inhumane, harmful, and not conducive to rehabilitation. Amid this era, professional organizations including that National Commission on Correctional Healthcare (NCCHC) and the American Correctional Association (ACA) developed standards of suicide prevention, which were adopted by many prison systems (Danto 1997; Hayes 1995; Hayes 1996). Since the year 2000, attention to the problem of prison suicide has grown (Daniel and Fleming 2006; He et al. 2001; Kovasznay et al. 2004; Way et al. 2005; White, Schimmel, and Frickey 2002). Again, however, most of the research is descriptive, psychological, focused on the inmate suicide profile, and geared toward prevention or protection from liability (Bonner 2000; and Hayes 1999). Indeed, research on prison suicide has been geared toward developing comprehensive suicide prevention programs that are "legally defensible" (Correia 2000).

Several themes emerge from these few decades of research on prison suicide. Most evident is the marked distinction between psychological and sociological approaches. Psychological research dominates the field while sociological inquiry into prison suicide is under-developed (Liebling, Durie, Stiles, and Tait 2005). One result of this imbalance is that the bulk of the research consists of descriptions of a small group of inmates who committed suicide while incarcerated in a particular prison over a specified period of time. Some studies, but very few, include a comparison sample of inmates in custody during the same time frame who did not commit suicide or a comparison of the entire correctional population (Fruehwald et al. 2004; Salive, Smith, & Brewer 1989; Way et al. 2005; and Winter 2000). A common finding in these descriptive studies points to the mental health status of suicidal inmates, with the majority of inmates who commit suicide in prison having been diagnosed with mental illness or having had contact with mental health services while in prison (Daniel and Fleming 2006; He et al. 2001;

Kovasznay et al. 2004; Way et al. 2005; White, Schimmel, and Frickey 2002). Because the overwhelming majority of studies are conducted at the individual level of analysis (within a single institution/system), the data do not allow for an examination of the effect of prison conditions on suicide. A second theme is the extent to which prior studies tend to emphasize individual predictors of suicide and ignore the role of the prison context as explanations for suicide (for an exception see Wooldredge & Winfree 1992). Liebling (2006: 18) notes "the prison as an institution tends to get less attention from researchers than prisoners, so we know considerably more about the fates of ex-prisoners on release, for example, than we do about why suicides occur disproportionately in one prison rather than another."

A third prevailing theme in the prison suicide literature is the assumption that prison suicide rates are higher than those in the general community. Researchers have compared prison and community suicide rates since the 1970s, but have reached different conclusions. Since the late 1980s, prison suicide researchers have reported declines in rates, which are attributed to the implementation of comprehensive suicide prevention programs (Hayes 1999; Bonner 2000; Daniel 2006). Inconsistent findings could be the result of declining prison suicide rates, a pre-occupation with suicide prevention and deflecting attention away from the prison as a cause of suicide, a product of more sophisticated research methods, or a combination of these factors. Whether suicide is more common in prison than the general community remains an empirical question.

Limitations of Prior Research & Contributions of Current Study

Due to the limited quantity of research on prison suicide, the available studies add valuable insight to the phenomenon. There are a few limitations of prior research, however. Three are particularly relevant for the current study.

First, the best research on the topic of prison suicide comes from a few qualitative studies (Liebling 1992; Medlicott 2001). The findings from these studies have not been replicated using quantitative designs with larger and more varied samples of prisons and prisoners. Thus, the generalizability of the findings has not been substantiated.

Second, a large portion of the research is conducted in countries other than the U.S. For example, Allison Liebling's (1992) qualitative research involves prisoners and prisons in the U.K. Well-designed studies have also been carried out in the Netherlands by Blaauw and colleagues, Austria (Freuhwald et al. 2004), Belgium (Snacken 2005), Canada (Wobeser et al. 2002) and Italy (Tatarelli et al. 1999). Differences in penal practices between countries including the separation of remand and sentenced prisoners make generalizing findings to the U.S. problematic.

Third, studies conducted in U.S. prisons as a whole are theoretically and methodologically limited. The bulk of the research conducted in U.S. prisons is solely descriptive, correlational, and limited to small sample sizes within one prison or state prison system (Anno 1985; Daniel and Fleming 2006; Hayes 1995; Jones 1986; Kovasznay et al. 2004; Salive, Smith, and Brewer 1989; Way et al. 2005; White, Schimmel, and Frickey 2002). Because most of the evaluations are prompted by the occurrence of suicide within an institution, the motivation is prevention and liability concerns rather than a fuller understanding of prison suicide. Consequently, these evaluations are often atheoretical (exception see Tartaro and Lester 2005).

Moreover, the methodological weaknesses of these studies often yield biased and contradictory results that threaten reliability, validity and generalizability. In the past, studies relied on descriptions of a small sample of suicide cases to produce prediction profiles that have

ultimately proved ineffective in preventing suicide (Kenney and Homant 1988). More recent studies have compared suicide cases with other samples of inmates who did not commit suicide or non-incarcerated populations including either suicide cases outside prison or characteristics of the U.S. resident population in general (Salive, Smith, and Brewer 1989; Kovasznay et al. 2004; Way et al. 2005; White, Schimmel, and Frickey 2002). In two of the most recent evaluations, suicide cases were drawn from mental health treatment records and compared with the characteristics of the mental health caseload in that prison and the total inmate population for that state as well as suicide cases in other institutional settings (Kovasznay et al. 2004; Way et al. 2005). Data for these studies was extracted from the mental health records of completed suicides that occurred within the New York Department of Corrections between the years 1993 and 2002 (n=76). The suicides analyzed represented only 84% of the suicides that occurred during the time frame. Due to the selected source of data, the analyses could provide no information on the details of the suicide cases that did not have contact with prison mental health services. Thus, the exclusion of 16% of suicides without mental health records created a potential selection bias in the findings and doubt as to the relationship between mental health of inmates and suicide.

Studies are usually conducted within one prison or prison system (Anno 1985; Daniel and Fleming 2006; Jones 1986; Kovasznay et al. 2004; Salive, Smith, and Brewer 1989; Way et al. 2005). Given the nature of the data, these studies can rarely offer conclusions about the relationship between the prison environment and suicide. In 1989, Salive, Smith, and Brewer noted the importance of the prison context for understanding suicide by acknowledging the need for larger, multivariate studies to analyze the separate effects of correctional characteristics. Over a decade later, Way et al. (2005: 220) proposed that to better understand and prevent prison suicide future work should focus on “incorporating long-term sentenced prison suicides from

many states and countries into a single data base with a standard format." Despite these conclusions, extremely few national evaluations of prison suicide in the U.S. are available (see Hayes 1995; Huey and McNulty 2005; Lester 1998; Mumola 2005; Tartaro and Lester 2005; White, Schimmel, and Frickey 2002). None of these evaluations have considered both the individual (importation) and the institutional (deprivation) effects on prison suicide. As is the case with much of the research in U.S. prisons, the individual characteristics of inmate suicide cases have been overemphasized and role of the prison context has been ignored.

Motivated by the limits of prior research, the central purpose of the current study of prison suicide is test the deprivation, importation, and combined models of prison suicide using national survey data on prisons in the U.S. This study pays particular attention to the features of prison environment predictive of suicide, how the inmate composition of prisons is related to suicide, and the interaction of prison and prisoner characteristics on the likelihood of suicide. Relatively little is know about why suicide occurs in some prisons but not in others and few studies have empirically considered the interaction of prison features and prisoner characteristics. For these reasons, this study represents a major contribution to the research literature on prison suicide.

Contributions for Sociology and Criminology

This study of prison suicide also yields important contributions for the disciplines of sociology and criminology. Specifically, the research bridges the sociological perspective on suicide and the research on the effects of imprisonment. First, the sociological study of suicide is well established (Durkheim 1966; Stack 2000a and 2000b). Despite this long theoretical tradition, the sociological study of suicide in prison is underdeveloped. That is, a limited number of studies, which argue for the environmental causes of suicide, exist in the literature on prison

suicide. In contrast, psychological studies of prison suicide, which focus almost exclusively on the characteristics of individuals, are numerous. In addition, the prediction and prevention responses to prison suicide speak to the larger study of social control and the construction of social problems. A variety of stakeholders have vested interests in the control and even the definition of prison suicide as a problem. The way in which prison officials have responded to the 'suicide problem' with a 'scientific' psychiatric approach needs to be examined critically by sociologists (Conrad and Schneider 1992; Douglas 1967; Liebling 1992; Page 1994).

Second, an examination of the prison environment should be of interest to any sociologist or criminologist concerned with the effects of mass incarceration (Welch 1999; and Garland 2001a and 2001b). Research which attends to the effects of incarceration typically focuses on whether prison achieves its various purposes. Most of the research in this area is geared toward understanding post-incarceration recidivism and reentry after release rather than on the correctional setting's effect on inmates currently incarcerated (Hochstetler, Murphy, and Simons 2004; Mauer and Chesney-Lind 2002). The notion of whether prison is harmful is downplayed (Liebing and Maruna 2005; Tonry 2007; Welch 1999). Within the comparatively limited portion of research the majority of studies investigate the relationship between the incarceration experience, prison conditions, and violence (against others) (Adams 1992; Berg and DeLisi 2006; Cao, Zhao, and Dine 1997; Ellis, Grasmick, and Gilmans 1974; Hochstetler and DeLisi 2005; Jiang and Fisher-Giorlando 2002; McCorkle, Miethe and Drass 1995). Suicide in prison (violence against self) is usually excluded from these analyses (Liebling, Durie, Stiles, and Tait 2005; for an example see Jiang and Fisher-Giorlando 2002; for an exception see Snacken 2005). Therefore, this dissertation research fills an important gap in the existing literature on the effects of incarceration.

Organization of Chapters

Chapter one has provided an introduction to the topic of prison suicide and outlined the study's motivations, purpose and research questions, and contributions. Subsequent chapters of the dissertation are divided into theoretical and methodological components. Chapter two serves as the academic portion of the dissertation. Here, the theoretical framework for the current study is detailed and relevant research is reviewed. Chapter two concludes with a statement of the study's research hypotheses.

Chapter three presents the study's research design and methodology. The chapter begins with a description of the data used in the current study. The independent and control variables are then outlined followed by an explanation of the study's analytic strategy.

The next two chapters are results chapters. In chapter four, prison suicide rates are compared with U.S. suicide rates. Comparisons are made on both the national and state levels. In addition, rates are age adjusted for the age distribution of the prison population and analyzed separately for males and females. The rate comparisons provide some initial answers to the study's research questions and implications for the deprivation and importation theories of prison suicide. Building on these findings, chapter five presents the results of the multivariate analysis, the Negative Binominal Regression Model (NBRM), which tests the theoretical explanations of prison suicide. The results of these models are preceded by a description of the sample including the key independent variables in the analysis as well as an examination of the bivariate relationships between these variables and prison suicide.

The dissertation concludes with a discussion of the study's empirical findings, theoretical implications, and practical implications for suicide prevention. The final chapter also includes a discussion of the limitations of the dissertation and directions for future research.

CHAPTER TWO

THEORETICAL FRAMEWORK:

INMATE ADAPTATION AND EXPLANATIONS FOR PRISON SUICIDE

As outlined in chapter one, this study of prison suicide is guided by two research questions. The first question focuses on the role of the prison environment in prison suicide. More precisely, to what extent do prison conditions promote (or restrict) suicide? Do features specific to the prison environment influence the likelihood of suicide behind bars? Further, do certain conditions have a greater impact on suicide than other conditions (e.g., isolation, security level, violence, and overcrowding)? The second question examines the relationship between inmate characteristics and suicide. To what extent do prisoner characteristics predict prison suicide? Are prisoners who commit suicide different from those who commit suicide in the community?

The questions guiding this dissertation research are informed by a larger theoretical debate within the criminological literature on how inmates adjust to life in prison—the deprivation and importation models. These historically competing models respectively attribute prison mal-adaptation (e.g., violence or suicide) to factors specific to the prison experience (deprivations) or characteristics that inmates bring with them (import) into the prison. Despite the focus on both individual and prison explanations for suicide, previous examinations of prison suicide have rarely set out to directly test the deprivation and/or importation models. Rather, studies have been *implicitly* organized by these theories (Hatty and Walker 1986). Within this research, support is found for both models. As an explanation for prison suicide each model

contains a number of limits. Thus, contemporary prison suicide researchers stress the importance of integrated models, which focus on the interaction between inmates' characteristics and the prison environment. The deprivation and importation models are seldom investigated together—due primarily to data limitations—however, integrated models of prison suicide represent the most vital area of prison suicide research (Dear 2006; Liebling 1999; Liebling 2006; Towl, Snow, and McHugh 2001).

The goals of chapter two are to describe the deprivation and importation models in greater detail, to demonstrate how each perspective, singularly and in combination, is used to explain prison suicide, and to review the relevant research that explicitly/implicitly tests these models. The chapter concludes with a summary of this study's objectives and contributions and a statement of research hypotheses.

Deprivation Model

The deprivation model is based on the classic work of Clemmer (1940), Sykes (1958), and Goffman (1961), and holds that mal-adaptation to prison (e.g., violence, aggression, anxiety, depression, distress, and suicide) is a product of the restrictive prison milieu. That is, depriving conditions of the prison produce aggressive or self-destructive behavior. Sykes (1958) coined the phrase "pains of imprisonment" to describe these conditions. He identified five specific deprivations and suggested that inmates successfully adapt to these pains through inmate solidarity and a system of inmate social roles. Clemmer (1940) described this process of adaptation as "prisonization." Goffman (1961) referred to the prison as a "total institution" and detailed how inmates adapt to life in the total institution following a process of mortification or changing of the self. In a more recent account of the modern prison, Farrington (1992) argued that the prison is a "not-so-total" institution. Evidence of the "get tough" stance on crime and

punishment as well as the return to the total institution model witnessed in the supermax prisons, however, indicates a shift toward a more total prison. Farrington's perspective along with the rise of the supermax prison illustrates how variations in levels of deprivation are directly related to inmate adaptation. The deprivations and inmate adaptations that correspond to each of these perspectives are presented in the following paragraphs.

Sykes' Pains of Imprisonment

According to Sykes (1958: xiv), the "prison represents a social system in which an attempt is made to create or maintain total or almost total social control." This total control of the inmate is at the core of what Sykes refers as the "pains of imprisonment." He identifies five pains or deprivations associated with prison life: deprivation of liberty, deprivation of goods and services, deprivation of heterosexual relationships, deprivation of autonomy, and deprivation of security.

The deprivation or loss of liberty is the most immediately obvious pain.

> The prisoner must live in a world shrunk to thirteen and a half acres and within this restricted area his freedom of movement is further confined by a strict system of passes, the military formations in moving from one point within the institution to another, and the demand that he remain in his cell until given permission to do otherwise. In short, the prisoner's loss of liberty is a double one—first, by confinement to the institution and second, by confinement within the institution (Sykes 1958: 65).

Sykes (1958: 65) adds:

> The mere fact that the individual's movements are restricted, however, is far less serious than the fact that imprisonment means that the inmate is cut off from family, relatives, and friends …It is not difficult to see this isolation as painfully depriving or frustrating in terms of lost emotional relationships, of loneliness, and boredom. But what makes this pain of imprisonment bite most deeply is the fact that the confinement of the criminal represents a deliberate, moral rejection of the criminal by the free community.

Thus, the loss of liberty consists not only of inmates' confinement to the prison institution, but also to the restrictive conditions within the institution that ultimately isolate inmates from family, friends, and the outside. This isolation and rejection is a threat to inmates' self-conception and must be "warded off, turned aside, rendered harmless" if the prisoner is to endure and adapt to prison life (Sykes 1958: 67).

The second pain, deprivation of goods and services, refers to the standard of living afforded to the inmate in prison. Here, Sykes refers to the prisoner's basic material needs—the so-called necessities of life—as well as the amenities, however perceived by outsiders and inmates as "rightful." This includes the basic needs of food, clothing, and shelter, opportunities for proper health and medical care including exercise, and material possessions including luxuries such as cigarettes and individual cell furnishings. In some situations, Sykes notes, "inmates are better off in prison, in strictly material terms, than they could ever hope to be in the rough-and-tumble economic life of the free community" (68). However, "the average inmate finds himself in a harshly Spartan environment which he defines as painfully depriving" (Sykes 1958: 68).

Inmates are also deprived of heterosexual relationships. The privilege of conjugal visits is often denied. Visits with spouses and significant others take place under strict scrutiny of guards and usually occur through a plate glass window by means of face-to-face phone communication. Lack of heterosexual relationships is described as psychologically and physically frustrating for inmates. Overt homosexual threats as well as latent homosexual fears are realities in the life of the inmate. For male inmates, Sykes notes that a man's masculinity is called into question when heterosexual relationships are denied.

Also called into question is the inmate' status as adult versus child. The loss of autonomy an inmate experiences while in prison includes the inability to make choices and the ways their lives are totally and minutely controlled by a vast array of rules imposed by guards. These rules often do not "make sense" or are randomly enforced. As described by Sykes (1958: 73):

> Most prisoners, in fact, experience an intense hostility against their far-reaching dependence on the decisions of their captors and the restricted ability to make choices must be included among the pains of imprisonment along with restrictions of physical liberty, the possession of goods and services, and heterosexual relationships.

For adult inmates, being thrust back into childhood dependency is frustrating. Because this loss of autonomy is imposed rather than freely granted, it is particularly painful and difficult to endure, and is another deprivation of prison life that inmates must adapt.

The last pain of imprisonment is the deprivation of security. The loss of security may include fear of physical aggression and exploitation of person or possessions, and may include threats to a prisoner's reputation and level of respect. Sykes (1958: 77) observes:

> There are a sufficient number of outlaws within this group of outlaws to deprive the average prisoner of that sense of security which comes from living among men who can be reasonably expected to abide by the rules of society.

Indeed, living with other criminals who are viewed as violent, dangerous, and out to prove their reputation for toughness is anxiety invoking. The prisoner must adapt to the loss of security or never feel safe living in prison.

Goffman's Total Institution

Parallel to Sykes' description of the pains of imprisonment is Goffman's (1961) analysis of the prison as a "total institution." He defines the total institution as "a place of residence and work where a large number of like-situated individuals, cut off from the wider society for an

appreciable period of time, together lead an enclosed, formally administered round of life" (Goffman 1961: xiii). For Goffman, being "cut off from society" signifies the barriers between the institution and the outside world (i.e., locked doors, high walls, fences, and surveillance). More importantly, Goffman emphasizes how the social organization of the total institution is incompatible with elements of the outside world including work and family structures.

In addition to being cut off from society, inmates lead a formally administered way of life. Within the total institution, inmates' lives are carried out in the presence of other inmates as well as under the authority and surveillance of staff. All inmate activities are tightly scheduled and sequenced/enforced by the institution's officials. The result of this formal round of life is an "untraining" which renders the inmate incapable, if temporarily, of managing features common to life on the outside (Goffman 1961: 13). Writing of this loss of autonomy, Goffman (1961: 38) explains that:

> By the time the individual is an adult he has incorporated socially acceptable standards for the performance of most of his activity, so that the issue of the correctness of his action arises only at certain points…Beyond this he is allowed to go at his own pace…In a total institution, however, minute segments of a person's line of activity may be subjected to regulations and judgments by staff.

In essence, inmates are stripped of their former selves and are forced to take on the role of docile inmate (Foucault 1977). This isolation from the wider society and consequent loss of social roles brings about psychological stress, especially in cases of involuntary confinement such as the prison. In order to adjust to life in the total institution environment, inmates must manage this tension between the home world and the institutional world.

Farrington's Not-so-Total Institution

As a direct challenge to Goffman's (1961) notion of the prison as a "total institution," Farrington (1992) and others (Jacobs 1977; McCorkle, Miethe, and Drass 1995; and Berg and

DeLisi 2006) describe the modern prison as "not-so-total." In essence, prisons and inmates are not as "cut off from society" as Goffman's ideal type suggests. Berg and DeLisi (2006:633) explain:

> Prisons are no longer 'total institutions' whose walls wholly isolate inmates from the community. Instead, the barriers between community and prison are porous and permit considerable transference of behaviors that influence inmate conduct.

Farrington (1992) points to several logical obstacles to the operation of the total institution model for the modern prison. These logical problems support the central thesis on why "the modern prison is not as completely or effectively 'cut off from the wider society' as Goffman's description" (Farrington 1992: 6). According to Farrington (1992: 113), the "most significant violations of the truly total institutional concept in the modern prison is the fact that those who work there tend to move with great freedom and regularity between it and the outside world." To be truly total, prison staff would also be separated from the outside world and the penal institution would be generally self-sufficient. In reality, institutional needs of the modern prison (e.g., food, clothing, work, education, and healthcare) are met with outside assistance from manufacturers, administrators, experts, and professionals.

Likewise, prisoners may be separated by walls, bars, and razor wire fences, but most modern prisons allow visitation between inmates and friends and family as well as contact with the outside world via letters, news, and telephone communication. Even among somewhat total institutions, prisoners are removed from society for only a short period of time and then reintegrated back into society. Contact with the outside community through work release and furloughs are used to prepare inmates for reintegration in some prisons.

Prison placement is another basic obstacle to the notion of the total institution. A common strategy is to site prisons in remote areas to ensure some amount of isolation. Even still,

prisons are located within urban and rural host communities rather than exiled to far removed locations. Prisons and communities develop a functional interdependence and connectedness (e.g., political, economic, and social) that limits the prison from being truly total.

Re-emergence of the Total Institution: Supermax Prisons

Farrington's (1992) description of the "not-so-total institution" co-exists with the "get tough" on crime and punishment measures of the past several decades. During this era, the U.S. embarked on a campaign of mass incarceration resulting in the imprisonment of nearly 2 million U.S. citizens. A hallmark of this era and an equally tough response to crime and punishment has been the emergence of the supermaximum security prison. Since the 1990s, approximately forty states in the U.S. have constructed these institutions to house inmates too violent for the general population of maximum security prisons and those inmates who represent a threat to guards and other prisoners (King 2006). In addition, most prisons have designated secure housing units (SHU) or administrative segregation cells with conditions similar to the supermax. It is estimated that approximately 20,000 inmates or 2% of the inmate population in the U.S. are housed in these institutions and units (King 2006).

Characterized by solitary confinement and deprivation, these facilities are reserved for the "the worst of the worst" inmates, the prisoners that society wants to punish the most. Inmates are confined to single, isolated cells for 23 hours per day with no contact with other inmates. Out of cell activities including exercise and hygiene routines are also solitary. In addition to the solitary nature of confinement, inmates' lives are highly regulated. Contact with friends and family via visits, phone calls, and mail is tightly controlled and limited as is contact with guards. Guards monitor inmates through video surveillance and communicate through speakers and microphones. When out of their cells, inmates are escorted in shackles, bound at the hands, feet,

and waist, and often wear face shields. Guards wear protective clothing and gloves during escorts which further reduces one-on-one contact with inmates. Each time an inmate leaves or returns to a cell, a strip search is performed. Personal items including books, pens, and televisions are restricted or prohibited, and if available are controlled by the guards (King 2005).

Supermax prisons are purposefully depriving. The conditions of these institutions can be described as nothing less than total. Thus, the rise of the supermax prison represents a re-emergence of the total institution model where inmates are "cut off from society" as well as isolated from each other.

Modes of Adaptation

Contemporary prisons in the U.S. range in the levels of deprivation as evidenced by Farrington's (1992) description of the "not-so-total institution" as well as the increased use of supermaximum security units and prisons. The ways inmates adapt to these conditions also varies. Deprivations may increase individual opposition (i.e., violence or suicide) or produce inmate solidarity and the development of an inmate subculture. Both Sykes (1958) and Goffman (1961) expound upon the different modes of adaptation.

According to Sykes (1958), in order to alleviate the "pains of imprisonment" inmates develop their own social structure, which includes corresponding norms and values (inmate code), language (argot), and social roles. This inmate social system is rooted in solidarity among inmates and antagonism towards guards. Through the process of "prisonization" (Clemmer 1940), inmates assimilate into the culture of the penitentiary in order to alleviate the "pains of imprisonment."

While Sykes' (1958) primary interest is how inmates relieve the "pains of imprisonment" through the development of inmate solidarity, he acknowledges that, in rare instances, inmates

demonstrate other reactions to life in prison. Inmates may attempt to physically escape from prison. In addition, inmates may escape psychologically by withdrawing from the goals, drives, and needs common to most inmates. Lastly, inmates may attempt to "overthrow or change the custodial regime to ease the frustrations and deprivations which plague them" (Sykes 1958: 80-81). This could be a forceful rebellion or a peaceful persuasion for change. Sykes emphasizes, however, that inmates are rarely capable of successfully implementing these modes of adaption.

Goffman (1961) also describes how inmates adapt to life in total institutions. Upon entering the prison, inmates are stripped of their personal, pre-prison characteristics via degradation and mortification rituals, and become institutionalized. A new "self" develops through interaction with other people in the prison (inmates and guards) as well as through daily rituals of the institution.

For Goffman, the ways inmates adapt or "do time" in the institution varies. At the extremes, inmates may either become completely immersed in or alternately withdraw from/challenge the institution in order to adapt. For example, through a process of "colonization" inmates lead a relatively contented existence within the institution by focusing on the desirability of life inside the institution relative to life on the outside. A similar form of adaptation is "conversion." Here, inmates act out the role of the perfect inmate. In contrast to these modes of adaptation, inmates may "situationally withdraw" from involvement in everyday events of the institution. Goffman relates this to "prison psychosis." In other cases, inmates may challenge the formal institution and refuse to follow the rules of the regime. Most inmates, he notes "play it cool" in order to maximize the chance of getting out of the institution physically and psychologically intact.

Although Sykes and Goffman identify different modes of adaptation, their analyses of inmate adjustment result in three essential types. As outlined by Matthews (1999: 55), these types include:

> 1. *Co-operation or colonization.* In this mode of adaptation prisoners will aim to keep out of trouble and do their time with the minimum degree of conflict and stress, and with the intention of working towards their earliest release date.
>
> 2. *Withdrawal.* This can take a number of different forms, including physical separation from other inmates, engaging in minimum degrees of communication, depression, or self-mutilation and suicide.
>
> 3. *Rebellion and resistance.* This may involve engaging in riots or disturbances at one extreme, and forms of non-cooperation at the other. The form which rebellion or resistance takes will depend upon the pressures placed on offenders, their background and experiences and the extent to which they feel that their confinement or treatment in prison is fair and just.

Sykes and Goffman emphasize the first type of adaptation (co-operation). Much of the literature which tests the deprivation model of inmate adaptation examines the final mode of adaptation (i.e., violence and prison disturbances) (for example, Berg and DeLisi 2006; Cao, Zhao, and Dine 1997; Grasmick and Gilman 1974; Hochstetler and DeLisi 2005; Jiang and Fisher-Giorlando 2002; McCorkle, Miethe and Drass 1995). Withdrawal as a form of (mal-) adaptation, and in particular prison suicide, has received relatively little attention, theoretically or empirically. Drawing on the available prison suicide research, the following section evidences the ways in which the deprivation model of inmate adjustment applies to suicide in prison.

Application to Prison Suicide

In the case of prison suicide, the greater the levels of deprivation or the more total a prison institution, the greater the likelihood of suicide in prison. Because prisons vary in levels of deprivation, "confinement is not everywhere equally suicidogenic" (Haycock 1993:129). With

suicides reported in only 10-15% of U.S. prisons each year, it is evident that most prisons do not experience suicide (Huey and McNulty 2005). Certain conditions of the prison environment including security level, isolation within the institution, contact with others outside the institution, overcrowding, program availability, and levels of violence and safety tend to influence the likelihood of suicide.

Research suggests that suicides occur more often in maximum compared to medium and minimum security prisons, where deprivations are greatest (Daniel and Fleming 2006; Huey and McNulty 2005; Salive, Smith, and Brewer 1989; Way et al. 2005). Way et al. (2005) reported that 83% of suicides in the New York Department of Corrections between 1993 and 2001 occurred in maximum security settings. In a study of the effects of institutional conditions and prison suicide, Huey and McNulty (2005) found security level to be the strongest predictor with maximum and medium security prisons, respectively, 7.5 and 4.5 times more likely to experience suicide than minimum security counterparts. The relationship between supermaximum security prisons and suicide has not been empirically established, but anecdotal accounts suggests that increased levels of psychological harm and distress are reported among inmates living the depriving conditions of the supermax (Johnson 2005; King 2005 and 2006). In particular, placement in a single cell or other segregated housing unit similar to those used in supermax prisons, is shown to increase the likelihood of suicide (Freuwald et al. 2002; and Freuwald et al. 2004; Way et al. 2005).

Moreover, researchers consistently point to isolation as a major risk factor for suicide in prison (Hayes 1995). Evaluations of suicide cases in prison suggest that the overwhelming majority of suicides are housed in single cells. Anno (1985) concluded that 97% of inmates who committed suicide were housed in single cells. More recent evaluations indicate that

approximately 60% of inmates who commit suicide are housed in single cells, nearly half of which are described as administrative segregation or punitive housing (Daniel and Fleming 2006). In addition, prisons in which inmates are held in single cells are significantly more likely to experience a suicide compared to those in which inmates reside in dormitory style housing (Huey and McNulty 2005).

In some prisons, inmates participate in community work release programs or are allowed weekend furloughs, family visits, and additional opportunities for contact with the outside community. By maintaining extra-prison social bonds, this relationship between prison and community, in turn, affects suicide in prison, with "not-so-total" institutions experiencing less suicide. Liebling's (1992) qualitative interviews with suicide attempters in U.K. prisons indicate that prisoner's vulnerability to suicide is related to family and outside contact. Prisoners vulnerable to suicide have few or unreliable visits, write few letters, have little contact with community release/probation programs, and find thinking of the outside difficult. The extent to which community release programs create a buffer for prison suicide is not yet clear. However, descriptive studies that report the location of suicides in custody indicate that only 3% of suicides occur outside of the facility while inmates are on work details, on work release, or under community supervision (Mumola 2005). Participation in community/work release programs may similarly decrease the likelihood of suicide as participation in in-prison vocational, education, and psychological programs (Huey and McNulty 2005).

Another aspect of deprivation is the extent to which prison facilities provide inmates with access to rehabilitation and similar programs. Suicide may be more likely in prison environments that lack or provide limited access to educational and vocational programs while prisons in which larger percentages of inmates participate in such programs evidence significantly lower

odds of suicide (Huey and McNulty 2005; Kupers 1999). Additionally, several qualitative studies suggest that the ways in which inmates "do time" are also associated with suicide (Liebling 1992; Matthews 2000; Medlicott 2001). For some prisoners, the subjective experience of passing time in prison is painful. Medlicott (2001) found that empty time was particularly painful for suicidal prisoners. Liebling (1992; 1999) concluded that the use of time and opportunities accounted for much of the difference between suicide attempters and other prisoners, with inactivity the central variable in the context of prison suicide.

Overcrowded prison conditions also contribute to the pains of imprisonment. It is widely assumed in the literature—reinforced through court decisions—that overcrowding exerts deleterious effects on inmates' psychological and behavioral well-being. Evaluations of the effects of overcrowding on prison suicide have produced somewhat mixed results (Gaes 1992; Liebling 1992). Due to the use of different measures and definitions of overcrowding, researchers have reached different conclusions as to the effects on suicide. In an evaluation of 527 U.S. prisons, Innes (1987) found that as the inmate population increases, the number of suicides increased. Cox et al. (1984) examined prison suicide rates in Illinois, Mississippi, Oklahoma, and Texas prison systems and found that as the inmate population increased, the rate of suicide increased three times more. Overcrowding as measured by prison size, rated capacity, and inmate to staff ratio evidenced a pronounced effect on suicide in U.S. prisons (Huey and McNulty 2005). In this study, conditions that would normally buffer against suicide such as lower security levels were erased under conditions of high overcrowding. Minimum security facilities were as likely to experience suicide as maximum and medium security counterparts at high levels of overcrowding. The relationship between court orders to reduce inmate counts and prison suicide has received little empirical attention. One study, however, found the presence of

court orders to reduce overcrowding to be related to *decreased* rates of suicides in prisons (Cox et al. 1984).

While prison violence in general has not been directly linked to suicide in prison, the levels of violence and fears for safety are for some inmates a paramount component of the pains of imprisonment. Suicides in prison are often preceded by stressors such as bullying, violence, and prison rape (Blaauw, Winkel, and Kerkhof 2001; Lester and Danto 1993; Liebing 1992). Half of the inmate suicide cases in New York State Correctional Facilities between 1993 and 2001 were preceded by recent inmate-to-inmate conflict while nearly half (42%) of these cases had received disciplinary action (Kovasznay et al 200). Likewise, for federal inmates, inmate-related conflicts were noted among the precipitating factors for suicide (White, Schimmel and Frickey 2002).

Importation Model

In contrast to the deprivation perspective, the importation model attributes mal-adaptation to the characteristics of inmates rather than features specific to the prison environment. Proponents of the importation hypothesis (Irwin and Cressey 1962) criticize the deprivation model as being overly narrow and ignoring the characteristics of inmates, which largely determine behavior in prison. According to Irwin and Cressey (196:145) “a clear understanding of inmate conduct cannot be obtained simply by viewing ‘prison culture’ or ‘inmate culture’ as an isolated system springing solely from the conditions of imprisonment.” External behavior patterns and values are instead imported into the prison from the outside. The “convict code” as suggested by Clemmer (1940) and Sykes (1958) is better characterized by the “code of the street” (Anderson 1998; Wacquant 2001). Characteristics as well as norms and values facilitate

inmate adjustment to prison for certain groups of inmates (Carroll 1974; Jacobs 1974 and 1977; Wacquant 2001).

Application to Prison Suicide

As an explanation for prison suicide, the importation perspective suggests that inmates' demographic, social, and psychological characteristics rather than prison conditions best explain suicide in prison. For importation theorists, prison represents an opportunity for suicide rather than its cause (Kennedy and Homant 1988). Supporting this notion, research indicates that risk factors associated with suicide in non-incarcerated populations including mental health issues, previous trauma, prior suicide attempts, and substance abuse problems as well as demographic correlates (e.g., gender, age, and race) are prevalent among suicide cases in prison as well as the prison population as a whole (Kovasznay et al. 2004; Mumola 2005; Way et al. 2005). Prisoners are designated as a high suicide risk group (WHO 2000) and are described as suicide prone and carefully selected to be at risk of suicide (Liebing 1992: 68).

Gender and Prison Suicide. As is the case for U.S. residents in general, and as a reflection of the U.S. prison system, which is disproportionately male, most suicides in prison involve male inmates. Consequently, prior research on prison suicide has focused almost exclusively on male suicide cases or male-only prisons (Lester and Danto 1993; Salive, Smith, and Brewer 1989; White, Schimmel, and Frickey 2002). Based upon the assumption that female inmates are under-represented among prison suicides, suicide in prison has been viewed as a problem that only affects male inmates (Liebling 1999; Themeli 2006). As the population of female inmates and prisons has increased, however, more attention has been geared toward understanding the relationship between gender and prison suicide. Way et al. (2005) reported that 4% of the suicides completed between 1993 and 2002 in New York State prisons involved female inmates,

which was similar in proportion to the total female inmate population in that state. In Mumola's (2005) report on suicide in U.S. state prisons during 2001-2002, male and female inmate suicide rates were similar. At a rate of 14 per 100,000 inmates, male inmates were slightly more likely to commit suicide than females (10 per 100,000).

Men in general commit suicide at a rate of two to four times higher than women (WHO 2004). The similarity in prison suicide rates for males and females differs from suicide rates reported for male and female U.S. residents (17.6 versus 4.1 suicides per 100,000 residents respectively in 1999) (see also Way et al. 2005). This discrepancy in rates has received little research attention by importation theorists, but requires explanation (for an exception see Liebling 1999; Themeli 2006). The gender-suicide relationship is considered in more depth later in this chapter.

Age and Prison Suicide. Regarding the relationship between age and suicide, summary statistics for U.S. residents indicate that suicide mortality increases with age (WHO 2004). In U.S. prisons, this trend has not been confirmed (Kovasznay et al. 2004). Mumola (2005) reported that inmate age was not related to prison suicide rates for the years 2001-2002. Across all age groups (18 to 55 and older), rates consistently ranged from 13 to 14 suicides per 100,000 inmates. White, Schimmel, and Frickey (2002) also found no consistent age trend among suicide cases over a fifteen year timeframe.[1]

Prison suicide profiles point to younger offenders as being at the greatest risk of suicide in prison (Lester and Danto 1993; Liebling 1999). Studies indicate that inmates who commit suicide are on average younger than the general prison population as well as the U.S. resident

[1] Studies of prison suicide in other countries reveal a different age-suicide relationship, with older inmates over-represented among suicide cases (Blaauw, Kerkhof, and Hayes 2005; Blaauw and Kerkhof 2006).

population. Comparing 76 suicides that had mental health services contact with the overall prison mental health caseload and the New York Department of Corrections population, Way et al. (2005) found that the suicide group was significantly younger than the comparison groups (32.8 years versus 37.1 and 34. 6 years respectively). Nearly half (47%) of the suicide cases were between the ages of 25 and 34. In a study of Maryland prisons, Salive, Smith, and Brewer (1989) reported a similar age distribution. In this study, the mean age of suicide cases was 29.3 years (SD=6 years) and the highest suicide rates were for those ages 25 to 34. Of the 337 suicides that took place in U.S. state prisons during the years 2001-2002, 116 suicides (34.4%) were among prisoners age 25 to 34 (Mumola 2005).

Recent research attention has focused on suicide among juveniles in custody (see Hayes 2004). Suicide represents the leading cause of death in juvenile correctional facilities (Roberts and Bender 2007). Suicide rates in these facilities are estimated at more than four times the rates of juveniles in the U.S. (Hayes 2004; Memory 1989). For inmates under the age of 18, the rate of suicide in *adult* prisons is 52 per 100,000, which is four times higher than other inmate age groups (Mumola 2005).

Race and Prison Suicide. The over-representation of white inmates and under-representation of black and Hispanic inmates in prison suicide estimates is consistently reported in the literature on prison suicide (see Anno 1985; Anson 1983; Anson and Cole 1984; Daniel and Fleming 2006; Danto 1973; He et al. 2001; Kovasznay et al 2004; Salive, Smith, and Brewer 1989; Way et al. 2005; White, Schimmel, and Frickey 2002). For example, the racial disparities in inmate suicide are evident in the New York Department of Corrections for the years 1993 to 2001. During this time, white inmates accounted for 37% of inmate suicides, but only 18% of the

total inmate population (Way et al. 2005). The most recent U.S. state prison estimates indicate that for the years 2001-2002:

> White inmates had the highest suicide rate of all State prisoners (22 suicides per 100,000 inmates). This rate was 22% higher than the Hispanic suicide rate (18 per 100,000)…Black inmates had the lowest suicide rate of all State prisoners (8 per 100,000). Blacks were about a third as likely as white to commit suicide in State prison and less than half as likely as Hispanics (Mumola 2005: 6).

Compared to other racial and ethnic minorities, suicides are more prevalent among white inmates and U.S. residents alike (Anson and Cole 1984; Salive, Smith, and Brewer 1989). Anson and Cole (1984) examined the racial differences in inmate suicidal behavior in the Florida prison system for a five year reporting period. Their findings indicated that, relative to black inmates, suicides committed by white inmates exceed the proportion of white inmates in the prison population. Because whites are also significantly more likely to commit suicide than blacks in the free-world, Anson and Cole (1984) argued that the findings supported the importation model of prison suicide. They concluded that the relationship between race and suicidal behavior observed within the prison "is a reflection of the same demographic forces operating on the outside. It follows from this that racial differences in the prison experience are best explained by pre-prison experiences or processes" (Anson and Cole 1984: 555). Using a similar rationale, Haycock (1989) suggested that the lower rate of suicide for black inmates simply conforms to the racial differences in suicide rates within the community (see also Lester and Danto 1993).

Mental Health, Psychiatric Diagnoses, and Prison Suicide. The psychological make-up, mental illness, and psychiatric impairment of prison suicide cases is well-documented in the literature on inmate suicide (Anno 1985; Bland et al. 1990; Bonner 2006; Cox 2003; Dooley 1990; Fogel 1992; Green et al. 1993; Ivanoff 1992; Ivanoff and Jang 1991; Jones 1986; Kovasznay et al. 2004; Skegg and Cox 1991; Smyth and Ivanoff 1994; Tatarelli et al. 1999; Way

et al. 2005; White, Schimmel, and Frickey 2002). Using a case-control design to compare suicide cases in custody with a similarly matched group of inmates, Fruehwald et al. (2004) reported that psychiatric diagnoses were one of the most important predictors of suicide among sentenced prisoners.[2] Studies report that 25% to 35% of inmates suicide cases are diagnosed with a psychotic disorder such as schizophrenia (Daniel and Fleming 2006; Kovasznay et al. 2004; Way et al. 2005; White, Schimmel, and Frickey 2002). In addition, mood/affective disorders, personality disorders, adjustment disorders, and substance-related disorders are prevalent among inmate suicide cases (Daniel and Fleming 2006).

Indeed, mental health and psychiatric diagnoses including psychotic disorders, anxiety, depression, drug and alcohol dependence/ abuse, and prior suicide attempts are the most common correlates of suicide for both non-incarcerated and prison populations (Tripodi and Bender 2008). However, prisoners in general evidence an elevated risk of these disorders, which makes prediction and screening for suicide potential based upon mental health indicators difficult (Blaauw and Kerkhof 2006; Liebling 2001; Medlicott 2001). Most suicide evaluations (i.e., mortality reviews and psychological autopsies) find that the eventual suicide cases were judged as low or undetected for risk of suicide based on symptoms of mental illness during incarceration and at the time of the suicide (Sanchez 1999; Tartarelli et al. 1999; Way et al. 2005). Although inmate suicide cases evidence a number of mental health issues, the proportion of cases with documented mental health diagnoses is low compared with that of the total prison population and with suicide cases that do not take place in custody. When Way et al. (2005) compared suicide cases to the mental health caseload and estimates for the non-incarcerated population the results indicated that diagnoses for schizophrenia were similar in proportion to the caseload group

[2] Inmates were matched on time of admission, demographic characteristics, custodial institution, and custodial status.

(about 25%), but much lower than found among non-incarcerated populations (Kovasznay et al. 2004). Likewise, depression and affective/mood disorders were underrepresented among the suicide group compared to the mental heath caseload (9.2% versus 21.2%) (Way et al. 2005). In comparison, over 90% of suicides among non-incarcerated populations have a history of mental illness. (Liebling1992).

A further issue is the extent to which prisoners' mental health problems existed prior to incarceration or whether these problems were brought about by imprisonment. A recent review of suicide cases in the New York Department of Corrections revealed that 70% of inmate suicide cases had received mental health treatment prior to incarceration; 84% had received mental health services during incarceration (Kovasznay et al. 2004). Similar percentages reported by Way et al. (2005) also showed that nearly three-quarters of the suicide cases were currently receiving mental health treatment at the time of the suicide. Over half of the cases (56.1%) were seen by mental health staff within one week prior to the suicide. Llyod (1990) reviewed 13 studies from the U.K., the U.S., Canada, and Australia. His findings indicated "about one-third of inmates who committed suicide had been treated as psychiatric in-patients prior to imprisonment" (Llyod 1990: 6). Based on these numbers, he cautioned that while psychiatric histories were hypothesized to be associated with suicide in prison "none of the studies conclusively showed that previous psychiatric contact was more common among prisoners who committed suicide" (Lloyd 1990:6). In a more recent evaluation, Daniel and Fleming (2006) concluded that an explanation of prison suicide should not focus exclusively on mental health as a predictor of prison suicide; 30% of suicide cases in his sample presented no mental health problems. Given the basis of the importation model—that inmates import characteristics into the prison—the issue of pre-prison versus prison-induced mental illness/distress is important.

Combined Model

Singularly, the deprivation and importation models of prison suicide have limits for explaining suicide in prison. Most important for the deprivation model is the fact that most prisoners do not commit suicide in prison. Within similarly depriving institutions, or within a single institution that is characterized by high levels of deprivation, most inmates do not commit suicide. The deprivation perspective fails to explain why incarceration leads to suicide for some inmates but not others. What is it that distinguishes these groups?

Importation theorists have attempted to address this question by comparing suicide cases with groups of non-suicidal inmates and non-incarcerated populations. Citing the prevalence of risk factors for suicide among inmates, these theorists conclude that individual characteristics rather than prison specific features explain suicide. Two problematic issues rest with this conclusion. First, by overemphasizing individual characteristics such as mental illness and psychiatric diagnoses, importation models ignore or fail to adequately address the prison context and the role of the prison environment in suicide. In doing so, the painfulness and harm caused by the prison experience is denied without reason or consideration. Second, given that inmates in general possess many risk factors for suicide, again, why is it that most inmates do not commit suicide in prison?

A remaining question concerns the fact that most prisons do not experience suicide. What is it that distinguishes these prisons? Why do suicides occur disproportionately in one prison and not another? Presently, relatively little is know about which aspects of the prison experience contribute to suicide (Liebling 2006).

Based on the weaknesses of these models, unanswered questions, and findings of prior research, the current consensus among prison suicide researchers is that inmate characteristics

and features of the prison environment in combination and in interaction best explain suicide in prison. In summarizing one of the most recent books on suicide in prison, Dear (2006: 235) offers the following assessment:

> The authors of every chapter in this book have expressed the view that suicide and other self-harm in prison stem from the interaction of personal vulnerabilities that the prisoner brings into prison (importation factors) and features of the prison environment (deprivation factors). It seems that there are no hardened proponents of either the importation or deprivation model left. The theories, personal opinions based on experience in prisons, and empirical research cited throughout this book support the interactionist perspective.

Leading this interactionist movement, Allison Liebling, based on her extensive research in U.K. prisons, convincingly argues that "a synthesis between the two approaches is required in any satisfactory theory of prison suicide" Liebling (2006: 17).

The combined model recognizes that prisons are painful and that certain prison conditions increase the likelihood of suicide *for some inmates*. Key to the combined model is the idea that inmates react differently to these conditions largely as a result of levels of vulnerability (e.g., socio-demographic variables, psychiatric history, as well as values, norms, and life experiences). Unlike previous applications of the importation model within the prison suicide literature, the combined model considers the role of the prison environment in promoting/ restricting suicide and how inmates "cope" with this environment (Liebling 1992; Medlicott 2001; Zamble and Porporino 1988). From this perspective, highly vulnerable prisoners (i.e., those demonstrating the greatest risk for suicide) may successfully adapt to living in prison when conditions are less depriving. Under the most depriving prison conditions, however, inmates' vulnerabilities are exposed; these inmates are worse off compared to other inmates in terms of the ability to cope with the prison environment (Liebling 2006).

Empirical Support for a Combined Model

Although scholars agree on the importance and need for an integrated model of prison suicide, research supporting the combined model is undeveloped, especially with regard to suicide in U.S. prisons. Descriptive studies in U.S. prisons and elsewhere indicate that prison suicide is associated with both deprivation and importation variables (Daniel and Fleming 2002; Kovasznay et al. 2004; Salive, Smith, Brewer 1989; Way et al. 2005; White, Schimmel, and Frickey 2002) (for international studies see Blaauw and Kerkhof 2006; Freuhwald et al. 2004; Green et al. 1993; Hurley 1989; Jenkins et al. 2005; Lekka, Argyriou, and Beratis 2006; Shaw et al. 2004; Skegg and Cox 1991; Tartalli et al. 1999;Wobeser et al. 2002). Much of the empirical evidence for a combined model of prison suicide is found in Liebling's qualitative work in U.K. prisons.

Liebling's (1992; 1995; 1999) early work carried out in late 1980's and early 1990's on suicide attempters in U.K. prisons focused on the development of the combined model and provided much of the empirical support for it. Her qualitative interviews with young prisoners revealed that suicide attempters coped significantly less well with prison life than a comparison group of prisoners drawn randomly from the general population within the same institutions. Differences in background between the two groups reflected inmates' pre-prison lives. Suicide attempters experienced more family violence/breakdown, school difficulties, psychiatric treatment, alcohol/drug abuse, sexual trauma, and previous suicide attempts. In prison, suicide attempters viewed their situation as worse than the comparison group and as a result had more difficulty being locked up, relieving boredom, mixing with other prisoners, engaging in work, education, and release plans, and keeping in touch with family and friends. The vulnerabilities of

the suicide attempter group intensified the effects of these aspects of the prison environment (Liebling 2006).

Subsequent work by Liebling and colleagues (2004) attempted to measure environmental aspects of the prison that reflected the quality or "moral performance" of U.K. prisons and in turn how dimensions of prison quality (i.e., respect, humanity, safety, order, fairness, personal development, and family contact) affected prisoner distress and vulnerabilities for suicide. Central to the prison quality measures was the way inmates viewed and experienced the pains of imprisonment (deprivations).

Building on this research, Liebling (2006) conducted surveys with inmates and staff in 12 U.K. prisons in order to understand the relationship between individual background vulnerabilities, prison quality, and prisoner distress. Her analyses included controls for four background variables indicative of vulnerabilities for suicide: previous suicide attempts, previous self-harm, psychiatric treatment, and drug use. Each of these variables predicted agreement with the statement "I have thought about suicide in this prison." She found that vulnerability indicators were related to the prison setting and prison quality, and that vulnerability and establishment differences significantly predicted prisoner distress. Regression analyses revealed that deprivation indicators explained 45 percent of the variation in distress while "imported vulnerability" measures explained between 8 and 15 percent.

One of the most salient features of the prison environment that predicted suicide thoughts among inmates in Liebling's study (2006) was the presence of a strong traditional culture where staff overused authority, maintained a distance from prisoners, distrusted outsiders including mental health staff, and avoided prisoners' problems. To borrow Goffman's term, this type of

"total" environment was negatively correlated with inmate feelings of safety and fairness and with increased distress among inmates, especially those with specific vulnerabilities for suicide.

Specific Vulnerabilities

Liebling (1992; 1993; 1994; 1995; 1999) and others (Grossman 1992; Roberts and Bender 2008; Rodgers 1999; Themeli 2006;) have written extensively on the specific vulnerabilities that inmates bring to prison, which, in combination with prison conditions, increase the likelihood of suicide. By integrating the deprivation and importation perspectives on prison suicide, these researchers have addressed some of the limitations and discrepancies found in prior studies. The gender-suicide relationship, in particular, has received theoretical attention, although age, race, and mental health indicators are additional vulnerabilities that have been examined.

In explaining the unpredictably similar rates of male and female suicide in prison, Liebling (1994; 2006), Grossman (1992), and Themeli (2006) argue that female inmates differ from male inmates in terms of greater vulnerability and in the ways each experiences the pains of imprisonment. As such, rates of suicide in prison may be as high for females as for male inmates (Liebling 1999). Compared to men, women in prison have reportedly higher levels of psychiatric disorders, histories of physical and sexual violence, and previous suicide attempts. In addition, female inmates have increased difficulties with separation from children and family during incarceration. The location of the relatively few prisons for women makes visiting less likely. There is also evidence that women's prisons, in comparison to men's prisons, offer fewer educational, medical, and vocational services (Themali 2006) and are more overcrowded (Grossman 1992). In essence, women may be more isolated or "cut off" from society than male

inmates and more deprived of goods and services. Themali (2006: 189) concludes "women's experience of the pains of imprisonment is harsher than that of men."

Juvenile offenders are also recognized as a vulnerable group. Suicide risk is related to incarcerated juveniles' greater levels of mental crises such as depression, substance abuse, and histories of family breakdown and violence (Roberts and Bender 2008). Youths' vulnerability for suicide is compounded by prison stressors including fear of violence, bullying, and victimization, and lack of support networks both inside and outside the prison institution. Liebling (1993) found young inmates who attempted suicide were more isolated than a comparison group, having fewer fellow inmates as friends, spending more time in protective custody or segregation, and having fewer visits and contact with the outside. The suicide attempter group was less engaged in education, work, and physical activities (i.e., sports) than the comparison group and spent more time in their cells "feeling bored" (Liebling 1993: 395). Discussions with young prisoners revealed a series of motivations for suicide attempts; most (over half) were related to a combination of problems originating both inside and outside the prison (Liebling 1993).

Integrated importation and deprivation models have also been used to explain racial differences in inmate suicide (Carroll 1988; Johnson 1976; Rodgers 1995). Although controversial, the conclusion is that the prison experience is less painful for black inmates whose pre-prison cultural orientations are similar to prison life norms and life experiences. In contrast, the experience of prison is incongruent with the pre-prison lives of white inmates. Referring to the white, middle-class inmate, Rodgers (1995: 120) hypothesized that the "inmate finds himself suspended between two worlds, thrust into an anomic situation—a meaningless abyss—from which suicide may seem to be the only meaningful alternative."

Mental illness and psychiatric disorder are the most commonly cited vulnerabilities for suicide. Because the presence of mental illness is highly prevalent among inmates in general and relatively low compared to suicide cases in non-incarcerated populations, mental illness alone can not fully explain suicide in prison. Using a combined model of prison suicide, mental illness is viewed as a vulnerability that interacts with the prison environment rather than a sole cause of suicide. Research suggests that inmates with mental illness are often victims of abuse and violence while incarcerated (Liebling 1992). In some cases, prisons lack the mental health services to meet the needs of inmates with mental health/psychiatric problems (Skegg and Cox 1991).

The most prominent prison feature affecting the mental health of inmates overall is the use of isolation or solitary confinement (Kupers 1999). Problem inmates, including those with mental difficulties and those who attempt suicide, are often isolated in segregation cells and noted as discipline problems. Ironically, deprivation research shows that these are the most likely and most opportune conditions for suicide in prison (Kupers 1999). In a case control study of suicides in Austrian prisons, Freuhwald et al. (2004) found psychiatric diagnoses and single-cell accommodations as the main risk factors for suicide in custody. While this study only speculated about the combined effects of mental illness and isolation on suicide, logistic regression results evidenced substantial support for both indicators. Suicide cases were 17.4 times more likely to have a psychiatric diagnosis and 16.9 times more likely to be housed in single-cell accommodation than the comparison group. Within supermaximum security prisons, there is also evidence that the solitary conditions that define these institutions have devastating mental health consequences for inmates, especially those with pre-existing mental illnesses (King 2005 and 2006; Johnson 2005; Toch 2001).

Statement of Research Hypotheses

To recap, the deprivation theory of prison suicide suggests that higher levels of deprivation increase the likelihood of suicide. The importation model attributes suicide prison to the characteristics of inmates most at risk of suicide. In the combined model, prison suicide is explained by the interaction of depriving prison conditions and individual risk factors. That is, for some inmates, greater levels of deprivation expose vulnerabilities, which then in turn increase the likelihood of suicide. Under less depriving conditions, however, the likelihood of suicide is reduced, even for inmates at high risk of suicide. Based on the tenets of the deprivation, importation, and combined theoretical models as well as prior research findings, this study examines the following research hypotheses.

First, regarding the relationship between deprivation and suicide, it is hypothesized:

H1: Prisons that are more "cut off from society" will be more likely to experience suicide. More specifically,

- H1a: Prisons located in rural areas versus urban locations will be more likely to experience suicide.
- H1b: Prisons where inmates are allowed to depart the facility for work or study will be less likely to experience suicide than prisons without such programs.
- H1c: In higher security settings, suicide will be more likely. That is, compared to minimum and medium security prisons, prisons designated as maximum or supermaximum security will be more likely to experience suicide.

H2: Prisons where deprivation of goods and services is high will be more likely to experience suicide. More specifically,

- H2a: Prisons operating over capacity will be more likely to experience suicide than prisons under capacity.
- H2b: Prisons under a court order to reduce the number of inmates will be more likely to experience suicide than prisons not under such court orders.

H2c: Prisons that offer a greater number of vocational, educational, or psychological programs will be less likely to experience suicide.

H3: Prisons with greater levels of violence will be more likely to experience suicide. For example, prisons with high assault rates will be more likely to experience suicide compared to prisons with low assault rates.

Next, regarding the relationship between inmate composition variables and suicide, it is hypothesized:

H4: Male only prisons will be more likely to experience suicide than female only prisons.

H5: Prisons that house inmates under the age of 18 will be more than to experience suicide than adult only prisons.

H6: Prisons with a greater proportion of white inmates will be more likely to experience suicide.

H7: Prisons with a greater proportion of inmates receiving mental health services will be more likely to experience suicide.

Finally, the study considers the relationship between the combined effects of deprivation and importation indicators and suicide. Broadly, in prisons with greater levels of deprivation suicide will be more likely for high risk groups of inmates. It is hypothesized:

H8: At higher levels of deprivation[3], no differences in suicide are expected between male and female prisons.

H8a: At higher levels of deprivation, females will be as likely to experience suicide as male inmates (evidenced by suicide rate comparisons).

H9: At higher levels of deprivation, prisons that house juvenile inmates (under 18 years old) will be more likely to experience suicide than adult only prisons.

H10: A higher levels of deprivation, prisons with a greater proportion of white inmates will be more likely to experience suicide (Rodgers 1995).

[3] Higher levels of deprivation include rural location, less likely to depart the facility for work or study, higher security levels, overcrowding, fewer programs for inmates, higher assault rates.

H11: At higher levels of deprivation, prisons with a greater proportion of inmates receiving mental health services will be more likely to experience suicide.

Chapter two presented the theoretical models that frame the research questions of the dissertation, provided empirical support for these models, and outlined the study's research hypotheses. Hypotheses 1 through 11 are tested in a series of multivariate analyses in order to determine the relative and combined effects of each theoretical model on the likelihood of suicide. Results of the multivariate models are presented in chapter five of the dissertation and discussed in depth in chapter six. Before proceeding to the results chapters, the data, methods, and analytic strategy are described (chapter three).

CHAPTER 3

RESEARCH DESIGN & METHODS

The goal of chapter three is to describe the data currently available on suicide in U.S. prisons including the Census of State and Federal Adult Correctional Facilities (CCF) data used in the current study, to present the key independent variables included in the analysis, and to explain the analytic strategy. The chapter begins with a description of the data, followed by an outline of the measurement of the dependent and independent variables. The rationale and appropriateness for using the CCF data and the Negative Binomial Regression Model (NBRM) concludes the chapter.

Data

In order to address the research questions posed in this study, national data on prison suicide is needed. While the vast majority of primary (original) data collections used to examine suicide are restricted to one prison or prison system, several national, secondary data sources containing information on the incidence suicide in U.S. prisons currently exist. These include The National Corrections Reporting Program (NCRP), the Deaths in Custody Reporting Program (DCRP), and the Census of State and Federal Adult Correctional Facilities (CCF).

The National Corrections Reporting Program (NCRP) is collected annually by the Bureau of Justice Statistics. The data contains individual level data on all admissions to and releases from prison each year. In 2000, demographic, criminogenic, and sentence related information was collected for approximately 500,000 inmates. For the purposes of the NCRP, deaths are considered “releases” from prison. Thus, information is available on counts of suicide. Unfortunately, in most cases the data do not specify type of death. Suicides and homicides are

reported together or, more often, suicides are recorded as "other" unnatural deaths. Due to these classifications, only 42 deaths were categorized as suicide in 2000.

A second data source is the Deaths in Custody Reporting Program (DCRP). Collected annually since 2001, this collection contains information on counts of deaths including suicides for local, state, and federal correctional agencies in the U.S. Demographic, criminal/offense history, and situational factors related to each death are supplied. As cited throughout the dissertation, the DCRP (Mumola 2005) provides the best individual level data on suicide among U.S. prisoners to date. Although originally scheduled for release in May of 2006, the DCRP data is currently not available for public use.

The data used in the current study is drawn from the third source, the Census of State and Federal Adult Correctional Facilities (CCF). The CCF is a longitudinal survey of U.S. prisons, sponsored by the U.S. Department of Justice and the Bureau of Justice Statistics and conducted by the U.S. Census Bureau.[4] Compiled every five years since 1974, the CCF contains data on the characteristics of federal, state, and private adult correctional facilities, including prisons, prison farms, reception/diagnostic/ classification centers, vocational training facilities, correctional drug/alcohol treatment facilities, and state-operated local detention facilities. Data is also collected from community-based correctional facilities where 50% or more of the residents are regularly permitted to depart unaccompanied. These facilities include halfway houses, restitution centers, and pre-release, work release, and study release centers. The CCF specifically excludes data on facilities operated by the military, the Immigration and Naturalization Service (INS), the Bureau of Indian Affairs, the U.S. Marshals Service, hospitals, and those locally operated (i.e.,

[4] Mail questionnaires are sent to each facility and completed by the appropriate correctional officials. Tardy respondents receive reminder notes, and are later contacted via telephone/email. In each CCF enumeration, follow-up procedures resulted in a final response rate of 100%.

jails). Facilities that house only juveniles are excluded as well although some of the adult facilities included in the census also hold juveniles.

The CCF represents the most comprehensive national collection available on U.S. prisons. Each census provides information on prison conditions, including inmate population size, design capacity, security level, facility design and function, housing, operational authority, rehabilitative programs offered and the level of participation in them, community release, and court orders; inmate and staff characteristics (i.e., gender, age, and race); and the number of assaults on staff and inmates. Data on the cause of inmate deaths are also available, including those due to suicide.

The primary advantage of the CCF is that the data allow for an examination of prison suicide on a national level. As previously noted, prior research on prison suicide has been limited to studies of one prison or prison system where suicides occurred, and has focused on individual inmate characteristics (risk factors) that predict suicide. Because these studies were situated in one prison or prison system, there was little variation in the findings, or no findings, regarding the relationship between the prison context and suicide. Other national sources of data on suicide in U.S. prisons contain reporting inconsistencies or are not currently available for analysis. In addition, these data collections only contain information on inmate suicide cases. No data on prisons where the suicides occur is provided. The CCF provides comparison data for prisons with and without suicides that can be used to determine the extent to which features of the prison environment as well as inmate characteristics influence the likelihood of suicide.

To test the deprivation, importation, and combined models of prison suicide, this study uses data from the most recent enumeration of the CCF, which was collected in the year 2000 (CCF 2004). The 2000 CCF contains organizational level data on 84 federal prisons and 1,584

state and state-operated private facilities in operation on June 30th (n=1,668). Due to missing data on the dependent variable, suicide, the 84 federal facilities are excluded from the analyses. In addition, the analysis excludes facilities whose sole function is alcohol/drug treatment, work release/prerelease, and similar community-based corrections programs (i.e., parole/probation). Thus, the analysis focuses exclusively on correctional facilities that function as general adult confinement. A small minority of the facilities serve multiple functions such as reception/ diagnosis/classification, mental health/psychiatric confinement, and community corrections. For these facilities, general adult confinement applies to largest number of inmates.

Table 3.1 shows the distribution of prison functions for all prisons in the CCF as well as those of the 1,082 state and private adult confinement facilities included in the final sample. The largest group of excluded facilities is community corrections programs followed by alcohol/drug treatment centers.

Independent Variables

Deprivation Variables

Six deprivation variables that have been used in prior prison suicide and violence research are included in the analysis. The first three deprivation measures capture the "total" or "not-so-total" nature of the prison institution or the extent to which inmates are "cut off from society." These include dichotomous indicators of prison location (rural area=0, urban area=1) and whether inmates are allowed to leave the facility unaccompanied for work or study. Prisons that allow inmates to depart are coded 1. Security level is the final variable in this group and is represented by a set of dummy-coded variables distinguishing super-maximum ("supermax"), maximum, medium, and minimum security prisons (the reference category). Higher security levels signify greater levels of deprivation.

Table 3.1 CCF, 2000 Facilities:
Distribution by Operational Authority and Primary Function
(Facilities included in current study indicated in bold)

	Federal Prisons	State Prisons	Private Prisons	Total
Primary Function:				
General Adult Confinement	80	**976**[a]	**106**[b]	1,162
Boot Camp		23	2	25
Reception/Classification		12	1	13
Medical Treatment/Hospital	3	4		7
Mental Health/Psychiatric		4		4
Alcohol/Drug Treatment		27	18	45
Youthful Offenders		13		13
Community Corrections		238	128	366
Return to Custody		9	5	14
Geriatric Care				0
Other	1	14	4	19
Total: CCF, 2000	84	1,320	264	1,668
Total: Current Study	**0**	**976**	**106**	**1,082**

[a] Other functions include 4 boot camp, 47 reception, 5 hospitals, 8 mental health, 9 alcohol/drug treatment, 5 youthful offender, 44 community corrections, 2 return-to-custody, 3 geriatric care, and 9 other facilities.
[b] Other functions include 2 reception, 1 mental health, 3 alcohol/drug treatment, 1 youthful offender, 15 community release, 2 return-to-custody, and 1 other facilities.

The second group of deprivation variables contains three measures that gauge a prison's level of deprivation of goods and services. The first two variables are measures of overcrowding. Due to the use of different measures and definitions of overcrowding in previous studies, researchers have produced mixed results regarding the effect of overcrowding on prison suicide. In some prisons, overcrowding provides inmates less opportunities for suicide. Inmates are in close proximity to one another, usually in multiple occupancy cells or dormitories, resulting greater levels of peer supervision. Conversely, the lack of goods and services, such as inmate vocational, educational, and psychological programming, that accompanies situations of overcrowding may increase inmates' feelings of boredom and deprivation and thus increase the

likelihood of suicide. The first measure of overcrowding is a dichotomous variable that distinguishes prisons operating over or under design capacity. Prisons over capacity are coded 1. While prisons may operate over/under capacity this does not necessarily represent the reality of prison overcrowding. Prisons that are ordered by the courts to reduce the numbers of inmates represent the most serious and well-documented instances of overcrowding. Because the deleterious effect of overcrowding is affirmed in numerous court decisions where prisons have been ordered to improve specific conditions of confinement or reduce the number of inmates, a dichotomous indicator for whether the prison is under a court order to reduce the number of inmates is also included (no court order=0, court order=1). The second variable in this category is a count of the number of special programs available to inmates. These programs include drug/alcohol, psychological, HIV/AIDS, and sex offender counseling along with employment, life-skills, and parenting skills programs.

The final deprivation variable assesses the degree of violence in a prison. The CCF data includes counts of the number of inmate on inmate assaults as well as the number of inmate on staff assaults. These counts and the average daily population of inmates are used to calculate the rate of inmate assaults in each prison. The level of prison violence is interpreted as the number of inmate assaults per 100 inmates.

Importation Variables

Four importation variables are examined as predictors of prison suicide. Each of these variables is measured at the aggregate/prison level and serves as a proxy for inmates' characteristics. These include inmate gender, age, and racial composition. The gender composition of a prison is represented by a set of dummy-coded variables distinguishing male-only (the reference category), female-only, and prisons that house both male and female inmates. Inmate age is represented by a dichotomous variable that denotes whether a prison houses

inmates under the age of 18. Prisons housing inmates under 18 are coded 1. Racial composition is operationalized as the proportion of white inmates, calculated as the number of white inmates divided by the total number of inmates and multiplied by 100. The operationalization of this variable was based on prior research on prison violence and suicide, which indicates that white inmates are more likely to commit suicide in prison than other racial/ethnic groups. The final importation variable is the proportion of inmates receiving prison mental health services, which is calculated analogously to that of racial composition. It is important to note that this variable represents mental health treatment received in prison rather than inmates' mental status prior to incarceration.

Control Variables

The analysis also includes a number of control variables, which may be predictive of prison suicide. The first control variable is a dichotomous variable that distinguishes between state and private prisons. Private prisons are coded 1. Second, prison age in years (since original construction) is included as a general measure of the physical and aesthetic quality of a prison. In addition, the analysis takes into account the effect of prison size on suicide. Size is operationalized as the average daily prison population (average number of inmates/prison). Here, size represents an exposure effect and consequently receives special consideration in the regression model. The exposure effect is described in more detail in the analytic strategy section of this chapter (see page 54). As an additional control, the suicide rate per 100,000 U.S. residents is included for each state to capture any relationship between suicide committed inside and outside prison. State suicide rates were obtained from the Center for Disease Control and Prevention's annual mortality data on fatal injuries, reported by the National Center for Injury Prevention and Control and available online via the Web-based Injury Statistics Query and

Reporting System (WISQARS™) (http://www.cdc.gov/ncipc/wisqars/). The state rates included in the analysis are age adjusted to resemble those age groups most likely to be incarcerated. Hence, rates are reported for U.S. residents ages 16 to 85 and for the calendar year 1999—the year for which the CCF data was collected (July 1, 1999 – June 30, 2000). If prison suicide is explained by factors external to the prison rather than specific features of the prison environment (e.g., individual characteristics such as age, gender, race, and mental health status), the suicide rate for non-incarcerated U.S. residents may be a significant predictor of suicide in prison. This possibility is considered at length in chapter four, where prison suicide rates and rates of suicide in the U.S. resident population are compared.

Analytic Strategy

Prison suicide is the dependent variable in this study. Prison suicide rates, counts of suicide, and a dichotomous variable indicating whether a prison reported one or more suicides in the 2000 CCF are examined using two analytic approaches. As presented and described in chapter four, the first approach focuses on the relationship between prison suicide and suicide among non-incarcerated U.S. residents. The goal is to compare the incidence of prison suicide and prison suicide rates (per 100,000 inmates) for each state with the corresponding state rates for U.S. residents (per 100,000 population) to determine if suicide rates in prison are higher than those for the general non-incarcerated population. Rate comparisons provide some initial insight into whether suicide results from prison specific features or characteristics of prisoners, and thus serve as preliminary evidence for the deprivation or importation models of prison suicide.

In the second approach, a series of regression equations is estimated to test the deprivation, importation, and combined models of prison suicide. The first two equations alternately capture the unique effects of the deprivation and importation variables on prison

suicide by analyzing each set of variables separately. The first equation includes only the deprivation variables while the second equation includes only the importation. The final, fully specified equation includes variables from both models along with control variables. To gauge the combined effects of the deprivation and importation variables on suicide, the final equation incorporates several sets of interaction terms. The dependent variable for the multivariate analyses is operationalized as a one-year count of the number of suicides in U.S. prisons. Due to the nature of this dependent variable, this approach employs a regression model designed specifically for count data.

Models for Count Data

Four models have been developed to estimate dependent variables that represent counts including the Poisson, the modified Poisson, the Negative Binomial, and Zero-inflated Models (Beck and Tolnay 1995; Cameron and Trivedi 1986 and 1998; Long 1997; Powers and Xie 2000). Each of these models is preferred over ordinary least squares regression (OLS), which tends to produce profoundly incorrect standard errors and thus incorrect inferences about relationships between variables. OLS models are inappropriate for count data because counts are inherently discrete (e.g., whole numbers or integers only) and by definition are truncated or bounded at zero (e.g., negative counts are not possible). As is the case with the distribution of suicide counts in the CCF data, count dependent variables tend to be highly skewed, making it difficult for errors in an OLS model to assume a normal distribution.

The Poisson and modified Poisson models assume that the dependent variable has a positively skewed shape that becomes more "normal" in shape as the mean increases. These models perform best when the mean and variance are equal. A common problem with Poisson models is that, empirically, the conditional variance of the dependent variable is often greater

than its mean (known as overdispersion). When overdispersion is present, Poisson models produce improperly small standard errors, large t values, and incorrect significance levels (Type I error). Efficient estimates can be produced by using the Negative Binomial Regression Model (NBRM), which yields an error term to account for overdispersion (alpha, α). A likelihood ratio test can be used to determine the statistical superiority of the NBRM relative to the Poisson model. In most cases, the NBRM is the preferred model (Long and Freese 2003).

Another common issue with highly skewed count data is the presence of excess zeros in the dependent variable. Zero-inflated count models (Poisson and NBRM) account for excess zeros by allowing a two-part analysis of the counts that distinguishes subjects in the always and not always zero groups (Lambert 1992). The first part is akin to a binary logistic regression equation predicting the likelihood of a zero count on the dependent variable. Part two resembles the Poisson and Negative Binomial models predicting a factor change in the expected count for subjects with non-zero values on the dependent variable. A statistical test (Geene 1994; Vuong 1989) can be used to compare the model fit of Zero-inflated and other count models. Because Zero-inflated count models estimate two separate equations, there are often overlapping sets of variables included in the models which increase the number of parameters being estimated. This results in statistically weak models where information is spread too thin. Even when Zero-inflated models are statistically supported, however, it is possible to "overfit" the data. Thus, the best rationale for Zero-inflated models is that it makes statistical and theoretical sense. For example, are there compelling reasons why some subjects but not others are in the always zero group or is it the case that subjects' counts on the dependent variable are a result of chance? In the absence of any theoretical rationale, the Negative Binomial, or in some cases, the binary

logistic regression model is preferred over the Zero-inflated count model (see Long and Freese 2003).

Count Models and the Current Study: Rationale for the NBRM

In the current study, a Negative Binomial Regression Model (NBRM) is used to analyze the number of prison suicides. The decision to use the NBRM makes both statistical and substantive sense. First, there is significant evidence of overdispersion (α=.34; G^2 = 3.06; $p < .05$); therefore, the NBRM is preferred over the Poisson model. Second, the variation in the number of suicides is quite small and contains excess zeros. Only 12% of the prisons reported suicides in the 2000 census (n=130). The number of suicides in these facilities ranged from one to four, with the majority prisons experiencing only one suicide (refer to Table 5.1, page 73). This marked positive skew in distribution would normally suggest support for the Zero-inflated count model. The Vuong statistical test does in fact support the Zero-inflated model over the NBRM. Because the variation is the number of suicides is quite small, however, the information obtained in the Poisson portion of the Zero-inflated model is weak, evidencing no significant differences in the expected count of suicide for any of the key independent predictors. In addition, because most of the prisons are estimated within the binary portion of the model, the results are nearly identical to the NBRM as well as a binary logistic equation predicting prison suicide. Consequently, little additional information is obtained by using the Zero-inflated model. More importantly, the Zero-inflated count model predicting prison suicide makes little theoretical sense. Are there compelling reasons (i.e., based on inmate characteristics or features of the prisons) why a prison could not experience suicide? In the case of prison suicide, the probability of suicide varies by prisons, but all prisons have some probability of suicide. Thus, inmate composition and prison features may increase/decrease the probability of suicide, but do

not restrict/eliminate the possibility of suicide. Substantively, then, the Zero-inflated model does not make sense and may indeed overfit the data. Thus, for the current study, the NBRM is preferred over the Zero-inflated model. To test the robustness of the findings, sensitivity analyses including results from the Zero-inflated and binary logistic regression models are explored. These models are presented and described in the appendices. All of the regressions are performed using the STATA statistical software package (version 8.2).

Additional Model Considerations: Exposure and Clustering

Two important assumptions about the data are considered in the paragraphs below: 1) the ways in which the number of inmates in each prison (exposure) affects suicide and 2) the effect that clustering of prisons within states has on suicide. Violations of these assumptions have important implications for the production of biased and inefficient estimates in regression models. As such, the effects of exposure and clustering on prison suicide are described in turn.

Exposure. Implicit within count models is the assumption that each observation possesses the same potential for an event. In the current study, this means that each prison is "at risk" of suicide regardless of the number of inmates in each prison. However, the number of inmates in each prison varies dramatically and the number of suicides in each prison varies directly with the size of the inmate population. That is, larger prisons produce more suicides simply because of the increased number of inmates "at risk" in these facilities.

This variation in exposure can be incorporated quite easily into count models. Including a variable that indicates prison size (measured by the average daily population) produces a rate, or exposure effect, that offsets the number of suicides in each prison. The use of an exposure variable is superior in many instances to analyzing rates as response variables because it makes use of the correct probability distribution. In addition, this technique is useful when analyzing

relatively rare events such as deaths, particularly when the number of events is small compared to the size of the population that generated the event.

The STATA statistical software package (version 8.2) provides a method to control for risk. To fit the model including exposure, the option *exposure(varname)* is used. In the following equations, the effect of differential exposure is included as the log of the number of inmates (ADP in 2000) with a regression coefficient constrained to equal one. Because STATA does not provide coefficients on the exposure variable, none are reported in the results section of the dissertation (chapter five).

Clustering. Similar to other types of regression models, count models assume the independence of observations. In some data, observations share similarities that violate this assumption. For example, in the CCF data, prisons are nested within states (50 states and the District of Columbia). In this case, it is highly likely that the observations within states, known as clusters, are not independent. Prison suicide may vary by state. In addition, responses on key independent variables may be shared by prisons within the same state due to state policies and regulations or similarities in state-wide prison conditions (i.e., overcrowding, prison size, racial composition of inmates, etc.). Incorporating state suicide rates in the count models as a control variable in and of itself violates the assumption of independence because prisons in each state share the same rate of suicide per 100,000 residents in the U.S. general population.

One implication for regression models is that when the clustered nature of data is ignored biased standard errors (usually underestimated) are produced and statistical inference tests are invalid. This occurs because observations within clusters are correlated. As the correlation becomes larger, each observation contains less unique information.

To correct the standard error estimates in these clustered models, traditional standard errors are replaced with robust standard errors, which are known as Huber/White sandwich estimates. Using STATA (8.2), these estimates are easily generated with the *cluster(varname)* option. This technique specifies which group each observation belongs to and denotes the ways observations within groups may be correlated. This correction does not alter parameter estimates (beta coefficients) but tends to increase the size of the standard errors, producing more conservative statistical tests. In the NBRM, state federal identification processing codes (FIPS) are used to identify prisons within each state and account for the clustered nature of the CCF.

Chapter three outlined the research design and methods. Included in the chapter was a description of the data used for the analysis, the operationalization of the independent and dependent variables, and an explanation of the analytic strategy employed. In the chapters that follow, the results of the analyses are presented and discussed. Chapter four focuses specifically on the comparison of prison and U.S. suicide rates. The purpose of these comparisons is to determine empirically whether suicide rates are in fact higher in prison than the general U.S. population and to determine the extent of variation in rates at the state level. More theoretically, outcomes of the rate comparisons provide initial support for either the deprivation or importation models of prison suicide. The multivariate analyses which test the deprivation, importation, and combined models of prison suicide are presented in chapter five. The results chapters are followed by a discussion of the theoretical and practical implications and limitations of the findings as well as directions for future research on the topic (chapter six).

CHAPTER 4

COMPARISON OF PRISON AND U.S. SUICIDE RATES BY STATE

Before presenting the results of the Negative Binomial Regression Model (NBRM) testing the deprivation, importation, and combined models of prison suicide (see chapter 5), this chapter examines the relationship between prison suicide and suicide among non-incarcerated U.S. residents. The purpose of these comparisons is to provide a description of national and state prison suicide rates, to show the variation in prison suicide by state, and to determine statistically whether suicide rates in prison are higher than those for U.S. residents in general. Comparisons made in subsequent pages of this chapter point preliminarily toward an explanation of prison suicide that focuses on features specific to the prison or, alternately, whether suicide both in and outside of prison operates in similar ways (i.e., based on characteristics of individual who commit suicide). Higher rates among inmates imply that a prison-based explanation is necessary to account for the difference in rates and to understand prison suicide. Similar rates, in contrast, indicate that a common individual level explanation may be used to understand suicide for both populations.

In addition, the following comparisons seek to address the methodological shortcomings of previous studies, first, by comparing national suicide rates and rates for each state, and second, by accounting for the age and gender composition of state prisons. Prison suicide rates are compared with age-adjusted state suicide rates for U.S. residents (ages 16-85), which approximate the age composition of adult prisons in the U.S. Due to gender differences in

suicide as well as the gender make-up of prisons, male and female rates for prison and the U.S. resident population are considered separately.

Prior Research

Typically, articles written on prison suicide acknowledge the discrepancy between prison suicide rates and those for the U.S. general population, with prisons rates reportedly higher than those in the community (Hayes 1995). Far fewer articles recognize the complexity involved with the calculation and comparison of these rates (Hayes 1995; Mumola 2005). The most common issues concern the level of comparison (state or national), the selection of an appropriate comparison group, and the calculation of prison suicide rates.

Early estimates of the 'suicide problem' were calculated within a small number of individual prison systems. Based on these studies, prison suicide rates varied widely. For example, a rate of 18.7 suicides per 100,000 inmates was reported within the Texas prison system (Anno 1985) while a rate of 53.7 suicides per 100,000 inmates was found in the Oregon system (Batten 1992). For the years 1979-1987, Salive, Smith, and Brewer (1989) reported a rate for the Maryland State Prison System of 39.6 suicides per 100,000 male inmates. Current estimates for New York State correctional facilities are 16.2 suicides per 100,000 inmates (Kovasznay et al. 2004; and Way et al. 2005). Similar rates (15.2) in other state correctional systems are reported by Daniel and Fleming (2006) (see also He et al. 2001).

In these types of studies, researchers reported rates for each state prison system and compared those rates with the state or national suicide rate. This approach takes into account the variations that exist among state prison systems as well as the relationship between place (state) and suicide. While this method provides state-level information, these studies lack comparative

data for other state systems. Suicide is consistently more prevalent in some states than others. It is not certain if the results are generalizable to other states.

Three evaluations have compared state prison and U.S. suicide rates on a national level (Hayes 1995; Lester 1998; Mumola 2005). In a 10-year (1984-1993) review of prison suicides rates by state, Hayes (1995) reported rates ranging from 7.1 (New Mexico) to 101.7 (North Dakota). For reference, the rates reported by Hayes are presented in Table 4.1. Hayes concluded overall that rates of suicide in prison were disproportionately higher than the general population.

> Although it might be assumed that prison systems with high rates of suicide would mirror the suicide rate in their respective communities, current data do not support this proposition…jurisdictions with high prison suicide rates had suicide rates for the general population comparable to the national average of 12.2 per 100,000 people (Hayes 1995: 31).

Lester (1998) compared prison and community suicide rates for each state. Using the prison suicide rates reported by Hayes, Lester found a small but statistically significant association between prison suicide rates, the total suicide rate of the states, and the male suicide rate of the states (Pearson correlation .24; $p<.05$, one tailed).

Ten years following Hayes, Mumola (2005) reported prison suicide rates based on data from the recently enacted Deaths in Custody Reporting Act of 2000 (DICRA, PL 106-297). His summary of the DCRP data included rates for each state. Table 4.1 displays the rates he reported along with those reported by Hayes (1995). Suicide rates for each state were not compared, but rates were analyzed on a national level using comparative mortality rates from the Centers for Disease Control and Prevention. According to Mumola (2005: 11):

> State prisoners had a higher rate of suicide (14 per 100,000) than the overall resident population (11). Once standardized to match the State prisoner population, the U.S. resident rate of suicide (18) exceeded that of State prisoners in 2002.

Hayes, Lester, and Mumola reached different conclusions with these comparisons. According to Mumola and others, inmates are considered a high suicide risk group (Liebling 1992; WHO 2000). The prevalence of risk factors among inmates introduces a possible selection bias. Prisons have higher rates of suicide because the population is more suicide prone than the comparison group. Mumola used a matched comparison group based on age, gender, and race to support this notion.[5] By weighting the rates by the proportion of all inmates represented in specific subgroups (e.g. white, females ages 35-44), he provided standardized rates for the U.S. population that matched the characteristics of State prison populations. Mumola notes that "the resulting rates estimate what the resident population mortality rates would be if the U.S. resident population had the same demographic composition as prisons and jails." Using this approach, he did not find that rates of suicide in prison were higher than the general community.[6] In contrast, Hayes' evaluation found that rates of suicide in prison were more than 50% higher than those for the general community. Hayes' study, however, did not consider how prison population characteristics differ from those of the U.S. resident population and, in particular, how these characteristics increase/decrease rates of suicide in prison.

Each of these evaluations has limitations that influence how the findings are interpreted. First, although both Hayes and Mumola included prison rates by state, neither provided comparisons by state. Rather, prison and community suicide rates were compared only on the national level. Second, regardless of the methodological rigor, Mumola's matching procedure masks much about suicide in prison. For example, do male and female inmates commit suicide at

[5] Mumola (2005) was able to match on demographic characteristics, but not on mental health or other risk factors.
[6] For a similar method that compares federal prison suicide rates see White, Schimmel, & Frickey (2002).

Table 4.1 Prison Suicide Rates Reported by Hayes and Mumola

	Hayes (1993)		Hayes (1984 – 1993)		Mumola (2001 – 2002)	
State	No. of Suicides	Rate	No. of Suicides	Rate	No. of Suicides	Rate
AL	1	6.1	17	13.9	2	4
AK	2	74.0	20	87.3	3	36
AR	1	12.6	13	21.9	8	36
AZ	6	33.9	38	30.4	6	11
CA	29	25.8	176	22.6	52	16
CO	2	25.4	17	31.5	5	14
CT	1	7.5	32	37.3	9	24
DC	4	37.1	13	15.6	--	--
DE	2	54.5	7	22.9	4	28
FL	5	9.4	43	11.2	11	8
GA	3	10.8	34	16.5	10	11
HI	0	0	7	31.2	2	19
IA	0	0	6	15.9	3	18
ID	0	0	7	41.8	3	28
IL	4	11.6	38	15.6	20	22
IN	2	13.8	20	17.0	6	15
KS	0	0	12	22.4	4	23
KY	1	11.6	14	21.1	1	4
LA	2	12.4	28	21.8	2	5
MA	1	10.4	26	32.8	3	15
MD	3	14.9	30	19.4	13	27
ME	0	0	9	67.5	9	24
MI	7	19.1	43	16.6	11	11
MN	0	0	27	88.3	2	15
MO	1	6.5	25	19.3	6	11
MS	2	23.3	17	24.1	2	7
MT	0	0	10	82.8	1	19
NC	3	13.5	25	13.5	8	12
ND	0	0	5	101.7	0	0
NE	1	40.8	10	45.4	0	0
NH	0	0	3	25.8	0	0
NJ	3	14.6	26	17.3	3	5
NM	0	0	2	7.1	4	34
NV	1	16.3	21	42.0	3	15
NY	8	12.4	53	11.0	21	15
OH	8	19.9	49	17.1	0	0
OK	3	26.8	32	34.3	2	5
OR	3	45.8	13	25.2	5	23
PA	3	11.5	49	25.9	6	8
RI	2	74.1	12	58.8	2	28
SC	1	5.8	21	16.1	2	5
SD	1	66.4	6	49.7	4	71

cont.	Hayes 1993		Hayes 1984 – 1993		Mumola 2001 – 2002	
State	No. of Suicides	Rate	No. of Suicides	Rate	No. of Suicides	Rate
TN	2	17.4	23	27.5	2	6
TX	17	25.5	89	19.7	49	17
UT	1	38.2	13	59.5	4	49
VA	4	21.9	28	20.5	4	6
VT	1	114.3	2	40.2	1	36
WA	0	0	22	30.4	4	13
WI	3	34.2	10	15.0	13	32
WV	0	0	3	19.8	1	14
WY	3	286.3	6	68.0	1	33
Total	158	17.8	1339	20.6	337	14

rates similar to their community counterparts? Do similar explanations for suicide hold up both in prison and in the community? The comparisons made in this chapter seek to address these limitations by analyzing state suicide rates for prison and non-incarcerated populations (age-adjusted) and by providing separate rate comparisons for males and females (age-adjusted).

Data

As noted in chapter three, state suicide rates for the non-incarceration comparison population were taken from CDC morality reports and represent the number of suicides per 100,000 U.S. residents between the years 1999 and 2000 ((http://www.cdc.gov/ncipc/wisqars/). Rates were obtained for each U.S. state and for male and female residents. Rates were also age-adjusted to approximate the age distribution of adult prison populations. Prison suicide rates were calculated by dividing the number of suicides by the average daily inmate population (ADP) and multiplying by a factor of 100,000. For each state, the number of suicides and the ADP were each summed and the rates were calculated analogously.[7]

[7] The racial/ethnic make-up of suicide cases was not provided in the CCF nor was the mental health status of inmates who committed suicide. As a result, the rate comparisons could not be matched on these characteristics.

Using ADP to calculate suicide rates has been criticized as an inaccurate estimate of the annual correctional population (Liebling 1992; O'Mahony 1994). Critics argue that the number of inmate admissions each year is a better population estimate, although the use of reception figures is also criticized (Liebling 1992). Because the focus of this study is on prisons rather than jails, ADP is not as problematic an estimate as suggested by critics. Compared to prisons, jails have more transient populations, admit/release more inmates each year, and usually hold inmates for less than one year. In the case of the jail setting, ADP does not accurately represent the number of inmates at risk. As a result, suicide rates are markedly higher in jails than prison or the general community (Hayes 1989). In contrast, prisons in the U.S. are defined as institutions where offenders are sentenced to one year or more. In the case of the prison, then, ADP is a fairly stable and reliable estimate of the annual population.

Results

Table 4.2 presents the suicide comparisons for each state. The first column designates the state and the number of prisons in each state (shown in parentheses). The next three columns display the number of prisons in each state that reported suicide, the number of prison suicides reported by each state, and the average daily number of inmates incarcerated in each state. The final two columns in Table 4.2 compare the rates of suicide in prison (by state) and the state suicide rates for the U.S. resident population.

As shown at the bottom of Table 4.2, this subset of state adult confinement facilities incarcerates over one million inmates. Only 172 of these inmates committed suicide in the year 2000. Similarly, only 130 of the 1,082 prisons reported suicide during this timeframe.

Table 4.2 Comparison of Prison and State Suicide Rates

State (n)	No. of Prisons w/Suicide	No. of Suicides	No. of Inmates	Prison Suicide Rate	State Suicide Rate
AL (25)	1	1	19694	5.08	16.60
AK (17)	0	0	3002	0	28.84
AR (11)	1	2	9368	20.75	16.36
AZ (15)	3	3	29957	10.01	19.86
CA (48)	13	24	158264	15.16	11.46
CO (30)	0	0	15105	0	18.15
CT (20)	2	2	16487	12.13	11.35
DC (4)	0	0	3482	0	4.91
DE (5)	0	0	5087	0	13.27
FL (60)	5	6	60159	9.97	16.19
GA (55)	6	8	38536	20.76	13.34
HI (7)	3	3	3344	89.71	14.33
IA (18)	2	2	8052	24.84	12.36
ID (8)	0	0	3395	0	16.61
IL (31)	7	10	41189	24.28	10.39
IN (19)	3	3	16265	18.44	14.24
KS (8)	1	1	8326	12.01	15.50
KY (15)	0	0	11360	0	16.39
LA (11)	2	2	18411	10.86	13.67
MA (17)	1	2	9113	21.95	7.57
MD (18)	4	4	20593	19.42	11.19
ME (6)	2	2	1543	129.62	14.75
MI (55)	2	2	42581	4.70	12.60
MN (9)	1	2	6764	29.57	11.29
MO (18)	3	4	23752	16.84	15.81
MS (10)	0	0	12520	0	13.42
MT (3)	0	0	1522	0	21.67
NC (66)	2	2	27100	7.38	15.18
ND (3)	0	0	1004	0	13.34
NE (6)	0	0	2835	0	14.45
NH (4)	0	0	2143	0	13.43
NJ (17)	3	4	22786	17.55	8.43
NM (10)	0	0	4914	0	22.28
NV (14)	2	2	8490	23.56	25.75
NY (60)	8	11	67986	16.18	7.56
OH (31)	9	12	48413	24.79	12.16
OK (32)	4	4	21456	18.64	18.42
OR (12)	1	3	9290	32.29	18.07
PA (25)	5	9	35765	25.16	13.74
RI (5)	0	0	2294	0	9.06
SC (23)	3	3	19160	15.66	14.03
SD (3)	1	1	2452	40.78	15.93

cont.

State (n)	No. of Prisons w/Suicide	No. of Suicides	No. of Inmates	Prison Suicide Rate	State Suicide Rate
TN (14)	1	1	17500	5.71	16.15
TX (107)	21	29	150353	19.29	12.76
UT (4)	1	1	4405	22.70	18.02
VA (49)	2	2	30443	6.57	13.69
VT (8)	0	0	1231	0	16.07
WA (13)	1	1	13411	7.46	15.75
WI (21)	3	3	13527	22.18	13.86
WV (7)	0	0	2619	0	16.49
WY (5)	1	1	1271	78.68	21.47
Total (1082)	130	172	1,098,989	15.65	13.29

NOTES: Prison suicide rates are calculated by dividing the number of suicides by the number of inmates and multiplying by 100,000. Prison suicide rates and state suicide rates represent the number of suicides per 100,000 population.

Fifteen states (including the District of Columbia) reported no prison suicides. These states include Alaska, Colorado, Delaware, Idaho, Kentucky, Mississippi, Montana, North Dakota, Nebraska, New Hampshire, New Mexico, Rhode Island, Vermont, and West Virginia. With the exception of Kentucky, Mississippi, and Colorado, which house over 10,000 inmates, states with no suicide incarcerate a relatively small number of inmates (between 1,000 and 5,000 ADP) and operate relatively few prisons. Only four states (Hawaii, South Dakota, Utah, and Wyoming) have small inmate populations and report prison suicide (range 1 to 3). In general, states that incarcerate relatively small numbers of inmates (<5,000) were less likely to report suicide in prison than larger state prison systems. Almost half of the states (24) reported one to three prison suicides. Four or more prison suicides occurred in twelve states: Maryland, Missouri, New Jersey, Oklahoma, Florida, Georgia, Pennsylvania, Illinois, New York, Ohio, California, and Texas. Five of these states reported 10 or more suicides (Illinois (10), New York (11), Ohio (12), California (24), and Texas (29)). All of these states have large inmates populations (>20,000) with California and Texas incarcerating over 150,000 inmates.

The rate of suicide in U.S. prisons, indicated at the bottom of Table 4.2, was slightly higher than the rate for the U.S. resident population (15.65 versus 13.29). Statistical tests reveal no significant differences between the prison and the U.S. resident suicide rates. At the national level, the prison suicide rate, although higher, was not significantly different from the rate of suicide among U.S. residents in general.

At the state level, the relationship between rates of suicide inside and outside of prison is mixed. The District of Columbia and Rhode Island, which reported no prison suicide, have two of the lowest state suicide rates for the U.S. resident population (4.91 and 9.06 respectively). Among states with no suicide in prison, however, the majority have state suicide rates that approximate or in most cases exceed the national rate for the U.S. resident population (13.29 suicides per 100,000). Indeed, the highest rate of suicide in the U.S. was found in Alaska (28.84 suicides per 100,000 U.S. residents), which reported no prison suicide in the 2000 CCF. A similar pattern is seen in Montana and New Mexico, each with no suicides in prison, but with state rates greater than 20 per 100,000 U.S. residents.

Among states that report at least one prison suicide, ten have prison suicide rates that are much lower than the national rate of 15.65 and lower than the corresponding rates for non-incarcerated U.S. residents. These states include Alabama, Arizona, Florida, Kansas, Louisiana, Michigan, North Carolina, Tennessee, Virginia, and Washington.

Nearly half the states (21) have suicide rates that are higher for prison than the U.S. resident population. Minnesota (29.57), Oregon (32.29), South Dakota (40.8), Wyoming (76.68), Hawaii (89.71), and Maine (129.62) reported the highest rates of prison suicide, which far exceed the corresponding state rates for the U.S. population. With the exception of Florida, Missouri, and Oklahoma, states with more than four prison suicides have prison suicide rates that

exceed those for the general U.S. population. In most of these states, prison rates exceed resident rates by a ratio of 2:1. Other notable states with comparatively high prison suicide rates are Arkansas, Indiana, Iowa, Massachusetts, Utah, and Wisconsin.

Tables 4.3 and 4.4 present prison and state suicides rates by gender. For these tables, only states that reported at least one prison suicide are shown. What is first apparent about these comparisons is that males in general are more likely to commit suicide than females. In prison, there are more than 20 male suicides for every female suicide (164 versus 8). The rate of prison suicide was slightly higher for male inmates (15.92 versus 11.71) while the rate of suicide for U.S. residents was over four times higher for males than females (22.09 versus 5.03).

State comparisons show that the number of states with suicide in prison is nearly identical for males as for the total sample. Sixteen states reported no suicide in prison; 23 reported between one and three male suicides; and 12 states reported four of more suicides. Only five states reported suicides among female inmates: Georgia (2), Louisiana (1), Massachusetts (2), Ohio (1), and Texas (2).

Tables 4.3 and 4.4 also show that when the overall prison suicide rate is calculated separately for males and females, the prison suicide rates and the rates for U.S. residents were much different than those described above (see Table 4.2). Unlike the previous rate comparisons, the prison suicide rate for males (15.92 per 100,000 inmates) was much lower than the U.S. rate for males (22.09 per 100,000 residents). For females, the prison suicide rate was more than double the rate for U.S. residents (11.71 for female inmates versus 5.03 female U.S. residents).

At the state level, comparisons of male suicide rates in and among the U.S. resident population are again mixed. Three states with no prison suicide have male resident rates that are lower than the national male rate of 22.09 and range from 8.29 in the District of Columbia to

Table 4.3 Comparison of Prison and State Suicide Rates by Gender (Male)

State	No. of Male Suicides	No. of Male Inmates	Male Prison Rate	Male State Rate
AL	1	18860	5.30	28.42
AR	2	8925	22.41	27.39
AZ	3	27921	10.74	32.15
CA	24	144871	16.57	18.41
CT	2	15249	13.12	19.00
FL	6	56848	10.55	26.78
GA	6	36745	16.33	21.57
HI	3	3176	94.46	23.22
IA	2	7472	26.77	21.64
IL	10	38513	25.97	17.49
IN	3	15103	19.86	24.28
KS	1	8107	12.34	26.48
LA	1	17481	5.72	23.60
MD	4	19504	20.51	19.14
ME	2	1465	136.52	26.62
MI	2	40734	4.91	21.04
MN	2	6427	31.12	19.32
MO	4	21889	18.27	26.67
NC	2	25370	7.88	24.19
NJ	4	21596	18.52	13.98
NV	2	7847	25.49	41.83
NY	11	64631	17.02	13.17
OH	11	45600	24.12	21.00
OK	4	19370	20.65	30.07
OR	3	8766	34.22	28.48
PA	9	34253	26.28	23.83
SC	3	18191	16.49	22.42
SD	1	2276	43.94	28.22
TN	1	16687	5.99	26.92
TX	27	140596	19.20	20.84
UT	1	4138	24.17	27.25
VA	2	28689	6.97	22.12
WA	1	12605	7.93	25.82
WI	3	12513	23.98	22.70
WY	1	1161	86.13	35.10
Total	164	1030379*	15.92	22.09

NOTES: Number includes 953,579 male inmates in 16 states with no male prison suicides.

15.63 in North Dakota. Most of the states that reported no male prison suicides have corresponding resident rates equal to or higher than the national resident rate. Montana, New Mexico, and Alaska reported no male prison suicide, but have the highest rates of suicide for male U.S. residents (37.25, 38.30, and 45.92 per 100,000 male residents, respectively).

Among states with at least one male prison suicide, eleven have prison suicide rates that were lower than the overall prison suicide rate of 15.92 and lower than corresponding state resident rates. Nearly half of the states (24) reported male prison suicide rates that are higher than the overall prison rate. The majority of these states have prison suicide rates that equal (11) or exceed (8) the corresponding male resident suicide rates. As shown in Table 4.4, of the five states that reported female inmate suicides, all have prison suicide rates that exceed the rates for female U.S. residents.

Table 4.4 Comparison of Prison and State Suicide Rates by Gender (Female)

State	No. of Female Suicides	No. of Female Inmates	Female Prison Rate	Female State Rate
GA	2	1791	111.67	5.57
LA	1	930	107.53	4.66
MA	2	663	301.66	3.68
OH	1	2813	35.55	4.08
TX	2	9757	20.50	5.00
Total	8	68340*	11.71	5.03

NOTES: Number includes 52,806 female inmates in 46 states with no female prison suicides.

Several noteworthy patterns emerge from these comparisons. First, in nearly all the states, prison suicide rates do not mirror the suicide rates for non-incarcerated U.S. residents. A minority of states (n=5) possesses either low or high rates both inside and outside of prison. Missouri, South Carolina, and Connecticut are among these states and have low-to-average prison and state suicide rates while Nevada and Oklahoma are the only states where the prison

and state suicide rates are both consistently high. The remaining states report no suicides (n=15) or are disproportionately divided among states with prison suicide rates that are either lower (n=10) or higher (n=21) than U.S. resident suicide rates. Second, there is a direct relationship between the size of the inmate population (ADP) and the number of prison suicides. States with large inmate populations are states with the highest counts of prison suicide while states with small inmate populations have no suicides or relatively few suicides in prison (1 to 3). Although states with the highest rates of prison suicide have the smallest ADPs, states that incarcerate large numbers of inmates also have some of the highest rates of prison suicide. Third, the rate comparisons clearly indicate differences in suicide rates for males and females. Numerically, males more likely to commit suicide both inside and outside of prison, however, the prison suicide rate for female inmates is substantially higher than the rate for female U.S. residents.

Features specific to the prison environment may explain this discrepancy in male and female prison suicide rates. To assess this possibility, the conditions of the five prisons that report female suicide are analyzed. Table 4.5 summarizes the characteristics of these prisons (Part A) and compares these five prisons with female prisons without suicide, and male prisons with and without suicide (Part B). As shown, all of the five female prisons that reported suicide were classified as either maximum or medium security. Only two of the five were under a court order to reduce the number of inmates. With the exception of the last prison (#5), these prisons were characterized by comparatively high assault rates that ranged from 3.56 to 23.78 assaults per 100 inmates. In addition, at least 30% to 55% of inmates in these prisons received mental health services. Compared to female prisons without suicide and male prisons (9.3% to 16.3%), 40% of the female prisons with suicide were under court order to reduce the inmate count. The average assault rate in female prisons with suicide was more than double that of male prison with

suicide (12.44 versus 5.97) and three times that of prisons without suicide. The average percentage of inmates receiving mental health services was also substantially higher in female prisons with suicide than other female prisons (39.9% versus 23.3%) and male prisons (16.3% and 12.2% in prisons with and without suicide).

Differences in conditions and culture between male and female prisons are well-documented in the literature (Pollack 2002). The subculture and social organization of women's prisons are different than institutions for men. In male prisons, inmates reportedly adhere to an inmate code that includes: "do your own time," "don't be a snitch," and "be loyal to your class/race." More typical in women's prisons are close associations with other inmates and correctional officers. Divisions among female inmates are rarely based on racial/ethnic group membership, but rather family type relationships (Owen 1998). Another difference noted in the literature is that female prisons are considerably less violent than male prisons. Owen (1998) found women try to avoid what she describes as "the mix," the underworld of the prison characterized by violence, drugs, and homosexual relationships. Although this small analysis can not provide statistical inferences about the relationships between gender, prison conditions, and suicide, these case studies illustrate some interesting inconsistencies in prison conditions—based on the literature and compared to other types of prisons in the census—among female prisons with suicide.

Given the variation in suicide rates, the range of prison suicide rates by state and the prison suicide rates for female inmates, these patterns suggest that prison suicide and suicide among U.S. residents are not due to common causes. Rather, it is likely the case that features specific to prison either promote or restrict suicide for those incarcerated in them.

Table 4.5 Female Inmate Suicide

Part A: Characteristics of Prisons that Reported Suicides by Female Inmates

	Security Level	Court Order to Reduce Count	Assault Rate (per 100 inmates)	Inmates Receiving MH Services
Prison #1	Medium	No	23.78	55.41%
Prison #2	Maximum	Yes	18.53	45.01%
Prison #3	Maximum	No	15.27	38.90%
Prison #4	Medium	Yes	3.56	30.08%
Prison #5	Medium	No	1.05	30.16%

Part B: Comparison of Conditions in Prisons with and without Suicide by Gender

	Prisons with Female Suicides (n=5)	Prisons with No Female Suicides (n=84)	Prisons with Male Suicides (n=125)	Prisons with No Male Suicides (n=957)
Security Level	0% Supermax 40% Maximum 60% Medium 0% Minimum	2.4% Supermax 31.0% Maximum 36.9% Medium 29.8% Minimum	4.0% Supermax 59.2% Maximum 31.2% Medium 5.6% Minimum	1.7% Supermax 20.9% Maximum 43.8% Medium 33.6% Minimum
Court Order to Reduce Count	40.0% Yes	9.3% Yes	16.3% Yes	9.7% Yes
Assault Rate (per 100 inmates)	12.44 (9.8)	3.69 (4.47)	5.97 (6.15)	3.65 (5.91)
Inmates Receiving MH Services	39.9% (10.7)	23.3% (21.9)	16.3% (20.8)	12.2% (19.6)

CHAPTER 5

RESULTS OF THE NEGATIVE BINOMIAL REGRESSION MODEL

Chapter five seeks to explain the variation in prison suicide using multivariate analyses that capture the effects of prison specific (deprivations) and inmate composition variables (importation) on prison suicide. The chapter begins with a description of the sample (n=1082) including the incidence and count distribution of prison suicide as well as the independent variables incorporated in the Negative Binomial Regression Model (NBRM). Next, bivariate relationships between prison suicide and the deprivation and importation variables are examined. The chapter concludes with the presentation and description of the NBRM results and post-estimation analyses.

Description of the Sample

Suicide in prison is rare. Most prisons in the US do not experience suicide in a given year. Consistent with prior estimates, the vast majority of prisons in the CCF report no suicides. Approximately 12% of 1,082 state and private adult confinement facilities report one or more suicides. This equates to a total of 172 suicides in 130 prisons. The number of suicides in these facilities range from one to four, with most experiencing only one suicide (see Table 5.1).

Table 5.1 Distribution of Prison Suicide Counts (n=1,082 prisons)

Suicide Count	Number of Prisons	Percentage of Prisons
0	952	87.99
1	99	9.15
2	23	2.13
3	5	.46
4	3	.28

Table 5.2 presents the descriptive statistics for the independent variables included in the NBRM predicting suicide counts. Variables from the deprivation model are listed first. As shown, prisons are equally divided among urban and rural locations. Although all of the prisons are categorized as general confinement facilities, 21% allow inmates to leave the prison for work or study. Nearly three-quarters of the prisons are classified as either minimum or medium security. The remaining prisons are primarily maximum security (25%). Only 2% of prisons report a "supermax" designation (n=21).

As evidence of mass incarceration, nearly half of the prisons are over capacity and 11% of the facilities are under a court order to reduce the number of inmates. Most prisons offer multiple special programs such as alcohol/drug/psychological counseling and courses in life skills, employment, and parenting. The average prison offers 5.3 programs (standard deviation=2.06; range of 0 to 8).

Much variation exists in the level of prison violence. In the average prison, there are about 4 assaults per 100 inmates. Assault rates range from 0 to over 50 per 100 inmates. Over 200 of the facilities, however, report no inmate assaults on staff or inmates.

Aggregate level measures of inmate demographic characteristics and mental health status serve as indicators of inmates' imported characteristics. These importation variables are also shown in Table 5.2. The vast majority of the prisons house males only (84%). The remaining facilities are equally divided between those that are only for females (8%) and those house both male and female inmates (8%). One-third of the adult facilities in the CCF also house juveniles under the age of 18. On average, 39% of inmates are white and roughly 13% of inmates receive mental health services.

Table 5.2 Descriptive Statistics (n=1,082)

	% or Mean (SD)	Range
Deprivation Variables		
Location (urban=1; reference is rural)	53.6%	
Inmates allowed to depart (yes=1)	21.4%	
Minimum Security (reference)	31.0%	
Medium Security	42.2%	
Maximum Security	25.8%	
Supermax	2.0%	
Over Capacity	48.9%	
Court Order to Reduce Inmate Count (yes=1)	10.7%	
Special Programs (#)	5.3 (2.06)	0 to 8
Assault Rate (per 100 inmates)[a]	3.9 (5.99)	0 to 56.5
Importation Variables		
Female Only	8.2%	
Both Male & Female	8.3%	
Male Only (reference)	83.5%	
House Inmates <18 years of age (yes=1) Reference is Adult Only Prisons	32.8%	
White (%)	39.1% (19.25)	0 to 97.4%
Receiving Mental Health Services (%)	12.7% (19.76)	0 to 100%
Control Variables		
Age of Prison (years)	31.3 (32.21)	<1 to 189
Private Prison (yes=1) Reference Category is State Prison	10.0%	
State Suicide Rate (per 100,000 US residents)	14.1 (3.81)	4.91 to 28.84
Exposure/Risk: Average Daily Population	1015 (991)	13 to 7200

Four additional variables—age of prison, private ownership, state suicide rates, and average daily population—are included as controls. As shown in Table 5.2, the average prison was constructed 32 years ago, although there is much variation around this number (standard deviation=32 years; range of <1 to 189 years). Only 10% of the prisons are privately owned.

According to CDC reports all states in the U.S. experienced suicide during 1999. Suicide rates among the U.S. population, however, varied considerably by state. State suicide rates for

the U.S. general resident population ages 16 -85 ranged from 4.91 (District of Columbia) to 28.84 (Alaska) during 1999, with an average rate of 14.1 suicides per 100,000 U.S. residents.

The final control variable, average daily population (ADP), the exposure variable, represents the number of inmates "at risk" of suicide. ADP also serves as an indicator of the size of the prison facility. The average prison in the CCF subset of adult confinement facilities houses a little more than 1,000 inmates. Some of the facilities are small holding less than 25 inmates while others are much larger housing up to 7,200 inmates.

Bivariate Results

Table 5.3 presents the bivariate correlations among the independent variables and prison suicide. These analyses are used to establish associations between variables, including potential problems with multicollinearity, and to provide a preliminary assessment of how prison suicide varies across each of the independent variables. Significant correlations are displayed in bold ($p<.05$; two-tailed test).

Bivariate correlations indicate that prison suicide is significantly related to features of the prison environment as well as the inmate composition of the prison. Correlations among the deprivation variables and suicide suggest that prisons that are cut off from society are more likely to experience suicide overall and in greater numbers. There is a significant and negative association between suicide and whether inmates are allowed to leave the facility for work or study ($r = -.10$). Higher security prisons evidence a significant and positive relationship with suicide, with minimum (not shown) and medium security facilities negatively correlated with suicide and maximum and supermaximum security prisons positively correlated with suicide. Prison conditions including operating over capacity, the presence of court orders to reduce the number of inmates, and the level of violence in the prison (captured by the assault rate) are also

Table 5.3 Bivariate Correlations (**Significant associations indicated in bold**)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Prison Suicide (yes=1)	1.00																		
Prison Suicide Count	**0.88**	1.00																	
Urban Location (yes=1)	0.02	0.01	1.00																
Inmates allowed to Depart (yes=1)	**-0.10**	**-0.10**	0.04	1.00															
Medium Security	**-0.08**	**-0.07**	**-0.10**	**-0.15**	1.00														
Maximum Security	**0.28**	**0.24**	0.04	**-0.17**	**-0.50**	1.00													
Supermaximum Security	0.05	**0.11**	0.02	**-0.07**	**-0.12**	**-0.08**	1.00												
Over Capacity (yes=1)	**0.12**	**0.11**	**.106**	-0.50	0.05	**0.14**	**-0.07**	1.00											
Under Court Order (yes=1)	**0.09**	**0.10**	**-0.07**	-0.05	**0.08**	**0.06**	-0.05	**-0.22**	1.00										
Special Programs (#)	**0.08**	**0.08**	0.00	-0.02	**0.23**	-0.04	-0.02	**0.09**	**0.09**	1.00									
Assault Rate	**0.14**	**0.14**	**-0.07**	**-0.13**	0.03	**0.20**	**0.12**	-0.02	0.05	**0.11**	1.00								
Female only Prison	-0.06	-0.04	**0.10**	**0.06**	-0.03	0.04	0.01	-0.01	0.01	**0.15**	0.01	1.00							
Houses both Males and Females	0.02	0.01	**0.08**	**0.16**	0.01	-0.04	-0.02	**-0.07**	0.05	0.01	**0.07**	**-0.09**	1.00						
Houses inmates under 18 (yes=1)	**0.10**	**0.06**	-0.04	**-0.08**	0.05	**0.19**	0.04	**0.10**	0.05	**0.10**	**0.06**	0.05	-0.04	1.00					
% White	**-0.06**	**-0.07**	-0.01	**0.09**	-0.03	-0.03	-0.01	-0.02	-0.05	**0.07**	**0.07**	**0.12**	**0.08**	0.01	1.00				
% Receiving Mental Health Services	**0.08**	**0.09**	**0.14**	**-0.08**	0.05	**0.09**	0.02	**0.11**	-0.04	**0.32**	**0.10**	**0.18**	0.00	0.00	**0.16**	1.00			
Age of Prison (years)	**0.12**	**0.11**	**0.14**	**0.12**	**-0.14**	**0.11**	**-0.09**	**0.11**	0.03	**0.06**	0.02	0.00	0.02	-0.01	**0.07**	**0.08**	1.00		
Privately Operated	**-0.08**	**-0.08**	**-0.07**	**0.08**	**0.08**	**-0.16**	-0.05	**-0.27**	-0.03	-0.04	-0.04	-0.03	**0.23**	**-0.17**	**-0.11**	-0.05	**-0.18**	1.00	
State Suicide Rate	**-0.08**	**-0.10**	-0.04	0.04	**-0.07**	-0.02	0.05	**-0.14**	**0.06**	**-0.12**	0.06	0.00	**0.21**	-0.05	**0.39**	0.01	**-0.08**	**0.11**	1.00
Average Daily Population (#)	**0.34**	**0.34**	-0.06	**-0.18**	**0.17**	**0.22**	0.01	**0.24**	**0.08**	**0.26**	**0.07**	**-0.12**	**-0.08**	**0.16**	**-0.20**	**0.07**	0.05	**-0.10**	**-0.21**

significantly and positively related to suicide, indicating that suicide is more likely in overcrowded and more violent prisons.

Interestingly, the number of special programs offered by the prison is significantly and positively associated with suicide (r = .08). Thus, as prisons offer more programs, suicide increases.

Among the importation indicators, correlations reveal significant and positive relationships between suicide and prisons that house inmates under 18 years of age (r = .10) as well as suicide and the percentage of inmates receiving mental health services (r = .08). The proportion of white inmates is negatively correlated with suicide, suggesting that suicide is more likely in prisons that house fewer white inmates.

Suicide is significantly associated with each of the control variables included in the analyses. Both age of the prison and average daily population evidence positive relationships with suicide while private ownership and U.S. state suicide rates are negatively correlated with suicide. Although many of the independent variables are significantly correlated with each other, none correlate so highly as to imply problems with multicollinearity.

Bivariate correlations suggest a number of significant differences between prisons that report suicides and those that do not. These relationships are explored using chi-square tests for categorical variables and independent samples t-tests for continuous variables. Results from these statistical tests are shown in Table 5.4. Here, significant differences between the 952 prisons with no suicides and the 130 prisons where suicides occurred are identified.

As shown in Table 5.4, compared to prisons with no suicides, prisons with one or more suicides are characterized by significantly greater levels of deprivation as measured by whether inmates are allowed to leave the facility, security level, capacity court orders to reduce the

Table 5.4 Bivariate Results

	Prisons w/No Suicide (n=952)	Prisons w/One or More Suicides (n=130)	Total
Deprivation Variables			
Urban Location	53.5%	56.2%	53.8%
	χ^2=.33, df=1, p=.564		
Inmates allowed to Depart	22.5%	10.0%	21.0%
	χ^2=10.74, df=1, p=.001		
Minimum Security	33.8%	5.4%	30.4%
Medium Security	43.7%	32.3%	42.3%
Maximum Security	20.8%	58.5%	25.3%
Supermaximum Security	1.7%	3.8%	1.9%
	χ^2=100.76, df=3, p=.000		
Over Capacity	46.7%	64.6%	48.9%
	χ^2=14.62, df=1, p=.000		
Court Order to Reduce Count	9.6%	17.7%	10.5%
	χ^2=8.03, df=1, p=.005		
Special Programs (#)	5.26	5.78	5.30
	t=-2.73, p=.006		
Assault Rate (per 100 inmates)	3.66	6.22	3.96
	t=-4.63, p=.000		
Importation Variables			
Male Only Prisons	83.2%	86.2%	83.5%
Female Only Prisons	8.8%	3.8%	8.2%
Both Males & Females	8.0%	10.0%	8.2%
	χ^2=4.13, df=2, p=.127		
Under 18	31.3%	46.2%	33.1%
	χ^2=11.39, df=1, p=.001		
% White	39.54	35.88	39.1%
	t=2.04, p=.042		
% Receiving Mental Health Services	12.08	17.19	12.7%
	t=-2.77, p=.006		

cont.

	Prisons w/No Suicide (n=952)	Prisons w/One or More Suicides (n=130)	Total
Control Variables			
Age of Prison (years)	29.9 years	41.3 years	31.2 years
	t=-3.81, p=.000		
Private Ownership	10.7%	3.8%	9.8%
	χ^2=7.55, df=1, p=.006		
State Suicide Rate (per 100,000 US residents)	14.23	13.24	14.1
	t=2.79, p=.005		
Average Daily Population (ADP)	892.58	1917.30	1015.
	t=-11.73, p=.000		

number of inmates, and assault rate. For example, prisons with suicide are significantly less likely to allow inmates to depart the facility for work or study than those without suicides (p<.001). Likewise, suicide is overrepresented among higher security prisons where deprivations are the greatest. Prisons with one or more suicides are significantly more likely to be maximum or supmaximum and less likely to be minimum security facilities than facilities with no suicides (p<.001). Although maximum security prisons represent one-quarter of the facilities in the CCF, these prisons account for more than half (58%) of the facilities with one or more suicides. A similar trend is witnessed among "supermax" prisons. In contrast, minimum security facilities, which represent one-third of the prison sample, account for only 5% of facilities with suicide. Prisons with one or more suicides are also more likely to be over capacity and under a court order to reduce the number of inmates than prisons without suicide (p<.01), indicative of both increased levels of overcrowding and greater deprivation. Approximately 65% of prison with

suicide are over capacity versus 47% without suicide ($p<.001$). Nearly 18% of prisons with suicide are under court order compared to 10% of prisons with no suicides. On average, the assault rate (per 100 inmates) is significantly higher among prisons with suicide than those without suicide ($p<.001$). As evidenced by the bivariate correlations and counter to the deprivation model, prisons with one or more suicides, on average, offer a significantly greater number of special programs than facilities with no suicide although the difference is not substantial (5.26 versus 5.78 programs; $p<.01$).

Nearly all the importation measures evidence significant bivariate relationships with prison suicide. With the exception of racial composition, all of the relationships are consistent with prior research and theory. Prisons with suicide are disproportionately composed of male inmates, inmates under the age of 18, and a greater percentage of inmates receiving mental health services. The vast majority of prisons with one or more suicides are male only prisons, which reflects the overall gender composition of the sample. However, prisons with suicide are less likely to house females only compared to prisons with no suicide (n.s.). Age composition of the prison is significantly related to suicide, with prisons that house inmates under the age of 18 overrepresented among prisons with suicide ($p<.001$). In prisons with one or more suicides, the average percentage of inmates receiving mental health services is significantly higher compared to prisons with no suicide ($p<.01$). As measured at the aggregate level, the relationship between race and suicide is inconsistent with prior research situated at the individual level of analysis. In these reports, prison suicide is a phenomenon witnessed largely among white inmates. In this sample, the bivariate relationship between racial composition (% white) and suicide suggests that prisons with suicide, on average, house a significantly smaller percentage of white inmates than prisons without suicide ($p<.05$).

Significant bivariate relationships are also found among suicide and each of the control variables. Prisons with one or more suicides are older, on average ($p<.001$), and are less likely to be privately owned ($p<.01$) than prisons with no suicides. Prisons with suicide also house a significantly greater number of inmates (about 1,000 more inmates), on average, than prisons with no suicide ($p<.001$).

The average state suicide rate among U.S. residents is significantly lower in prisons with one or more suicides than those with none ($p<.01$). Figure 5.1 shows the range of suicide rates for the U.S. population and illustrates the extent to which these rates vary by incidence of prison suicide. Excluding extreme values and outliers (denoted by circles and asterisks), the plot shows that the lowest state rates are evident in both prisons with and without suicide; however, prisons with no suicides are located in states with the highest rates of suicide.

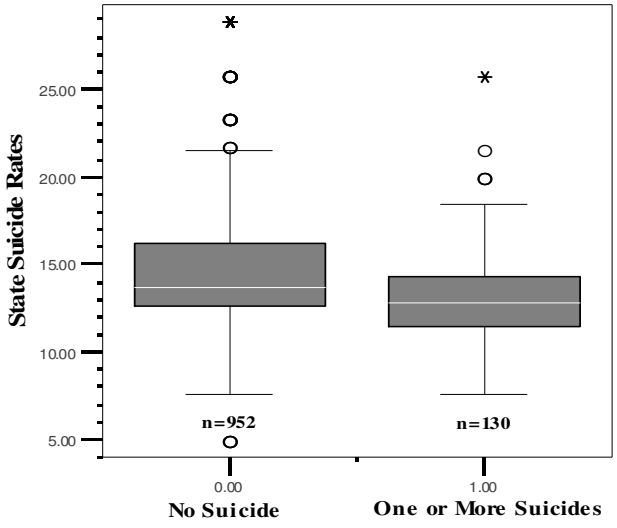

Figure 5.1 Range of State Suicide Rates (per 100,000 U.S. Residents) in Prisons with and without Suicide (n=1082)

Results of the Negative Binomial Regression Model

Results of the Negative Binomial Regression Model are described in the following paragraphs and presented in Table 5.5. Table 5.5 shows three sets of coefficients. These respectively represent the results of the deprivation, importation, and combined models predicting the number of suicides in a sample of 1,082 U.S. prisons. In each column, beta coefficients are shown. Significance levels are derived from the calculation of robust standard errors and are indicated in the table (two-tailed test).

As noted in Table 5.5 and shown in Model 1, three of the deprivation variables are significant. Security level is the largest single predictor of suicide counts. Compared to minimum security prisons, higher security settings significantly increase the number of suicides ($p<.001$). For maximum security, the number of suicides increases by a factor of 3.27 (*exp*(1.185)). For supermax prisons, the number increases by a factor of 6.74 (*exp*(1.908)). Indicators of overcrowding and violence also significantly increase the expected number of suicides. Having a court order to reduce the inmate count increases the number of suicides by a factor of 1.93 (*exp*(.657)) ($p<.001$). For a standard deviation increase in the prison assault rate (approximately 6 assaults per 100 inmates), the number of suicides increases by a factor of 1.23 or 17% (*exp*(.035 x 5.99)) ($p<.01$).

In Model 2, only one importation variable is significant. Holding other variables constant, the percentage of inmates receiving mental health services significantly increases the expected count of suicide ($p<.05$). For a standard deviation increase of approximately 19%, the number of suicides increases by a factor of 1.17 or 17% (*exp*(.008 x 19.23)) ($p<.01$). The remaining importation variables in Model 2, gender, age, and racial composition, all are nonsignificant.

Table 5.5 Negative Binomial Regression Results Predicting Prison Suicide Counts

	Model 1	Model 2	Model 3
Deprivation Variables			
Urban Location	.143		.071
Inmates allowed to Depart	-.313		-.335
Medium Security[a]	.399		.328
Maximum Security	1.185***		1.152**
Supermax	1.908***		1.971***
Over Capacity	.324		.303
Court Order to Reduce Inmate Count	.657***		.790***
Number of Special Programs[b]	.011		-.026
Assault Rate (per 100 inmates)	.035**		.032**
Importation Variables			
Female only[c]		-.152	-.259
Both Male & Female		.648	.705
Inmates <18 years of age		.032	-.095
% White		-.002	.005
% Receiving Mental Health Services		.008*	.009*
Control Variables			
Age of Prison (years)	.004*	.005*	.003*
Private Prison[d]	-.250	-.946	-.299
State Suicide Rate (age adjusted)	-.026	-.030	-.059
Exposure Variable			
ADP (number of inmates at risk)	--	--	--
Constant	-9.630***	-8.507***	-9.280***
Dispersion Parameter (α)	.42*	.92***	.34*
Log Likelihood	-399.685***	-422.712***	-394.435***

NOTES: N=1082; Beta coefficients reported; Model constrained by average number of inmates (exposure or "at risk" variable); Model Clustered by State to correct violation of the assumption of independence and to produce Robust Standard Errors. *p<.05; **p<.01; ***p<.001

[a] Reference is Minimum security prisons.

[b] Includes educational, vocational, psychological/self-help, and alcohol/drug treatment programs.

[c] Reference is Male only prisons.

[d] Reference is State prisons.

The final column in Table 5.5 presents the coefficients for the fully specified model, which combines the deprivation, importation, and control variables. Compared to previous models, there are no substantial changes to the coefficients in Model 3. Among the deprivation variables, prisons with higher security levels, court orders to reduce the number of inmates, and higher assault rates all increase the number of suicides in prison. The addition of the importation variables in Model 3 slightly decreases the effect for maximum security prisons evidenced in Model 1—in Model 3 the coefficient but not the significance level is reduced to 1.152; $p<.001$—and increases the coefficient for supermax from 1.908 in Model 1 to 1.971 in Model 3($p<.001$). Similarly, the coefficient for court orders is raised from .657 in Model 1 to .790 in Model 3 ($p<.001$). The effect of prison assault rates on the number of suicides is consistent with Model 1. Prison location, facilities where inmates are allowed to depart (accounted for by security level), and the number of special programs offered by the prison remain nonsignificant predictors of suicide in Model 3.

Log likelihood statistics provided at the bottom of Table 5.5 indicate that variables included in each model significantly improve the model fit over the intercept only equation ($p<.001$). Model 1, the deprivation model, evidences the greatest reduction in the log likelihood as compared to the importation only (Model 2) and combined model (Model 3). In the combined model, only a small portion of the reduction in the log likelihood is accounted for by the importation variables.

A series of models that incorporate product terms for the significant deprivation variables and the proportion of inmates using mental health services evidence no statistically significant relationships with prison suicide. Thus, the effect of mental health on suicide did not vary at higher levels of deprivation. Results of the interaction probes are presented in Appendix A.

Post-estimation Analyses

To further explore the combined effects of the deprivation and importation variables on suicide, a series of post-estimation analyses are performed using STATA 8.2. These analyses provide two ways to interpret the results of the NBRM. The first analysis, shown in Table 5.6, presents the changes in the expected count of suicide for a specified (discrete) change in several independent variables—security level, presence of court orders, assault rate, and the percentage of inmates receiving mental health services. For categorical variables the discrete change is computed by letting each variable change from 0 to 1. The total possible effect is found for continuous variables by letting each variable change from its minimum to its maximum. Changes in the expected count of suicide for a standard deviation increase in each continuous variable are also computed. The magnitude of the discrete change depends on the levels of other variables in the model. In the analyses described here, all other variables included in the NBRM are held constant at their mean values.

As shown in Table 5.6, each of the selected independent variables increases the expected suicide count, holding all other variables at their means. The expected number of suicides is .09 higher in maximum security and .35 higher in supermax prisons relative to minimum security settings (the reference). Likewise, the expected suicide count is .06 higher in prisons with court orders to reduce the number of inmates than prisons not under such orders. In the most violent prisons, the expected number of suicides is increased by .26 compared to prisons that report no assaults. A standard deviation increase in the assault rate (approximately 6 assaults per 100 inmates) increases the expected number of suicides by .01. The results show an increase of .07 in the expected number of suicides as the percentage of inmates receiving mental health services increases from 0% to 100%.

Table 5.6 Discrete Changes in Expected Count of Suicide for Select Independent Variables

Variable	Min→Max	0→1	+ SD
Maximum Security		.09	
Supermax		.35	
Court Order to Reduce Inmate Count		.06	
Assault Rate (per 100 inmates)	.26		.01
% Inmates Receiving Mental Health Services	.07		.01

NOTE: Remaining variables held constant at mean values.

The second type of post-estimation analysis focuses on the distribution of suicide counts and, in particular, on the probability of specific counts for a given level of the key independent variables. Table 5.7 presents the probability of suicide counts (0 to 4) for the average prison and minimum, maximum, and supermax security levels. In the average prison, the probability of no suicides and the probability of one suicide is .94 and .05, respectively. The last three columns of Table 5.7 display the predicted probability of suicide for prisons at increasing levels of security. The results show that as security level increases the probability of no suicides decreases and the probability of one or more suicides increases. For example, supermax prisons are less likely than minimum and maximum security prisons to have no suicides and are more likely to have one or more suicides. The rate of suicide in supermax prisons is .26 suicides higher than maximum security and .36 suicides higher than minimum security settings. These results demonstrate the rarity of suicide in prison, but also show how the probability of suicide is influenced by prison conditions such as security level.

A similar set of predicted probabilities is displayed in Table 5.8 and plotted in Figures 5.2 and 5.3. In Table 5.8, the probability of no suicides and one suicide is shown for prisons with court orders to reduce the number of inmates housed. Compared to the probabilities in Table 5.7, having a court order slightly lowers the probability of a zero suicide count and increases the

probability of one suicide in the average prison as well as in minimum security prisons. The presence of a court order has a greater impact on the predicted probability of suicide in maximum security and supermax prisons. For example, having a court order decreases the probability of a zero count in maximum security prisons from .87 in the average maximum security prison (shown in Table 5.7) to .77, a difference of .10. The difference is even more pronounced for supermax prisons (.69 versus .49).

Table 5.7 Predicted Probability of Suicide Counts

Count	Average Prison	Minimum Security Prison	Maximum Security Prison	Supermax
0	.94	.97	.87	.69
1	.05	.04	.12	.24
Rate	.06	.04	.14	.40

NOTE: Remaining variables held constant at mean values.

Table 5.8 Predicted Probability of Suicide Counts
Prisons with court order to reduce inmate count

Count	Average Prison w/court order	Minimum Security w/court order	Maximum Security w/court order	Supermax w/court order
0	.89	.93	.77	.49
1	.10	.07	.20	.31
2	.01	.00	.03	.13
3	.00	.00	.00	.05
4	.00	.00	.00	.01
Rate	.12	.07	.28	.81

NOTE: Remaining variables held constant at mean values.

Figures 5.2 and 5.3 reveal similar trends in the predicted probabilities of suicide for changes in the levels of violence and percentage of inmates receiving mental health services, respectively. The results show that as the assault rate increases the predicted probability of no suicides decreases. Likewise, as the percentage of inmates receiving mental health services increases the probability of no suicides decreases. Although no interaction effects are evident in the NBRM, the effect of these variables on the predicted probability of suicide is most pronounced in maximum security and supermax prisons. In the average supermax prison, the predicted probability of a zero suicide count is .69, the lowest of all security types. As the assault rate increases three standard deviations above the mean rate to approximately 22 assaults per 100 inmates, the probability of a zero count is reduced by .15 to .53. An equal reduction in the probability is evidenced as the percentage of inmates receiving mental health services increases one, two, and three standard deviations above the mean. In supermax prisons where 100% of the inmates receive mental health services, the probability of no suicides decreases to .45.

Extending the results from Figure 5.3, Table 5.9 shows the predicted probability of suicide counts (0 to 4) for supermax prisons and compares the count distribution for the average supermax prison with supermax prisons where 0% and 100% of inmates receive mental health services. Not only is the probability of not having suicide reduced in supermax prisons, the probability of having multiple suicides increases substantially as the percentage of inmates receiving mental health services increases. As shown, the probability of two suicides is nearly tripled as the percentage increases. In addition, the rate of suicide is .45 suicides higher in prisons where 100% of the inmates receive mental health services than the average supermax prison.

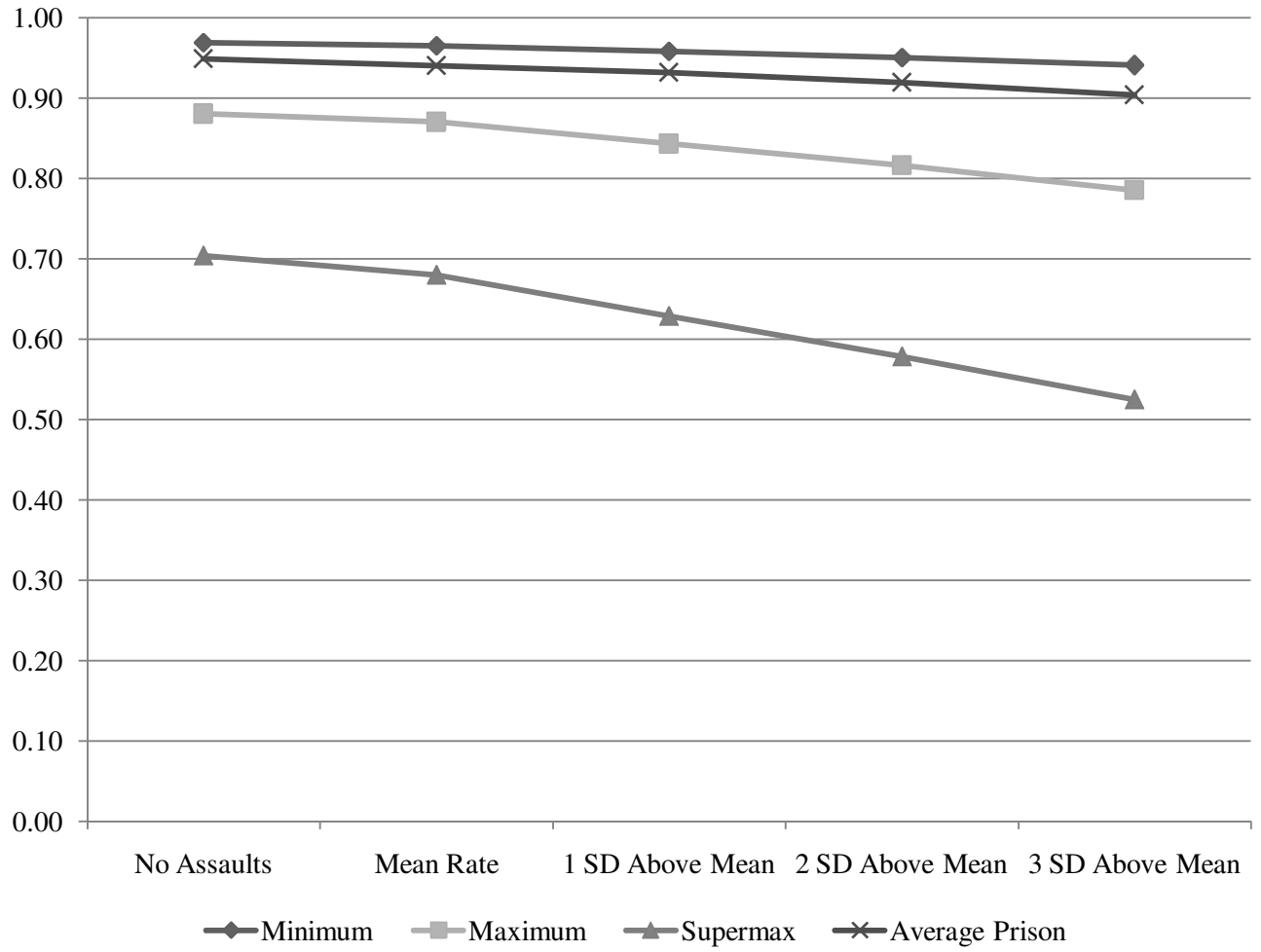

Figure 5.2 Predicted Probability of No Suicide by Increasing Prison Assault Rates

NOTE: Mean assault rate equals 3.9; Standard deviation (SD) equals 5.9.
Remaining variables held constant at mean values.

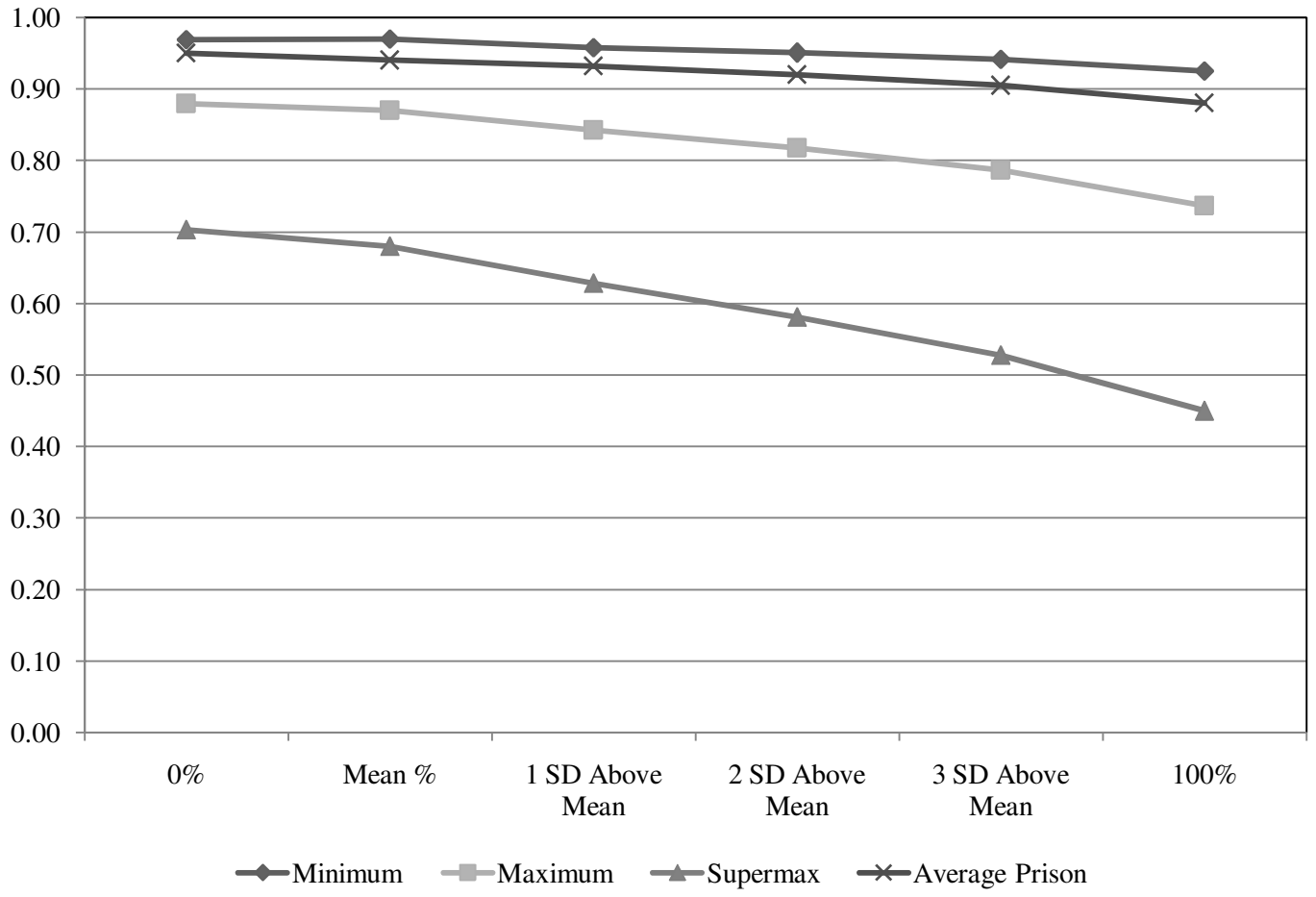

Figure 5.3 Predicted Probability of No Suicide by
Percentage of Inmates Receiving Mental Health Services

NOTE: Mean % equals 12.69; Standard deviation (SD) equals 19.76.
Remaining variables held constant at mean values.

Table 5.9 Predicted Probability of Suicide Counts
Supermax Prisons

Count	Average Supermax	Supermax: 0% MH Services	Supermax: 100% MH Services
0	.69	.71	.47
1	.24	.23	.31
2	.06	.05	.14
3	.01	.01	.05
4	.002	.001	.01
Rate	.40	.36	.85

Note: Remaining variables held constant at mean values.

In sum, the results show that, taken as a whole, measures of deprivation and importation (along with control variables) increase the expected count of suicide in prison. The NBRM and the post-estimation analyses, however, demonstrate the magnitude of the effect of security level on prison suicide in comparison and in combination with other deprivation (court orders and assault rates) and importation variables (inmates receiving mental health services), thus providing support for a combined model of prison suicide. In the next chapter, the theoretical and practical implications of these findings are discussed.

CHAPTER SIX

DISCUSSION AND CONCLUSIONS

The causes and correlates of suicide in prison have traditionally been organized by features of the prison environment (deprivation) and characteristics of the individual inmate (importation). Both explanatory models have received empirical support, but neither model has effectively or thoroughly aided in the complete understanding (or prevention) of prison suicide. Prison suicide scholars currently concede that prison suicide is best explained by a combination of the two models. From this perspective, the pain of imprisonment differentially increases the likelihood of suicide for vulnerable or "high suicide risk" groups of inmates. Although popular, the combined model of prison suicide has not been subjected to a great deal of empirical investigation.

The purpose of this dissertation was to assess the deprivation, importation, and combined models of prison suicide using national level data on prisons in the U.S. Two questions guided the analyses and hypothesis tests. First, to what extent do specific prison conditions (deprivations) promote/restrict suicide? Second, to what extent is suicide predicted by prisoner characteristics (importation)? In essence, what is it that determines why some prisons have suicide and others do not? Is it conditions of the prison, characteristics of the prisoners, or a combination?

Taken as a whole, results of the analytic approaches employed in chapters four and five provided support for the deprivation and importation models of prison suicide. Thus, the findings pointed toward a combined model for understanding prison suicide. The remaining portion of

this chapter summarizes the empirical findings of the analyses, details the outcomes for each hypothesis tested in the multivariate models, and discusses the theoretical implications of the results. Implications for penal practice and suicide prevention are then outlined. Chapter six concludes with a discussion of the study's limitations and suggestions for future research on the topic.

Summary of Empirical Findings:

Implications for Theoretical Explanations for Prison Suicide

Two analytic approaches were used to understand prison suicide. In the first approach, state suicide rates for prison and U.S. resident populations were compared. As a whole, the comparisons revealed no statistically significant differences between the suicide rate in prison and the age-adjusted rate for U.S. residents. The national prison suicide rate of 15.65 per 100,000 inmates was only slightly higher than the resident rate (13.29). The non-significant difference in suicide rates suggests that suicide in prison may be similar to suicide outside of prison, which points initially to support for an importation model of prison suicide. As Kennedy and Homant (1988) concluded: a prison suicide is simply a suicide that happens to take place in prison.

Further examination of rates revealed that, at the state level, suicide rates inside and outside prison varied. Overall, prisoner and U.S. resident rates were not comparable. Some states reported no suicides in prison, but high rates of suicide outside prison. Nearly half the states had prison suicide rates that were substantially higher than the corresponding rates for non-incarcerated U.S. residents. These comparisons imply that suicide in prison is not necessarily a reflection of suicide that occurs outside prison as the importation model suggests. Rather, the causes of suicide may be different for prison and U.S. resident populations. Based on this conclusion, both the deprivation and importation models of prison suicide are plausible. First,

prison conditions may promote/restrict suicide. Alternatively, the inmate composition of some prisons may be more prone to suicide.

Comparisons of male and female suicide rates inside and outside prison provided some additional insight into the relative contributions of the deprivation and importation models. Differences between male and female suicide were readily evident. In general, males were more likely to commit suicide than females both inside and outside prison. The national prison suicide rate for males was 15.92 per 100,000 inmates, which was lower than the rate for non-incarcerated male residents (22.09 per 100,000 residents). For female inmates, however, the national prison suicide rate was considerably higher than that for female U.S. residents (11.71 per 100,000 inmates versus 5.03 per 100,000 residents) and nearly as high as the rate for male inmates. This discrepancy in rates runs counter to the importation model of prison suicide.

Given this discrepancy in rates, prison conditions or the interaction of conditions and inmate characteristics may explain the gender-suicide relationship. To assess this possibility, the characteristics of the five female prisons that reported suicides were examined. Female inmate suicide occurred within the context of deprivation—higher security prisons, overcrowded prisons, and prisons with significantly higher levels of violence. The mental health of female inmates also contributed to the discrepancy in rates as a significantly higher proportion of inmates received mental health services in prisons where female inmates committed suicide. Although based on a small group of female prisons, the results of these cases suggest that deprivation factors play a pivotal role in prison suicide.

To directly test the deprivation, importation, and combined models of prison suicide, a second analytic approach—the Negative Binomial Regression Model—was employed, which relied upon a series of multivariate regression analyses to predict prison suicide counts. Eleven

hypotheses that specified the relationships between the deprivation and importation variables and suicide were tested. Outcomes for each of the hypotheses are presented in Table 6.1. For each hypothesis, the dependent variable is prison suicide count. The table shows the independent variables for each hypothesis, the effect on suicide, and a brief explanation of the relationship with suicide.

As shown, three sets of hypotheses each tapping a specific type of deprivation were used to examine elements of the deprivation model (Farrington 1992; Goffman 1961; Sykes 1958). Three hypotheses (H1a-H1c) referred to the ways inmates are "cut off from society." According to deprivation theory, the more inmates are "cut off" or isolated, the more likely suicide becomes (H1). The results generally confirmed this relationship. Hypothesis 1a was not supported in the regression model; prisons in more isolated, rural locations were as likely to experience suicide as prisons in urban areas. There was also a non-significant negative relationship between prisons that allowed inmates to depart the facility for work and study and suicide (H1b). This effect was accounted for entirely by security level. Higher security prisons were more likely to experience suicide (H1c), but were also less likely to allow inmates to leave the facility than lower security settings.

Additional support was found for the deprivation model of prison suicide in H2 (deprivation of goods and services). Here, one of two hypotheses was confirmed. Prisons with court orders to reduce the inmate count, indicative of overcrowded prison conditions and fewer services, evidenced a positive and significant relationship with suicide (H2b). Hypotheses 2a and 2c were not supported. Operating over capacity and the number of prison programs (i.e., vocational, education, and psychological) were not significant predictors of suicide.

Table 6.1 Deprivation, Importation, and Combined Models: Effects on Prison Suicide Counts
Hypothesis Tests

Hypothesis	Independent Variable(s)	Effect	Explanation
H1	Deprivation of Liberty ("cut off from society")		
H1a:	Prison location (rural=1)	n.s.	
H1b:	Inmates allowed to depart (depart=1)	n.s.	Effect accounted for by security level: Higher security prisons are less likely to allow inmates to depart facility
H1c:	Security level (mimimum (reference), medium, maximum, and supermaximum)	+	Suicide count significantly increased in higher security settings (maximum and supermax) as opposed to lower security (medium and minimum)
H2:	Deprivation of Goods and Services		
H2a:	Over capacity (over=1)	n.s.	
H2b:	Court order to reduce inmate count (court order=1)	+	Court orders positively related to suicide count
H2c:	Number of Programs	n.s.	
H3:	Deprivation of Security		
H3a:	Assault Rate (per 100 inmates)	+	Assault rate positively related to suicide count
H4:	Gender Composition (male only (reference), both male and female, female only)	n.s.	In full model, effect accounted for by ADP and security level.
H5:	Age composition (under 18=1)	n.s.	In full model, effect accounted for by security level.
H6:	Racial composition	n.s.	In full model, effect accounted for by ADP and security level.
H7:	Proportion receiving mental health services	+	Mental health positively related to suicide count.

cont.

Hypothesis	Independent Variable(s)	Effect	Explanation
H8:	Gender composition X Deprivation variables	n.s.	In combined model, there are no significant differences between male and female prisons.
H8a:	Female inmates		At higher levels of deprivations, female inmates experience equally high rates of suicide as male inmates. Support found via rate comparisons (chapter four).
H9:	Age composition X Deprivation variables	n.s.	
H10:	Racial composition	n.s.	Rodgers' (1999) and others' (Johnson 1976) theories on race and suicide not supported in combined model.
H11:	Mental Health Services X Deprivation variables	n.s.	Post-estimation analyses evidence trend: In supermax prisons, the effect of mental health services on the probability of a zero count is substantially reduced, which suggests a more pronounced effect of mental health on suicide in supermax prisons.

Lastly, the relationship between safety and prison suicide (H3) was upheld in the regression models. A positive and significant relationship was found for assault rates and suicide (H3a). Prisons with higher inmate assault rates (per 100 inmates) were significantly more likely to experience suicide than prisons with no assaults or low assault rates.

The next set of hypotheses (H4-H7) assessed the relationship between importation variables and prison suicide. Only one hypothesis (H7) received supported in the multivariate models. The proportion of inmates receiving mental health services was positively and significantly related to suicide. Prisons with a greater proportion of inmates receiving mental

health services significantly increased the suicide count. This effect was sustained after the deprivation variables were added to the model. The remaining importation variables—gender, age, and racial composition—were all non-significant. Thus, hypotheses 4, 5, and 6 did not find support. The gender and racial composition effects were accounted for by average daily population (ADP). Female only prisons were less likely to experience suicide than male only prisons, but once the size of the inmate population, or "exposure risk," was taken into account the effect disappeared. Simply, male only prisons were more likely to experience suicide because of the sheer quantity of male inmates and male only prisons in the data. Likewise, with ADP incorporated into the model as an exposure variable, the relationship between the proportion of white inmates and suicide disappears. The racial composition effect was also changed slightly in the full model by the addition of the set of security level dummy variables. Minimum security prisons housed a greater percentage of white inmates compared to higher security settings and were also less likely to experience suicide. As for the relationship between age composition and suicide, in prisons that house inmates under the age of 18, suicide was more likely than in adult only prisons. Again, ADP accounted for some of this effect. In the full model, however, this effect was further reduced by the inclusion of security level. Higher security prisons were more likely to have suicide and were also more likely to house inmates under the age of 18. When juveniles are tried as adults and sentenced to adult prisons, the offenses are usually more serious than cases involving juvenile offenses and thus young offenders in adult prisons are more likely to be housed in higher security settings where deprivations are the greatest and suicide is most likely.

The final set of hypotheses (H8-H11) considered the relationship between a series of product terms (deprivation and importation variables) and suicide. Interaction probes were used

to determine whether the relationship between prisoner characteristics and suicide was differentially affected by varying levels of deprivation. None of the product terms were significant. Thus, only H8 found support—the effect of gender composition on suicide was not significant. The remaining hypotheses (H9-H11) were not supported.

Overall, three of the six deprivation hypotheses and one of the four importation hypotheses were supported in the multivariate analysis. Being "cut off from society," deprived of goods and services, deprived of security, and receiving mental health services predicted suicide in prison. Of the deprivation indicators, security level was the largest predictor of suicide counts. Compared to the deprivation of security (assault rate) and the deprivation of goods and services (court order to limit count), the model suggested that deprivation of liberty or the extent to which inmates are "cut off from society" has the greatest effect on suicide. Of the importation indicators, the mental health of inmates was the only significant predictor of suicide. The demographic composition of inmates was not predictive of suicide. From the data, it is not clear whether offenders with pre-existing psychiatric problems are included in this percentage or whether mental health service needs are produced or exacerbated by the conditions of confinement. Nor is it the case that inmates receiving mental health services are those who commit suicide in prison. Whether the relationship between inmates' use of mental health services informs more about the conditions of the prison (deprivation) or the individuals at risk for suicide in prison (importation) is not certain. Based on the analytic models, both prison conditions and inmate composition were significant predictors of suicide.

Implications for Penal Practice: Improving Conditions and Preventing Suicide in Prison

Although the dissertation's main purpose was to test two historically competing theories of prison suicide, the findings also have implications for penal practice in general and for suicide

prevention more specifically. Overall, the findings reveal the detrimental effects of imprisonment. Prison is harmful. Suicide is one result of that harm. From this perspective, suicide is not an individual problem, but a problem central to the management of the prison. Prison researchers and correctional officials must pay closer attention to the effects of imprisonment on inmates during incarceration and strive to improve the conditions of confinement in order to create a healthier prison environment and to reduce the harm associated with the prison experience (Liebling 2004). This begins with decreasing the number of inmates incarcerated in U.S. prisons and relying more on community based programming rather than imprisonment. This also means providing opportunities behind bars and in the community for rehabilitation.

Based on the research reported in this dissertation, improved prison conditions in general will go far to reduce suicide behind bars. More specifically, though, the findings point to three foci for suicide prevention including factors related to prison security level, inmate mental health, and suicide in female prisons.

Security level was the most powerful predictor of suicide in the multivariate analyses. Higher security settings where deprivations were the greatest were associated with increased rates of suicide. Changes to the current security classification system of the U.S. correctional system are not likely. Thus, decreasing security settings to reduce/prevent suicide is not practical. Instead, the implementation of a more careful classification system would better differentiate offenders in need of placement in maximum security and those that could serve sentences under minimum/medium security conditions. Placement of inmates in lower security settings may reduce the incidence of suicide.

Furthermore, the notion that maximum security is synonymous with deprivation should be reconsidered. To fulfill any of the purposes of incarceration, higher security settings do not need to be overcrowded or characterized by violence, both of which were related to the increased likelihood of suicide in the current study. Because, as Goffman (1961) noted, prisons are an experiment on what can be done to the self, a critical reevaluation of the depriving conditions of prison and the effects of imprisonment is essential. Indeed, Sykes (1958) typology of the pains of imprisonment should not be used as the criteria which defines the level or amount of punishment or as the reality of the prison experience, but to counter and prevent the potential harmful effects including suicide.

Regarding security level, a practical implication of the findings for suicide prevention concerns the use of supermaximum security prisons. Suicide was significantly and substantially more likely in supermax institutions compared to prisons with lower security conditions. Incongruent with the intended purpose of the supermax prison, the harmful effects of total isolation and deprivation in these settings are more likely to produce suicide and other forms of violence rather than prevent it. The only solution for suicide prevention is to drastically decrease or completely eliminate the use of supermax prison conditions. In cases when supermax or similar isolating conditions are employed, inmates who are most at risk of suicide should not be housed in these settings. At a minimum, this includes inmates with mental health issues and previous suicide attempts.

Results of the multivariate analysis also indicated that the use of mental health services was a significant predictor of suicide in prison. As the percentage of inmates receiving mental health services increased, so did the rate of suicide. Whether this relationship informs more about the relationship between inmate mental health and suicide or the relationship between prison and

mental health (including suicide) more generally is unclear given the data. What is evident from the analysis is that in prisons where more inmates receive psychiatric services suicide is more likely. Again, a practical implication of this finding for suicide prevention is placement. This is particularly the case for supermax confinement. As noted, inmates with mental health issues should not be placed in isolation within the institution and should receive appropriate mental health treatment and rehabilitative programming. However, because the receipt of rehabilitative programming including psychological, vocational, or educational was not shown to decrease the likelihood of suicide in this sample of prisons, the conditions of the prisons in which the programming takes place should not be overlooked. Programming offered within the context of deprivation (i.e., overcrowding and violence) may affect the quality and the outcomes of that programming regardless of inmates' participation. In general, improving prison conditions may improve inmate mental health as well as prevent suicide.

Finally, the results of the suicide rate comparisons revealed a crucial discrepancy in the relationship between gender and suicide. Gender, being an obvious imported characteristic, was expected to have the same relationship with suicide both outside and inside prison. That is, females were expected to be less likely to commit suicide. The results, however, did not support this expectation. Female inmate suicide rates were nearly as high as male inmate rates and more than twice the rates for females in the non-incarcerated population. Unlike female prisons described in the literature (Pollack 2002) as well as in this sample, female suicides occurred in prisons with greater levels of deprivation including prisons with greater levels of security, prison with court orders to reduce the inmate count, prisons operating over capacity, prisons with relatively high assault rates, and prisons with a large percentage of inmates receiving mental health services. The pronounced occurrence of these deprivations in female only prisons with

suicide suggests that improvements to these prison conditions may be particularly important for preventing suicide.

Limitations of Findings

This current study is an important contribution to the research on prison suicide and demonstrates the unintended effects of incarceration and the ironies of imprisonment (Welch 1999). Despite these contributions, the study has a few limitations that must be acknowledged and addressed.

First, this research represents an ecological study of suicide in U.S. state prisons. Individual inmates commit suicide, but these suicides occur within the context of the prison. The focus of this study is on the role of the prison environment in prison suicide and therefore uses the prison as the unit of analysis. The CCF dataset is the best available data for this type of analysis. Because the level of analysis is the prison, the results do not provide information on who commits suicide in prison and for what reasons. Thus, inferences about the relationship between individual inmates and suicide are not appropriate (see Robinson 1950).[8] For example, the relationship between inmate composition variables included in the analysis and suicide must be interpreted carefully. Consider the findings regarding the percentage of inmates receiving mental health services. It is not clear from the CCF data whether inmates receiving mental health

[8] A study by Ellis, Grasmick, and Gilman (1974) examined violence in prison using aggregate, prison level data and data on individual inmates. The study addressed the association between group variables and aggressive behavior in prisons and the extent to which these relationships remained at the individual level of analysis. The findings indicated that the individual level variables held up as well as the findings from the aggregate data. The relationship between prison levels variables in the current study and suicide may correspond with findings of prior individual level research. Because individual level data was not available for analysis, the conclusion that prison level measures and suicide operate in the same way as the properties of individuals and suicide can not be confirmed here. This is an important area for future research. Only future research using both prison level and individual level, for example, can determine whether suicide in prison results from inmates' pre-incarceration mental health status, is an effect of imprisonment, or a product of both.

services commit suicide in prison. What is evident from the analysis is that in prisons where more inmates receive psychiatric services suicide is more likely. In the same way, consider the relationship between prison conditions and suicide. Although increases in the prison assault rates are related to the increased likelihood of suicide, it is not possible within the scope of this study to discern whether individual inmates who commit suicide are more likely to be victims of assaults. It is also important to note that the measures of deprivation in this study are objective indicators of security level, court orders for crowding, and assault rates rather than subjective measures of inmates' perceptions or feelings of deprivation.

Second, the current study uses a secondary data source to analyze suicide. Although there are many advantages to the use of secondary data (e.g., quick access, inexpensive, and comprehensive), the study design is vulnerable to many of the problems that accompany the use of secondary data in general. Principally, the data was not intended to study suicide in prison. Variables that may have important effects on prison suicide that were not included in the original survey were not available for analysis. Variables that were available and included in the analysis may have important limits as well. One charge in the literature is that security level is a crude indicator of deprivation (Liebling 2006). Prisons with the same security level may vary greatly. Even within the same institution, inmates may be housed in a range of security levels. Unfortunately, though, more nuanced measures of security level were not available in the CCF. However, the inclusion of other measures of deprivation including measures of isolation, overcrowding, and violence were used to quantify some of the most important deprivations of the prison environment.

In addition, any bias introduced in the initial data collection may be translated to the current study. The CCF is composed of official responses from correctional administrators. As is

the case with official data in general, these reports are criticized as being biased. Data may be inaccurate, under-reported, missing/omitted, or falsified. These errors are particularly relevant for the study of suicide (Douglas 1967). Criteria for determining cause of death may vary. Consequently, deaths may be differentially classified as suicide, accident, or unknown. Given this possibility, official measures of suicide may be inaccurate (Hayes 1996). Within the prison setting, it is also possible that social expectations and threats of legal liability may induce prison officials to downplay the number and types of deaths reported in custody. However, the number of suicides reported in the CCF dataset is consistent with other recent data collected by Mumola (2005).

Finally, the CCF data used in the current analysis relies on a cross-sectional design to test the deprivation, importation, combined models of prison suicide. Although previous enumerations of the CCF data are available and contain data on yearly suicide counts, other information varied from year to year. Key indicators of deprivation and importation were not common to all collections. The findings of this study then are correlational rather than causal.

Future Research

While the current study provides an important contribution to the understanding of prison suicide as well as insight into the role of the prison environment on suicide, data limitations produce a few unanswered research questions, especially with regard to the relationship between individual inmate characteristics and suicide. These questions can only be addressed through future research. Additional theoretically framed examinations of the causes and correlates of suicide carried out within methodologically sound research designs are needed. Better data is needed to conduct this research. The implementation of suicide prevention policies based on current research findings also needs evaluation. The scope of this research needs to be broadened

to include comparisons of suicide in prison and other settings such as jails, juvenile correctional facilities, alcohol/drug treatment centers, and psychiatric institutions; suicide in federal prisons; and suicide attempts and other forms of distress.

Most pertinent to the current study is the need for a multi-level analysis of prison suicide which combines data from individuals (suicide and non-suicide cases) and prisons (with and without suicides). A multi-level design would allow for the simultaneous analysis of the individual and prison effects on suicide and for the determination of cross-level interaction effects. More theoretically, this type of analysis would provide a more accurate test of the combined model of prison suicide.

To date, data for this type of analysis do not exist or have not been compiled on a national level. The Deaths in Custody Reporting Program data (DICR) combined with the Census of State and Federal Adult Correctional Facilities data (CCF) holds real potential for fulfilling this research gap in the near future. However, the DICR data is limited to demographic and situational information on suicide cases. In addition, as designed the DICR data does not provide comparative information for inmates who do not commit suicide in prison. The DICR data matched with the CCF represents a first step towards a multi-level analysis of prison suicide. Given the limits of the DICR data, primary data collection is needed, which would require the compilation of data on suicidal and non-suicidal inmates' demographic, criminogenic history, and pre- and post- mental health status (via clinical data).

Other research needs include longitudinal analyses, additional comparisons of suicides in custody and the general community, and cross-cultural studies. The drastic decline in prison suicide rates since 1980 should be examined using longitudinal data to determine empirically the relationship between this decline and suicide prevention efforts, changes in prison conditions,

and changes in the inmate composition including the imprisonment of increasing numbers of mentally ill offenders. Analyzing suicide and prison conditions over time would provide a more comprehensive understanding of how prison deprivations are related to suicide. For example, do changes in prison conditions such as increased crowding, more violence, and harsher prison regimes increase the likelihood of suicide over time? Longitudinal research is also necessary to determine whether the prison experience is a primary force in producing suicide or whether prison represents an opportunity for suicide rather than a cause. For example, do inmates who commit suicide bring into prison pre-existing psychological problems, prior suicide attempts, and other risk factors for suicide that pre-date the incarceration experience? Does prior incarceration affect future suicide attempts or completions in prison or after release? In essence, does the prison experience increase the likelihood of suicide for inmates?

In order to address these and other questions, additional studies that examine suicide in prison and the general community population are vitally needed (see Tartaro and Lester 2005; McCorkle, Meithe, and Drass 1995). Do similar types of individuals commit suicide in prison and in the community? Do inmates commit suicide for the same reasons as those in the community? On a more macro level, do the characteristics of inmates' communities such as socio-economic conditions affect suicide inside prison? In addition, how do the characteristics of prisons' host communities influence the likelihood of suicide in prison?

Lastly, cross-cultural research on suicide in prison would add to the knowledge of how the prison experience affects suicide (see Blaauw, Kerkhof, and Hayes 2005). Do inmates in different countries commit suicide at similar rates? How do differences in prisons cross-culturally affect the rate of suicide in prison? Do prison deprivations/conditions similarly predict suicide?

Another area for future research concerns prison suicide prevention efforts. An aim of most research on prison suicide is prevention. Based on the findings of prior research, suicide prevention programs have been implemented and accrediting bodies such as the American Correctional Association have required members to meet standards for suicide prevention. Components of comprehensive suicide plans are acknowledged in the literature and accounts of successful suicide prevention programs have been documented (Bonner 2000; Hayes 1995; 1996; 1999). In addition, a few studies have attempted to evaluate specific policies related to suicide prevention (Correia 2000; Daniel and Fleming 2006; Kovasznay et al 2004; Fruehwald et al. 2002; White, Schimmel, and Frickey 2002) More thorough evaluations are needed, though. These include pre- and post-intervention evaluations and evaluations over time that control for changes in prison conditions, penal policies, and inmate composition. Because suicide litigation is an important consideration for prison officials and state prison systems, evaluations should also take into account the legal ramifications on suicide in prison and its prevention (Danto 1997; Hanser 2000).

The current study of prison suicide was limited to an analysis of general adult confinement facilities operated by state departments of correction. The findings of the study must be interpreted within the limits of the sample. The research should be broadened to include federal prisons and jails and other institutional settings (e.g., treatment centers and psychiatric institutions) to determine if the findings generalize to these settings.

Suicide in general is difficult to study. Those who could best inform the research knowledge on the subject can not be interviewed. As a result, studies of suicide in prison are often based on official accounts and limited in information. Studies of suicide attempts and overall distress in prison are one way to broaden and enrich the research on suicide in prison

(Hochstetler, Murphy, and Simons 2004). Liebling (2006) and Medlicott (2001) have begun this type of research in the U.K. Similar studies of suicide attempts have yet to be carried out in U.S. prisons.

Conclusions

While suicide in prison is a rare event, the issue is not trivial. The contributions for sociology and criminology along with the implications for understanding and preventing suicide were made clear in this study. Research on the effects of incarceration rarely focuses on suicide. Further, prior research on prison suicide has narrowly focused on description of incidence as well as on the prediction of suicide, generally to the exclusion of more theoretically driven approaches to understanding and explaining variations in prison suicide. Because studies are usually prompted by the occurrence of suicide, they are conducted within a single prison or state prison system by prison psychologists and psychiatrists whose emphasis is on the role of individual characteristics in the prediction of suicide rather than the contributions of the larger prison context. As a result, suicide has become a medical phenomenon not a prison problem. The aim of this study of prison suicide was to redirect the research focus toward the prison context in a way that moves beyond description and contributes theoretically and methodologically to the understanding and explanation of prison suicide in the U.S.

This study of prison suicide posed the questions: To what extent is suicide a product of the prison environment (deprivation model), a result of inmate characteristics (importation model), or combination of both? Using national level data on 1,082 prisons, this study was able to address these questions and test alternate theoretical explanations for prison suicide. The results of the multivariate analyses revealed the combined effects of institutional conditions (security level, overcrowding, and violence) and inmate composition (mental health) on suicide.

Deprivation variables were overwhelmingly predictive of suicide indicating that the prison context is a crucial component of any explanation for suicide. More research on prison suicide is needed. Studies that can simultaneously examine individual level predictors and conditions of the prison environment in multi-level statistical analyses are necessary to fully test the deprivation, importation, and combined models.

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APPENDIX A

SUPPLEMENTARY & SENSITIVITY ANALYSES

The following tables include results for a series of analyses that supplement those presented in chapter five. Specifically, to test the robustness of the negative binomial regression model a logistic regression model, zero inflated negative binomial model, and two alternate negative binomial regression models are displayed. Due to the differences found between male and female suicide rates, an alternate model predicting only the number of male suicides was run. A second alternate model was for run which excludes supermaximum security prisons. The final models presented in Appendix A show the negative binomial regression model results for the interaction probes.

Overall, the results of these additional analyses are consistent. None of the demographic composition variables are significant predictors of suicide in these models. Receipt of mental health services significantly increases the likelihood of suicide in the logit model and the count of suicide in the reduced NBRM models. Likewise, deprivation indicators including security level, court orders to reduce the inmate count, and assault rates are significant predictors of suicide. Each of these models supports the robustness of the findings reported in chapter five.

Logistic Regression Model Predicting Probability of Prison Suicide	
	Model
Deprivation Variables	
Urban Location	.103
Inmates allowed to Depart	-.380
Medium Security[b]	.666[†]
Maximum Security	1.931[***]
Supermax	2.221[***]
Over Capacity	.453
Under Court Order	.778[*]
Number of Special Programs	.027
Assault Rate (per 100 inmates)	.032[*]
Importation Variables	
Female only[a]	-.911
Both Male & Female	.687
Inmates <18 years of age	.248
% White	.004
% Receiving MH Services	.008[†]
Control Variables	
Age of Prison (years)	.005[†]
Private Prison[c]	.000
Number of Inmates	.001[***]
State Suicide Rate	-.062
Constant	-3.967[***]
Log Likelihood	-304.598
Psuedo R^2 (Nagelkerke)	.233

NOTE: Logit coefficients presented. Robust Standard Errors used. N=1082
[a] Reference is Male only prisons; [b] Reference is Minimum security prisons; [c] Reference is State prisons.
[†]p<.10; *p<.05; **p<.01; ***p<.001

Results of Zero Inflated Negative Binomial Regression[9]				
	Count Model	Inflated[10] Model	Count Model	Inflated Model
Deprivation Variables				
Urban Location	.328†	1.864		
Inmates allowed to Depart	-.089	2.894		
Medium Security[a]	.329	-.339		
Maximum Security	.843	-2.999†		
Supermax	1.951**	-.899		
Over Capacity	-.347	-5.051		
Court Order to Reduce Inmate Count	.200	-2.171		
Number of Special Programs[b]	.006	-.0369		
Assault Rate (per 100 inmates)	.044**	.060		
Importation Variables				
Female only[c]			.809	15.342
Both Male & Female			.487	-6.174
Inmates <18 years of age			-.120	-1.755
% White			-.008	-.075
% Receiving Mental Health Services			.002	-.472
Control Variables				
Age of Prison (years)	.004†	-.021	.006	.030
Private Prison[d]	--	--	-1.231†	-10.177
State Suicide Rate (age adjusted)	--	--	-.006	.131
Number of Inmates (exposure variable)	--	.000	--	-.002
Constant	-9.532***	.172	-8.410***	3.331

NOTE: Beta coefficients shown. N=1082 (130 Nonzero observations and 952 Zero observations). Count model constrained by average number of inmates (exposure or "at risk" variable). Standard Errors (robust) adjusted for clustering by state.
†p<.10; *p<.05; **p<.01; ***p<.001
[a] Reference is Minimum security prisons.
[b] Includes educational, vocational, psychological/self-help, and alcohol/drug treatment programs.
[c] Reference is Male only prisons.
[d] Reference is State prisons.

[9] Some of the non-significant control variables were removed from the deprivation only model in order for the model to converge. Full model failed to converge. Results not shown.
[10] Inflated portion of the model is a binary logit model and is interpreted as the probability of being in the always zero group versus the not always zero group.

Negative Binomial Regression Results Predicting Prison Suicide Counts
Alternate Models

	Male Only Model (N=993)	Model w/out Supermax Prisons (N=1061)	Full Model (N=1082)
Deprivation Variables			
Urban Location	.043	.083	.071
Inmates allowed to Depart	-.263	-.352	-.345
Medium Security[a]	.242	.326	.328
Maximum Security	1.166**	1.110**	1.152***
Supermax	2.018***	--	1.971***
Over Capacity	.352	.278	.303
Court Order to Reduce Inmate Count	.739**	.757***	.790***
Number of Special Programs[b]	-.020	-.028	-.026
Assault Rate (per 100 inmates)	.025*	.035***	.032**
Importation Variables			
Female only[c]	--	-.191	-.259
Both Male & Female	.691	.712	.705
Inmates <18 years of age	-.113	-.021	-.095
% White	.003	.002	.005
% Receiving Mental Health Services	.007*	.009*	.009*
Control Variables			
Age of Prison (years)	.003	.004*	.003
Private Prison[d]	-.398	-.347	-.299
State Suicide Rate (age adjusted)	-.046	-.039	-.059
Constant	-9.371***	-9.425***	-9.280***

NOTE: Logit coefficients reported. Model constrained by average number of inmates (exposure or "at risk" variable). Standard Errors (robust) adjusted for clustering by state. †p<.10; *p<.05; **p<.01; ***p<.001

[a] Reference is Minimum security prisons.

[b] Includes educational, vocational, psychological/self-help, and alcohol/drug treatment programs.

[c] Reference is Male only prisons.

[d] Reference is State prisons.

Negative Binomial Regression Results Predicting Prison Suicide Counts
Interaction Probes

	Model 1	Model 2	Model 3
Deprivation Variables			
Urban Location	.071	.068	.065
Inmates allowed to Depart	-.358	-.349	-.349
Medium Security[a]	.337	.331	.326
Maximum Security	1.128**	1.170**	1.162***
Supermax	1.941***	1.981***	2.004***
Over Capacity	.287	.293	.306
Court Order to Reduce Inmate Count	.804***	.781***	.784***
Number of Special Programs[b]	-.031	-.022	-.023
Assault Rate (per 100 inmates) [d]	.032**	.031**	.028*
Importation Variables			
Female only[c]	-.290	-.296	-.284
Both Male & Female	.696	.709	.717
Inmates <18 years of age	-.076	-.094	-.107
% White	.006	.005	.005
% Receiving Mental Health Services [d]	-.005	.008*	.009**
Interaction Probes			
Medium X % MH Services	.012		
Maximum X % MH Services	.017		
Supermax X % MH Services	.000		
Court Order X % MH Services		.008	
Assault Rate X % MH Services			.000

NOTE: Logit coefficients reported. Model constrained by average number of inmates (exposure or "at risk" variable). Standard Errors (robust) adjusted for clustering by state. †p<.10; *p<.05; **p<.01; ***p<.001

[a] Reference is Minimum security prisons.

[b] Includes educational, vocational, psychological/self-help, and alcohol/drug treatment programs.

[c] Reference is Male only prisons.

[d] Variables centered at mean.

[e] Reference is State prisons.

cont.	Model 1	Model 2	Model 3
Control Variables			
Age of Prison (years)	.003	.003	.003
Private Prison[e]	-.330	-.298	-.310
State Suicide Rate (age adjusted)	-.060	-.058	-.056
Constant	-9.257***	-9.299***	-9.310***

NOTE: Logit coefficients reported. Model constrained by average number of inmates (exposure or "at risk" variable). Standard Errors (robust) adjusted for clustering by state. †p<.10; *p<.05; **p<.01; ***p<.001

[a] Reference is Minimum security prisons.

[b] Includes educational, vocational, psychological/self-help, and alcohol/drug treatment programs.

[c] Reference is Male only prisons.

[d] Variable centered at mean.

[e] Reference is State prisons.