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INCARCERATION, SOCIAL BONDS, AND THE LIFECOURSE

By

Beth Marie Huebner

A DISSERTATION

**Submitted to
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ABSTRACT

INCARCERATION, SOCIAL BONDS, AND THE LIFECOURSE

By

Beth Marie Huebner

In the current study, the lifecourse perspective, as posited by Sampson and Laub (1993), was used to examine the relative effect of incarceration on social bond attainment. It was hypothesized that individuals who have been incarcerated would be less likely to attain bonds to marriage and work and the nature of bonds attained would be further diminished by the event. The hypotheses were tested using data from the National Longitudinal Survey of Youth.

Results from regression and growth curve models confirm the lifecourse perspective. Across all models estimated, incarceration was negatively associated with both the likelihood of attainment and the nature of the social bond. A number of significant relationships were found between static-individual predictors and social bond attainment; however, individual demographic factors were found only to be moderately related to the initial status of the individual and had little effect on the nature of change over time. The findings from this study reinforce the importance of adult social bonds in determining life trajectories. Implications of these findings are discussed in terms of their relevance to the study of prisoner reentry.

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To J.R.S. with all my love

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Introduction: Chapter 1

In 2000, about 571,000 prison inmates were released from state prisons back into the community. At year end 2001, there were over 700,000 persons on parole; this population represents a three-fold increase since 1980 (Glaze, 2002). Most of the individuals returned back to the community will not succeed in abstaining from crime. The recidivism statistics for incarcerated persons are striking. Of prisoners released from state institutions in 1994, 68 percent were rearrested for a new offense and 52 percent were returned back to prison or jail on conviction for a new offense or a technical violation within three years of release (Langan & Levin, 2002). Among State parole discharges in 1999, only 42% successfully completed their term of supervision (Glaze, 2002).

The increase in prisoner reentry is even more dramatic in light of rising incarceration rates. In the last twenty-five years the imprisonment rate has increased nearly fourfold and currently stands at 476 per 100,000 persons. Approximately 1.2 million people are in state prisons on any given day and an additional 600,000 are incarcerated in local jails (Beck, Karberg, & Harrison, 2002). The 'imprisonment binge' (Irwin & Austin, 1994) has taken a substantial toll on both institutional populations and the community. Few prisoners receive programming while in prison. Less than one third of all state prisoners in 1997 reported participating in educational or vocational programs (Lynch & Sabol, 2001). The parole systems have also been inundated with individuals. Despite this increase, per capita spending on parole services has decreased about \$1,500 over the past thirteen years (Lynch & Sabol, 2001). An increasing number of people are being released into the community ill prepared and with little or no supervision. In light

of the organizational constraints faced by local correctional facilities and the lack of resources aimed at programming, it is not surprising that prison remains a revolving door.

Despite the dire recidivism statistics, many people do succeed following incarceration and remain free from involvement with the criminal justice system and crime. In fact, approximately 40 percent of those individuals released back into the community are not re-incarcerated following release. Many people do well. Even with the relative successes, few researchers have examined the factors associated with resiliency and desistance from crime following release from prison. Most research conducted to date on incarceration outcomes has been designed to estimate recidivism (Gendreau, Little, & Goggin, 1996); however, there is great utility in examining predictors associated with desistance.

Integrating the study of desistance and resiliency into the examination of crime enhances the research conducted within criminology. Theories of criminology have traditionally been centered on discovering the factors associated with the etiology of crime. More recently, lifecourse perspectives have brought to light the importance of examining different phases of the criminal career. Predictors related to the termination of a criminal career can have important theoretical implications for the study of the onset of criminality. For example, if researchers discover that positive social bonds to marriage increase the likelihood of desistance in adulthood, then it would be important for researchers to consider if individuals who develop similar bonds are able to escape involvement in criminality altogether. Desistance is in many ways the opposite of the inception of the criminal career where activation refers to the gradual involvement in criminality, and desistance is signaled by a reduction in criminal behavior and gradual

and eventual conclusion of the career (Loeber & Le Blanc, 1990). Failure to examine all phases of the criminal career limits the validity of lifecourse perspectives and criminology in general.

The examination of factors associated with desistance in adulthood also has important implications for criminal justice policy. Although researchers have begun to develop comprehensive models of criminal career initiation, it remains difficult to identify those individuals who will eventually become involved in serious delinquency. Moreover, there are substantial limitations to conducting research on and intervening in the lives of youth. Conversely, researchers have greater freedom to become involved with those individuals who have been formally processed within the criminal justice system (see Uggen & Piliavin, 1998). Stronger treatments can also be administered to individuals under legal supervision of the criminal justice system. For example, it is possible to require participation in a rigorous work treatment program for those individuals on parole; whereas, this type of intervention would be difficult to conduct with one who had not been officially sanctioned.

Apart from utilitarian concerns, developing appropriate theories of desistance is also cost-effective. Institutional placement is extremely costly, especially in light of current economic crisis and the rising incarceration rate. The reentry point represents an opportune time in the lifecourse for intervention. Incarceration research has traditionally been centered on developing appropriate risk prediction instruments. Estimates of risk are very important for parole decisionmaking and institutional placement, but are of little assistance in understanding and predicting success following incarceration. The

development of predictive models specific to desistance will aid researchers and practitioners alike in crafting appropriate interventions.

Limitations of Correctional Research

Research conducted to date on corrections and reentry has been limited by a number of predictors. First, much of the literature is centered on the examination of recidivism following a discrete incarceration event, but more than half of all inmates will be sentenced to more than one term of incarceration in their lifetime. It is important to understand how multiple stays of incarceration affect both the relative risk of recidivism and the likelihood of desistance.

Second, the breadth of the data available to study recidivism has limited current research. Most research has been centered on the examination of a geographically limited sample of offenders for a brief time period. Desistance is most often considered a gradual process (Laub, Nagin, & Sampson, 1998). Restricting the time allotted for subject follow-up truncates the lifecourse experience and inhibits the valid consideration of the desistance phenomenon. Expanding the nature of the sample and the time frame for data collection enhances the generalizability and validity of the study.

Finally, the incarceration research has been limited by the nearly singular emphasis on negative transitions following incarceration. As discussed above, the study of factors associated with desistance has utility for the expansion of lifecourse research and is also important for developing appropriate intervention and rehabilitation programming.

Current Research

The current research serves to address many of the limitations associated with the existing literature on correctional outcomes and the lifecourse. This research is unique to corrections research in that the incarceration event is modeled as a lifecourse event. As such, a sub sample of a nationally representative, longitudinal dataset was used to examine how incarceration interrupts and changes life trajectories. Specifically, the research focused on understanding social bond development following incarceration. The research has been designed to examine the likelihood of developing social bonds to work and marriage following incarceration, and how the incarceration event affects the nature of such bonds. Social bond development has also been operationalized as a correlate and precursor of desistance; hence, the current work contributes to this body of literature.

This research also expands current correctional literature by including multiple measures of incarceration. Incarceration measures were developed to reflect the frequency and length of incarceration events. In addition, the use of longitudinal data facilitates the examination of the relationship between timing of incarceration and social bond development.

Summary

The incarceration and subsequent reentry rates have reached remarkable heights. The existing corrections research has largely examined the reentry phenomenon in relationship to recidivism and has ignored factors associated with resilience following incarceration. The current study adopts a lifecourse perspective to examine incarceration

as an important turning point. The primary goal of this research is to understand social bond development following incarceration. This research also has important implications for both theoretical development and correctional policy.

Chapter 2: Theoretical Perspectives

This chapter presents a review of the literature on lifecourse criminology and its relationship to the study of corrections. First, this chapter examines the general paradigm of lifecourse criminology. Special attention is paid to the research conducted by Sampson and Laub (1993). The theory of social capital as posited by Coleman (1988; 1990) is also discussed in relationship to social bond development. Second, contemporary research on recidivism and prisoner reentry is reviewed. Finally, the existing research on development of social bonds to marriage and work following incarceration is discussed. In addition, the review examines the quality of research conducted to date and draws some conclusions as to what is known about the relationship between incarceration and successful social bond development and what questions remain unanswered.

Crime and the Lifecourse

Theoretical Development

The lifecourse perspective is relatively new to the study of criminology. Prior to the 1970's, the majority of criminological research was based on static theories of crime using aggregate, cross-sectional data. Research that was conducted with individual-level data focused largely on adolescence and ignored early childhood development. This research failed to provide insight into the heterogeneity among offenders, how individuals interact with the community, and how criminal involvement changes over time.

During the past thirty years, a number of seminal longitudinal research studies have examined crime over the lifecourse (e.g. Elliott, Ageton, & Canter, 1979; West & Farrington, 1973; Wolfgang, Figlio, & Sellin, 1972). These studies were unique because they used individual-level measures to examine change in criminal trajectories. Researchers from this perspective were also the first to incorporate theories and methodologies from developmental psychology. Much of the prior research in the social sciences had only examined delinquency in late adolescence and early adulthood; however, research from the developmental perspective examined how deficits in early childhood extend to criminality in both adolescence and adulthood (T. E. Moffitt, 1993; T. E. Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Patterson & Yoerger, 1993). This research shifted the focus of criminology away from the examination of late-adolescent persistent, high-rate offenders to the study of the etiology of crime.

A central focus within developmental psychology has been the examination of heterogeneity in lifecourse offending patterns between individuals over time. For example, Moffitt (1993) argues that individuals who become involved in criminality at a younger age are qualitatively different from those that begin their criminal involvement in adolescence. Youth who initiate criminal careers at an early age are substantially more likely to be involved in criminality later in adulthood when compared to adolescent-onset offenders. The development of offender typologies also became important as part of this research. An implicit assumption of this research was that not all offenders experience criminality and other lifecourse events in the same manner. From this research it became important to examine individual life trajectories instead of treating youth involved in criminality as a homogenous class of persons.

Two central findings emerge from early research on lifecourse criminology. First, there appears to be continuity in offending across time and a strong association between past and future delinquency at the individual level. Individuals who are involved in delinquency at a young age are also more likely to be involved in criminality as an adult (see Blumstein, Cohen, Roth, & Visher, 1986; Tracy & Kempf-Leonard, 1996; Wolfgang, Thornberry, & Figlio, 1987). Using data from the 1958 Philadelphia Birth Cohort, Tracy and Kempf-Leonard (1996) found that the majority of sample members had no record of adult or juvenile crime. Of those who reported having criminal involvement, the majority had a record of delinquency but had not been involved in criminality as an adult. One third (32%) of individuals who had been involved in offending as a juvenile went on to adult criminal careers. In comprehensive reviews of the literature Olweus (1979) and Loeber (1982) also confirm the stability of criminality across time.

Another consistent finding in the literature is that aggregate delinquency rates peak between late adolescence and early adulthood and decline into adulthood. Using data obtained from the Philadelphia Birth Cohort study of 1967, Wolfgang, Thornberry, and Figlio (1987) followed a sample of individuals until age thirty and discovered that delinquency peaks at age sixteen and declines into adulthood (see also Wolfgang et al., 1972). This finding has been confirmed by a number of researchers using data from official arrest reports (F.B.I, 1990), self-reported data (Rowe & Tittle, 1977), and from populations outside the United States (Farrington, 1986).

Despite the commonality in findings from the early delinquency research, a number of different theoretical models have been developed to explain the results.

Research within this area can be classified into three groups. The *population heterogeneity* explanation sees adult criminality as a function of criminal propensity, or latent traits, developed in early childhood (e.g. M. R. Gottfredson & Hirschi, 1990). Conversely, theorists within the *state dependence* framework argue that criminality is a direct result of interaction with the social environment (Blumstein et al., 1986). The final group includes *integrated theories* that merge both change and continuity arguments. A review of the relevant research conducted within each of the three perspectives is presented below.

Population Heterogeneity

The stability of crime and antisocial behavior over the lifecourse has been well documented (Caspi & Bem, 1990; M. R. Gottfredson & Hirschi, 1990; Loeber, 1982; Olweus, 1979). A dominant explanation for this stability has been presented by theorists within the population heterogeneity perspective (see Bushway, Brame, & Paternoster, 1999; Nagin & Paternoster, 1991). Researchers of this tradition have argued that differences in predisposition to engage in criminal activities explain all differences in offending over the lifecourse. Latent criminal propensities develop early in life and are time stable. This theoretical framework is most often associated with the work of Gottfredson and Hirschi (1990); however, a number of researchers have conducted work within this framework (Fishbein, 1990; Wilson & Herrnstein, 1985). For example, Wilson and Herrnstein (1985) argue that offending can be explained in relation to criminal propensity, which can include personality traits such as impulsivity, conscience, and conditionability. Propensity is developed early in life and influences criminality,

school performance, employment, and substance abuse. Biological theories of crime also can be classified as population heterogeneity models because of their emphasis on the relationship between genetic factors (e.g., chemical imbalances) and criminality (see Fishbein, 1990).

The General Theory of Crime by Gottfredson and Hirschi (1990) has been one of the most influential and controversial criminological works. Their population heterogeneity argument is centered on self-control. Self-control is developed by age four or five, largely as a result of parental interaction, and remains stable over the lifecourse (M. R. Gottfredson & Hirschi, 1990:97). Consistent with other theories in the population heterogeneity framework, they argue that criminal propensity is constant across the lifecourse; therefore, the best predictor of crime is past criminal behavior (M. R. Gottfredson & Hirschi, 1990:107). Based on this theoretical framework, any person who has inadequate restraint to resist the temptations and gratifications of criminality, and has an opportunity to commit a deviant act, will do so. Because criminal propensity is established at an early age, Gottfredson and Hirschi argue that adult social bonds established through marriage, meaningful employment, or other control mechanisms will have little effect on adult trajectories. Any positive correlation found between criminality and social bonds is spurious. Instead, both processes can be explained in relationship to self-control.

A number of policies have been proposed based on this theoretical perspective. Researchers within this population heterogeneity framework have argued that public agencies should focus on cultivating self-control through social service programming for youth and their families in early childhood. According to population heterogeneity

theorists, the use of any kind of rehabilitation program would be ineffectual. Instead, programming should focus on early childhood when self-control and other personality traits are believed to develop. In addition, researchers within the framework contend that modifications to the criminal justice system in any manner will not reduce involvement in criminal activities (Gottfredson and Hirschi, 1990). Individuals with low self-control will not be deterred by traditional criminal justice sanctions. Criminal justice institutions can be used to protect community safety by separating the offender from society, but the provision of any form of rehabilitation or prevention services, after the individual has reached late childhood is futile.

State Dependence

The second lifecourse perspective has been deemed the state dependence framework (Brame, Bushway, & Paternoster, 1999; Nagin & Paternoster, 1991). The state dependence argument has been most often associated with the strain, control, and labeling theoretical frameworks. Theorists of this tradition contend that involvement in crime alters life chances (e.g., ability to vote or attain employment); thereby, increasing the likelihood of future offending (Nagin & Paternoster, 1991:166). Involvement in criminality or deviance at any age changes the offender, making her or him more or less likely to commit future acts. Most state dependence theorists argue that prior participation in criminality reduces barriers to future participation making subsequent deviance more likely. For example, Hirschi (1972) proposed that by committing a crime, the strength of the offender's social bond to society is weakened. In damaging the social bond, the offender limits future legitimate social avenues; therefore, subsequent

criminality becomes more attractive. This state dependence framework has also been identified as the criminal career perspective because theorists in this tradition argue that early criminal propensity is not necessarily deterministic of adult criminality (see Blumstein et al., 1986). Instead, the state dependence paradigm takes a dynamic approach by considering criminality exclusively in relationship to the offenders' interactions with society.

Age and Offending

The introduction of developmental and lifecourse theoretical perspectives has fostered a rift in criminology. This divergence in perspectives has grown largely from the study of the association between age and crime. As stated above, aggregate research on offending patterns over the lifecourse has found that involvement in delinquency rises quickly through adolescence, peaks in late adolescence or early adulthood, and declines steadily into adulthood. The traditional view, associated with the population heterogeneity framework, has been that the majority of juveniles who participate in delinquency at a young age will continue to offend into adulthood; although, the frequency of offending by these individuals will decline markedly over the lifecourse (M. R. Gottfredson & Hirschi, 1986). Age is correlated with crime. The effects of age do not depend on demographic influences and cannot be explained in reference to them (Hirschi & Gottfredson, 1983:581). Criminal propensity, developed in childhood, is deterministic of offending patterns throughout the lifecourse.

Conversely, theorists within the state dependence paradigm make no assumptions about the frequency or duration of offending. Researchers from this perspective also do

not deny the evidence of a general age crime curve, but they do argue that there is variation in criminal trajectories among subgroups when the data are disaggregated (Blumstein, Cohen, & Farrington, 1988a, 1988b). For this perspective, the key to understanding crime lies in the identification of sources of variation. This includes examining individual variation over time and understanding differences between offenders and non-offenders (Blumstein et al., 1988b:64).

A number of methodological implications follow from this rift. Population heterogeneity theorists (M. R. Gottfredson & Hirschi, 1986; 1990) have argued that because criminal behavior is related to stable, underlying group differences, there is little utility in using longitudinal methodologies (see also Hirschi & Gottfredson, 1983; Hirschi & Gottfredson, 1985). They suggest that researchers pose retrospective questions in a cross-sectional research design if data are needed on events that occurred prior to the study period (M. R. Gottfredson & Hirschi, 1986). Criminologists from the state dependence framework contend that cross-sectional designs are inferior because they only allow researchers to infer correlation and not causation. Retrospective panel designs are also not ideal to collect historical data, namely because of problems with imperfect participant recall (Blumstein et al., 1988b; Greenberg, 1985). Researchers from the state dependence perspective agree that prospective longitudinal designs, although not without problems, allow researchers to obtain data proximate to the event and to make valid generalizations from the data.

Although the theoretical debate between continuity and change over the lifecourse remains an important topic of research in criminology to date (see Geis, 2000; Hirschi & Gottfredson, 2000), a number of researchers have now embraced integrated models. In

fact, most researchers widely agree that it is important to take into account stable individual differences when estimating time-variant models (see Brame et al., 1999; Nagin & Farrington, 1992a, 1992b; Paternoster, Dean, Piquero, Mazerolle, & Brame, 1997). Research from this debate has spawned a new class of work that melds the central tenets from the population heterogeneity and state dependence frameworks. A summary of the lifecourse perspective is presented below.

Lifecourse Perspectives

It was also during this time of great debate within criminology that a new class of research began to emerge. Hagan & Palloni (1988) argued that criminological research from both the population and state dependence traditions had been too narrowly focused on the peak years of criminality (e.g., late adolescence and early adulthood) and high-rate offenders. The authors encouraged researchers to broaden their examination of criminality and focus on crime as an element in the larger context of the lifecourse.

Researchers also introduced the concept of a trajectory during this time. A trajectory represents the long-term development and behavior of an individual over the lifecourse. Using data from the lifecourse allows researchers to examine criminality in a larger context of other life events (see Elder, 1985). Crime can represent a turning point in the lifecourse, but it is not an isolated event. Involvement in crime cannot be separated from the individual and must be examined in light of other life transitions (e.g., marriage, educational attainment). The criminal event signals a transition in the lifecourse, and research should seek to understand how individuals adapt and change following the transition. Different adaptations to the same event can lead to very different trajectories

(Elder, 1985:35). The trajectory of an individual who responds to a narcotics arrest by seeking treatment could be very different from the trajectory of another individual who chooses to return to the same community and maintain involvement with crime. Said another way, crime and incarceration are but events in the larger trajectory; it is the individual's response to these events that influences future outcomes.

The timing and the nature of an event can also have a substantial effect on lifecourse trajectories. Researchers have stressed that both delays in achieving transitions or milestones and early or precocious transitions can have detrimental effects on future trajectories (Caspi & Bem, 1990; Rindfuss, Swicegood, & Rosenfeld, 1987). The time between transitions has also been linked to differential outcomes (Hogan, 1978, 1980). For example, it is important to examine not only the attainment of the marital bond, but also the timing and the nature of the bond. In general, bonds resulting from marriage have been associated with desistance; however, marriage that occurs close to the birth of a child does not have the same deterrent effect (Laub et al., 1998). Again, social events do not exist in isolation; the social context and timing of the lifecourse event and the individual adaptation to the event are as important as the event itself.

The lifecourse perspective is particularly relevant to the study of incarceration and prisoner reentry. Researchers within the lifecourse perspective include incarceration in a class of general social events, like marriage and illness, which can impact life trajectories (Sampson & Laub, 1993). Incarceration is not an isolated event. Instead it is a part of a larger life trajectory that can be characterized by a number of life changes.

Sampson and Laub (1993) have developed one of the most preeminent lifecourse perspectives on criminology. Their model rests on the assumption that social bond

development over the lifecourse can have profound effects on both conformity and criminality. Details of the theoretical model posited by Sampson and Laub are presented below. Specifics on the application of their model to the study of incarceration are also discussed.

Crime in the Making

Building on the work of the state dependence and offender heterogeneity perspectives, Sampson and Laub (1993) developed an age-graded integrated theory of offending (see also Laub & Sampson, 1993; Sampson & Laub, 1990, 1992). Their theoretical model is a unique contribution to criminological theory in that it incorporates both continuity and change. They understand the importance that criminal propensity can have on individual inclination toward criminal behavior; however, they also argue that social bonds both as a juvenile and as an adult can insulate offenders from criminality and influence criminal trajectories. Prior criminality is also included in the model in that the researchers argue that prior criminality can have an influence on future trajectories by ‘knifing off’ certain life avenues.

In order to test their hypothesis, Sampson and Laub reanalyze Sheldon and Eleanor Gluecks’ data presented in *Unraveling Juvenile Delinquency* (1950b). The sample included 500 White males between the ages of ten and seventeen from Boston who had been committed to one of two Massachusetts’s juvenile correctional facilities. The Gluecks’ also carefully constructed a matched sample of 500 non-delinquents recruited from Boston area public schools. A graphical depiction of Sampson and Laub’s theoretical framework is presented in Figure 1.

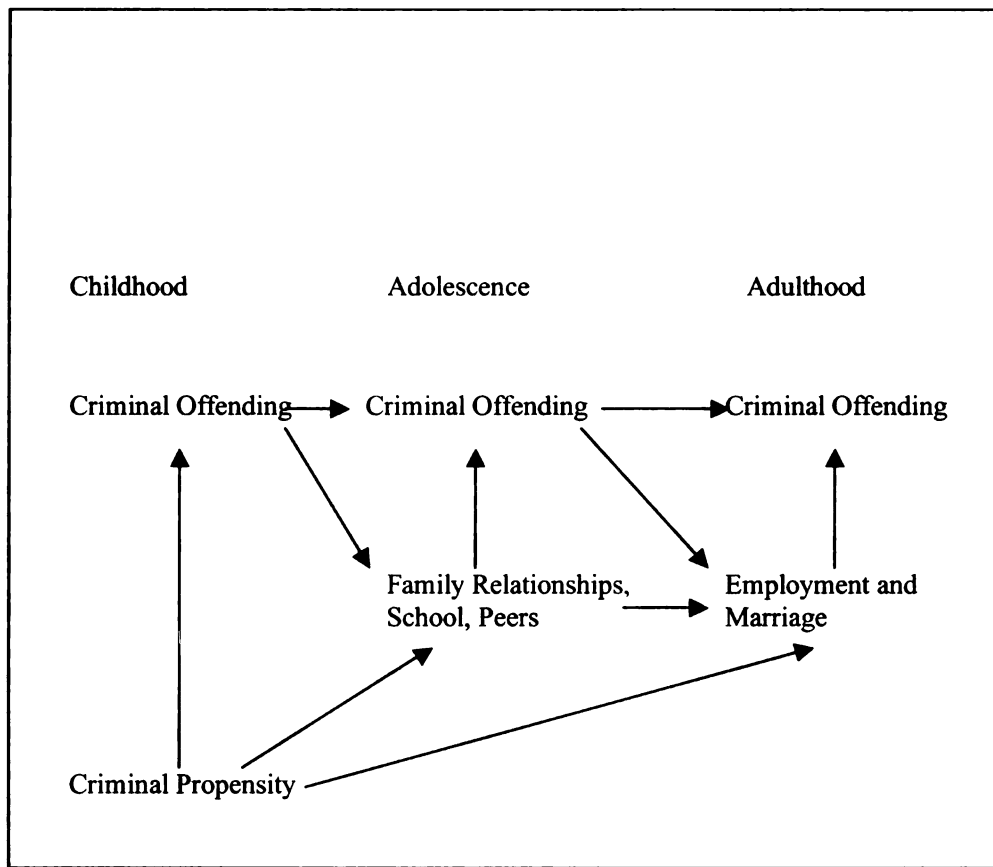


Figure 1. Sampson and Laub's Theoretical Model¹

Child Social Bonds and Continuity across the Lifecourse

Sampson and Laub present their theoretical model in three parts. The first phase of the analysis seeks generally to examine why only some individuals, raised in neighborhoods with structural and economic disadvantages, go on to be involved with delinquency as an adolescent. The authors posit a control-centered model and contend that weakened ties to social institutions in childhood and adolescence increase the likelihood of involvement in delinquency. As part of their test of the control model, the

¹ Figure 1 was adapted from a figure developed by Bushway, Brame, and Paternoster (1999).

authors also include measures of the adolescent's criminal history and family structure. In their model criminal propensity, is operationalized using measures of early childhood behavioral problems. Antisocial behavior also serves as proxy for self-control as developed by Gottfredson and Hirschi.

The authors' analyses establish the importance of early childhood bonds in mitigating future delinquency. Attachment to family and school are found to be the most powerful predictors of delinquency in adolescence. Net of early childhood propensities, individuals who were part of a family characterized by consistent parental discipline, strong attachment, and parental supervision were significantly less likely to be involved in delinquency (Laub & Sampson, 1988b; Sampson & Laub, 1993:93). Attachment to school also had a large negative effect on delinquency net of family controls (Sampson & Laub, 1993:119). More importantly, Sampson and Laub discovered that informal social controls consistently mediate the effect of both individual propensity and structural background variables. It does appear that there is a small direct effect of childhood behavioral problems on delinquency; however, the relationship is not strong enough to predict a substantial amount of variation in delinquency, especially in light of family factors. This research confirms the importance of early social bonds in predicting adolescent delinquency.

Not only do weak social bonds increase the likelihood of involvement in delinquency for adolescents, diminished social bonds continue to shape criminal trajectories into adulthood. The results presented by Sampson and Laub (1993) support much of the criminological research that suggests that there is continuity in childhood

behaviors that extend through adulthood (see also Laub & Sampson, 1993). Individuals who participate in delinquency as youth are more likely to have adult criminal histories.

Sampson and Laub's theoretical argument explaining continuity over the lifecourse diverges from that of traditional criminology. Continuity does not develop as a result of criminal propensity. Instead, individuals who have weakened bonds to social institutions in adolescence can be shut out of opportunities as adults. This argument, most often associated with the cumulative continuity or cumulative disadvantage perspective, posits that criminal behavior has, "a systematic, attenuating effect on the social and institutional bonds linking adults to society" (Laub & Sampson, 1993:306). For example, juvenile delinquency can preclude individuals from participating in educational and training programs limiting the possibilities for meaningful attachment to work in the future. In short, cumulative disadvantage links investments made in youth to their life trajectories towards or away from delinquent involvement.

Prosocial Bonds in Adulthood

The finding that individual delinquency inhibits development of prosocial bonds in adulthood conversely suggests that the attainment of strong bonds in adulthood may attenuate the effect of delinquency on adult outcomes. Sampson and Laub (1993) introduce change as an essential part of understanding how, in adulthood, adolescent offenders are able to realign their criminal trajectory in adulthood toward conformity. They argue that trajectories of both crime and conformity can be interrupted by social institutions in the transition to adulthood (see also Laub & Sampson, 1993). Specifically, strong, quality social bonds in adulthood that create interdependent systems of obligation

and restraint are the best predictor of desistance in adulthood (Sampson & Laub, 1993:141). Among members of the sample, adult social bonds to work and marriage explained significant variation in adult crime, independent of childhood deviance (Laub et al., 1998; Sampson & Laub, 1993).

Social Capital

An integral part of the lifecourse model as posited by Sampson and Laub is the development of social capital in adulthood. Most lifecourse research has only examined the attainment of the bond itself in relationship to trajectory change; however, Sampson and Laub (1990; 1993) argue that the quality or strength of social ties are more important than the development of the bond per se. The social investment in a relationship dictates the salience of the bond. It is in relationship to social bond development that Sampson and Laub incorporate the concept of social capital. The more social capital the individual acquires from a social relationship, the stronger the social bond.

It is important to consider social capital in the larger purview of the theoretical construct of capital. The concept of capital was initially posited by Marx (1887) who argued that economic capital provides individuals with the opportunity to purchase resources that may aid achievement. This construct was based solely on monetary exchange and did not incorporate individual differences in the ability to generate capital. More recently Becker (1964) and Schutz (1961) have expanded the concept of capital to include human capital. Human capital refers to the capacity of individuals to attain within themselves, through education or other training, the ability to facilitate social outcomes (Paxton, 1999:92). The concept of human capital is unique in that it moves the

concept of capital from a characteristic of a monetary exchange to an entity that can be attained by individuals.

Social capital expands the theory of capital to include the examination of relationships. The concept of social capital was first developed by Pierre Bourdieu (1986) and then expanded by Coleman (1988; 1990). Bourdieu defined social capital as, “the aggregate of the actual or potential resources which are linked to . . . membership in a group” (p.248). Social capital can be viewed generally as a resource present within communities that facilitates collective action; however, membership in a group, per se, is not enough to facilitate social capital. Instead, social capital involves transforming daily relationships into those that duly feel and imply durable obligations (pp. 249-250). The level of social capital possessed by a group, according to Bourdieu, is in direct relationship to the networks of relationships that can be mobilized and the amount of capital possessed by members of that network.

Social capital as posited by Bourdieu was a strictly organizational construct. Coleman (1988; 1990) has expanded this work to examine how individuals glean capital from their membership in a group. Coleman argues that social capital does not rest in the individual; instead social capital develops out of interactions between actors. Both the group and its members can use the capital produced as a result of the networks for the achievement of goals. Social capital is productive, making achievement of certain ends possible (Coleman, 1988:S98). Like Bourdieu, Coleman argues that not all network ties will facilitate capital. Capital develops from relationships that are positive and based on trust.

In short, when examining social capital or social bonds it is important to consider both the network relations linking people together in a social space, in addition to the quality of the relationships that tie the group members together. Similarly, Sampson and Laub (1993) stress the necessity of examining the nature and quality of social bonds. Not all bonds are characterized by high levels of capital. It is not the bond itself that attenuates criminal careers, it is the development of social capital that strengthens the relationship and mitigates involvement in future crime.

Social Bonds, Social Capital and the Lifecourse

Criminologists have begun to incorporate the concept of social capital into the study of criminological problems; however, the theory has yet to be systematically applied in the research. To date, the theory has been applied largely to the study of communities, but has also been used to examine the effectiveness of community policing (e.g. Manning, 1994), general crime rate (e.g. Rose & Clear, 1998), and homicide (Rosenfeld, Messner, & Baumer, 2001). Macro-level examination of social capital has been important for the study of community capital and societal outcomes, but this research provides little insight into how individual capital can facilitate positive outcomes on the individual level.

Most recently, social capital theory has been used to study individual level delinquency. Researchers have tied low social capital in families to youth homelessness, high rates of juvenile crime and violence, and adult criminality (Hagan & McCarthy, 1997; Wright, Cullen, & Miller, 2001). In delinquency research, social capital has been studied as a buffer developed through a strong relationship with a family. Individuals

with strong family bonds have less involvement in delinquent acts themselves, but are also less likely to participate in secondary correlates of delinquency like association with delinquent peers and drug use (Wright et al., 2001). To date, the concept of social capital has not been specifically applied to the study of the relationship between incarceration and reentry outcomes, but initial research has documented the low availability of capital for offenders, especially for incarcerated women (see Reisig, Holtfreter, & Morash, 2002). Low social capital compounded with removal from the community only further reduces social ties increasing the likelihood of subsequent involvement in criminality.

Although the application of the social capital framework to the study of criminality is still in its infancy, the initial results reinforce the work conducted by Sampson and Laub (1993). Social bond development can assist in the development of social resources that aid in achievement of desistance from crime. Below, a general review of the existing research on incarceration is discussed. This research provides further evidence of the salience of incarceration as a lifecourse event. The final section of this chapter addresses the link between incarceration, social capital, and bond development.

Incarceration, Recidivism, and Reentry

As noted above, the goal of the current research is to examine incarceration as a lifecourse event. The existing correctional research provides a context for the current study. Research on individual correctional decisionmaking and recidivism is presented below.

Individual Level Research

Research that has examined imprisonment at the individual level has been primarily limited to the study of judicial decisionmaking. The extant literature has focused primarily on two models of decision making, the rational legal model and the extra-legal model. The extra-legal or conflict model rests on the assumption that certain groups of people are more likely to be punished harshly. Specifically, researchers have found that poor, young, minority males are most likely to be incarcerated (Spohn & Holleran, 2000; Darrell Steffensmeier, Ulmer, & Kramer, 1998). Initial research discovered inconsistent effects of race on the sentencing decision; however, the preponderance of research conducted on gender and sentencing decisions indicates that women are less likely to receive imprisonment when compared to their male counterparts (Darrell Steffensmeier, Kramer, & Streifel, 1993).

More recently research has identified models that estimate the interaction of gender, race, and age on sentencing decisions. Overall, young Black men are most likely to receive a term of incarceration with the impact of race declining as defendants age (Darrell Steffensmeier et al., 1998). Steffensmeier et al. (1998) found that independent of age, Black women are more likely to be imprisoned than White women. The intersections research provides important insight into the study of incarceration.

Despite the strides that researchers have made in studying individual decisionmaking, there are many methodological limitations to individual-level sentencing research. Specifically, much of research suffers from sample selection bias in that data are most often obtained from one courtroom at one time period. This research is also imperfect because only the subset of the offender population that reaches the sentencing

decision point is considered. The current study improves on the extant decision making literature in that it examines the incarceration event as a continuous opportunity over the lifecourse. This modeling strategy allows the researchers to understand how different individuals reach incarceration, specifically those of different social and racial groups, and to compare the trajectories of those individuals over time.

Recidivism and Reentry

Research on the outcomes of imprisonment has focused primarily on recidivism. The development of appropriate predictors of recidivism is an important goal of the criminal justice system in that findings from this research can be used to develop and enhance offender treatment programs and appropriate risk models for sentencing and parole. Researchers have identified two general classes of predictors of recidivism: *static factors* which are part of an offender's past that are immutable (e.g., race) and *dynamic factors* which refer to the variable components (e.g., attitudes, cognitions, and values) of an individual (Andrews & Bonta, 1994; Andrews, Bonta, & Hoge, 1990; Gendreau et al., 1996). Researchers have found that both static and dynamic factors aid in the prediction of recidivism. Overall, age, criminal history, gender and family factors are the most potent static predictors; whereas, the dynamic factors which includes criminogenic needs (e.g., antisocial behavior), is significantly associated with recidivism (see Gendreau et al., 1996 for a review).

In addition to including individual, offender specific characteristics in models of recidivism, researchers have also considered the nature of the incarceration experience as a predictor of re-arrest and reentry. The results of the research on time served and

recidivism has been mixed. Some researchers have found that time incarcerated is directly and positively related to incarceration (D. M. Gottfredson, Gottfredson, & Garafolo, 1977; Schmidt & Witte, 1988), whereas, others were unable to replicate the relationship (DeJong, 1997; Jones & Sims, 1997; Orsagh & Chen, 1988). A recent three-year follow up of a national sample of prisoners released in 1994 also found no relationship between length of incarceration and recidivism (Langan & Levin, 2002).

Researchers have also examined the possibility of a non-linear relationship between time served and incarceration. Gottfredson et al. (1977) and Gainey, Payne, and O'Toole (2000) found evidence of an inverted U shape relationship between time served and recidivism; whereas, there is a positive effect for shorter sentences and evidence of a deterrent effect following long stays of incarceration. Orsagh and Chen (1988) also posit a curvilinear relationship between length of incarceration and recidivism; however, they argue that time served has a negative impact in the short term.

Research on time to failure has discovered that the first year following release is the most critical period in relationship to recidivism. For example, Langan & Levin (2002), found that over sixty percent of the total re-arrests came in the first year following release; nearly half of all new convictions also came within the first year. DeJong (1997) also observed that time to failure was shorter for first time offenders; whereas; length of incarceration was positively associated with time to failure for offenders with prior criminal histories (see also Gainey et al., 2000).

The extant recidivism research provides important insight into individual factors associated with recidivism; yet, this research is not without limitations. The methodologies used by the researchers are inconsistent; hence, it is difficult to compare

findings across studies. Moreover, data for this research are often culled from official records and do not include sufficient data on dynamic risk predictors (e.g., antisocial behavior) that may temper the relationships found.

Most importantly, the recidivism research has primarily examined negative transitions, and not considered factors associated with positive community reentry. The recidivism literature was used in this paper to inform research on positive lifecourse transitions into. Although it is not the primary aim of the paper, this study also tests if the factors associated with negative transitions are also related to successful reentry.

Resiliency Following Incarceration

Traditionally, research has focused on the etiology of crime; however, little is known about why people desist from crime (Uggen & Piliavin, 1998). The research that has examined factors associated with desistance is mixed (see Laub & Sampson, 2001 for a review). Initial results indicate that risk factors predicting offending may also have utility in desistance models (LeBlanc & Loeber, 1993). That said, researchers have also argued that it is important to develop separate models of desistance because the functional causes of desistance from crime are different from that of causes of crime (Uggen & Piliavin, 1998).

There is preliminary evidence that desistance can be linked to development of social bonds. Family formation and employment have been the most salient predictors of desistance from crime and other problem behaviors (e.g., alcoholism) in adulthood (Laub & Sampson, 2001). In the same light, researchers have provided evidence that formal contact with the criminal justice system reduces the likelihood that an individual will

develop positive social bonds and consequently desist from crime (Freeman, 1991; Sampson & Laub, 1993; Western & Beckett, 1999). Although there is some inconsistency in the results, researchers have argued that incarceration, especially at a young age, closes the doors for the development of positive social bonds; hence, limiting legitimate opportunities for change (see Freeman, 1991; Western & Beckett, 1999).

The nature of the causal relationship between social bond development and desistance is still unclear. Researchers have argued that the internalized commitment to the relationship or institution associated with the social bond itself (Sampson & Laub, 1993) reduces the likelihood of future criminality; whereas, others contend that the relationship between social bond attainment and desistance is more indirect. For example, Warr (1998) stated that desistance is often correlated with marriage because the process of being involved in a relationship reduces opportunities to interact with delinquent others and situations. Because of the nature of the data available for the current research, it is not possible to examine the change in peer relationships and social contexts as a result of social bond development; however, this line of inquiry is important for future analyses. This research is centered on the examination of the attainment and the quality of the social bond itself.

Employment

As discussed, both negative and positive life events can affect adult trajectories. The timing of an event is also significant, especially for employment. Early adulthood is an important time when individuals enjoy strong earnings growth and can attain firm-specific human capital (Western, Kling, & Weiman, 2001). This phase in the lifecourse

is especially fundamental in that individuals gain skills and lay the groundwork for future careers. It follows that changes in employment status, especially in late adolescence and early adulthood, will have a significant effect on desistance and other outcomes.

Research on employment and desistance has been limited; however, initial research does reveal the importance of the quality and nature of employment in the examination of outcomes. The following section outlines the research conducted on employment and desistance. Specific attention is given to work on the quality of social bonds. In addition, the research on the attainment of employment following incarceration is reviewed.

The relationship between unemployment and crime is still being debated by theorists (e.g. Paternoster & Bushway, 2001). At the aggregate level, the connection between labor market variables and crime has been well documented (see Chiricos, 1987 for a review); however, the work on individual level outcomes has been inconsistent. Much of the research suggests that the relationship between unemployment and crime is reciprocal, but definite conclusions have yet to be made (Baron & Hartnagel, 1997; Good, Pirog-Good, & Sickles, 1986; Thornberry & Christenson, 1984). Current work on criminality and labor force outcomes has shifted away from the examination of unemployment to consider the relationship between attainment of employment and desistance.

There is initial evidence that the quality of work can have a differential effect on criminality. Researchers have found that individuals employed in higher quality jobs are less likely to recidivate (Allan & Steffensmeier, 1989; Duster, 1987). The conclusions that can be drawn from this research are limited. This research has been mired by self-

selection problems in that it is difficult to separate the pre-existing characteristics of workers from job effects. Many offenders do not have the human capital to attain a high quality position; hence, it is difficult to separate the attainment of quality work from the characteristics of the offender.

Researchers have also operationalized participation in the workforce in relationship to both attachment to work and consistent involvement in the labor force. Initial evidence suggests that both predictors are important in examining desistance. For example, Sampson and Laub (1993) found that job stability was central in explaining desistance from crime. Subjects with low job stability at ages 17-25 were four times more likely to be arrested in the future (179). Sampson and Laub posit that work *per se* does not lead to desistance. Instead, work leads to internalized social controls through commitment and stability thereby reducing the likelihood that the individual will sever the bond by engaging in criminality (Sampson & Laub, 1993:304). Uggen (2000) also found that employment was significantly related to desistance. This research is unique in that it examines data from the National Supported Work Demonstration Project. Project participants were randomly assigned to groups where the experimental group was given career counseling and given a minimum-wage job. The experimental design reduces many of the methodological concerns (e.g., sample selection bias) associated with prior research. Uggen found that the effect of participation on recidivism varied with the age of the offender. Older participants were more amenable to the impact of the work program. Participation in the program was significantly associated with desistance from crime for those offenders over the age of twenty-six. The findings from this research support an age-graded model of employment.

Overall, individuals who have developed an attachment to work are less likely to be involved in criminality. Employment represents an important social bond on the road to desistance; therefore, it is important to understand how people attain social bonds to work following incarceration. A number of researchers have examined the relative effect of incarceration on labor force outcomes (see Western et al., 2001 for a review). When compared with other criminal justice outcomes (e.g., arrest or conviction), researchers have found that individuals with incarceration histories are less likely to be employed and to earn a high wage (Freeman, 1991; Grogger, 1995; Western & Beckett, 1999). Incarceration is both significantly and negatively associated with labor force outcomes; however, there is inconsistent evidence on how, or if, the relationship between incarceration and employment varies over the lifecourse.

Juvenile incarceration has also been consistently linked with reduced earning potential in adulthood. Researchers who have used the National Longitudinal Survey of Youth (NLSY), have consistently found that imprisonment as a juvenile had a substantial long term effect on earnings (Fagan & Freeman, 1999; Freeman, 1991; Western & Beckett, 1999). Western and Beckett (1999) found that fifteen years after release, the earning potential of individuals who were incarcerated as youth was still diminished. The coefficient for incarceration far exceeded those for dropping out of high school and living in an area with high unemployment (1048). These findings reinforce the cumulative disadvantage perspective presented by Sampson and Laub (1993). Youth who are incarcerated at a young age are less likely to attain the human and social capital needed to procure a successful job. Incarceration at a young age can mortgage the future of youth by limiting avenues for meaningful employment.

The relationship between adult incarceration and employment outcomes has been less clear. For example, Western (2002) found that incarceration had an initial negative effect on employment, but the effect of imprisonment on earnings is reduced three to four years after returning to the workforce. Conversely, Waldfogel (1994) found that incarceration was negatively associated with both the employment rate and earnings potential (see also Kling, 1999).

The relationship between adult incarceration and employment also varies by the characteristics of the offense. Both Kling (1999) and Waldfogel (1994) found that White-collar offenders were differentially affected by incarceration. White collar offenders earned ten to thirty percent less following incarceration; whereas, individuals convicted of violent or drug offences actually reported an increase in their earning potential five to eight years following release from prison (Kling, 1999).

Based on the cumulative disadvantage proposition, one would expect that the length of incarceration would be negatively related to work force outcomes. While incarcerated, individuals would be less likely to participate in training programs and to maintain and develop other employment-specific skills. Individuals are also removed from social networks that may facilitate employment and reinforce social bonds to employment. Using unemployment insurance data, both Kling (1999) and Needels (1996) found that employment rates did not vary in relationship to time served. Needels (1996) did find that the length of incarceration was both negatively and significantly associated with earnings. Increasing incarceration length by one year reduced earnings by 12 percent over an eight-year period.

Overall, adult incarceration does not appear to preclude employment following incarceration; but wage data does suggest that the same quality or prestige of position may not be able to be maintained following incarceration. The extant research has provided important insight into the relationship between work, incarceration, and desistance; however, additional research is needed. Specifically, the relationship between the length, nature, and timing of the incarceration is in need of further examination. The current research serves to further expand the existing research on incarceration and employment.

Attachment to Spouse

Like work, marriage also engenders social bonds and can serve as a turning point in the lifecourse. Sampson and Laub (1993) found that for married members of the sample, attachment to a spouse assumed greater relative importance than job stability (see also Laub et al., 1998). Marital attachment was negatively and significantly related to all measures of deviance. Horney, Osgood, and Marshall (1995:665) also found that cohabitation with one's wife doubles the odds of desistance from criminality; whereas, leaving the marital home increases the likelihood of offending. The relationship between marriage and desistance is not instantaneous. Instead, the influence of marriage is gradual over time (Laub et al., 1998). The timing of marriage is also important. Individuals who married young were more likely to refrain from criminality (Laub et al., 1998). Ouimet and Le Blanc (1996) argued that the relationship between marriage and desistance varies by age. Cohabitation at an early age was positively associated with crime; however, marriage after age 21 acted as a force toward desistance.

The transition from incarceration to marriage has also not been widely addressed in the literature. The majority of work conducted in this area has been qualitative and has examined the detrimental effect that incarceration has on current marital bonds (Goeke, 1980; Schafer, 1994). The literature in this area has also been based on research that used small sample sizes and only examined the relative effect of prison stays on marital bonds. To date, research has not been conducted on the relationship between the timing, nature, or length of incarceration on marital development.

Although marriage has traditionally not been examined as a measure of resiliency following incarceration (with exception Horney et al., 1995) including measures of marital bonds in this study provides a comparison point for both the effect of the incarceration event itself and as an additional measure of resilience following incarceration. As Sampson and Laub (1993) found, marriage can mitigate the relationship between work and criminality; hence, it is also important to examine the relationship between marital bonds, employment, and incarceration.

Summary

The literature reviewed in this chapter highlights the importance of adult social bonds in mitigating criminal careers. Researchers have found that individuals who develop strong bonds to work, family, and other social institutions are significantly less likely to be involved in criminality (Sampson & Laub, 1990, 1992). In the same light, attainment of social bonds in adulthood can interrupt criminal careers (see Laub et al., 1998).

The study of desistance and social bond development has important implications for the study of incarceration. The research on social bond development that has been reviewed in this chapter points to the difficulties in attaining positive social bonds following incarceration. In general, the research suggests that incarcerated persons are less likely to develop bonds to marriage; however, the relationship between incarceration and employment is more complex. Recent research has discovered that offenders are generally able to attain employment following incarceration, but the quality of the work attained and the wage levels garnered are reduced as a result of incarceration (e.g. Western & Beckett, 1999). This is an important finding because the development of social bonds has been consistently linked to desistance from crime.

Further research is needed on the relationship between social bond development and incarceration. The existing literature has not considered how the timing and nature of incarceration is related to the development of social bonds to marriage and work. Moreover, the cumulative effect of multiple terms of incarceration also has been ignored. This omission is striking in that results from the recidivism literature indicate that the majority of incarcerated individuals experience more than one stay of incarceration during their lifetime. The present study expands on the current incarceration and social bond literature by exploring social bond development following incarceration. Specifically, this research has been developed to aid in the understanding of the relative effect of incarceration on social bond development to work and marriage.

Chapter 3: Methodology

Current Research

Few researchers have examined incarceration as a lifecourse event. Studies of incarceration in general and as a lifecourse phenomenon have been limited by three primary factors. First, most of the existing research conducted to date has operationalized incarceration as a dichotomy. For example, incarceration is modeled at one point in time and reflects the absence or presence of the event during a certain period (e.g. Freeman, 1991). Second, much of the research has been cross-sectional and therefore has not examined the possible cumulative effect of multiple stays of incarceration. Third, the scope of the previous work has been limited by only focusing on negative transitions following incarceration (i.e. recidivism). The current study has been designed to overcome many of the limitations associated with previous correctional research. Unlike other studies performed, this current research examines the relationship between the frequency and timing of incarceration and resiliency as measured by positive social bonds to marriage and employment.

The following research questions guide the analyses presented below.

- 1) How does incarceration affect life trajectories?
 - a. Specifically, are members of the sample able to attain bonds to marriage and work following incarceration?
 - b. How does the development of bonds among the incarcerated group vary from that of a similarly situated group that did not experience incarceration?

- 2) Does incarceration remain a significant predictor of social attainment, even after controlling both time-varying covariates and static factors (e.g., race)?
 - a. What is the relative effect of incarceration on social bond development in contrast to other lifecourse events (e.g., military participation)?
- 3) Does the timing of the incarceration event differentially affect the likelihood of developing bonds to work and marriage, and is the nature of the bond diminished over time as a result of the event?
 - a. Does incarceration at an earlier age have a differential effect on social bond development when compared to incarceration at early or middle adulthood?
 - b. How do multiple stays of incarceration affect the likelihood of and the nature of the bond over time?

In many ways, this research is guided by the theoretical work proposed by Sampson and Laub (1993); although the current study also serves to expand their research in a number of ways. First, a large, nationally representative sample was used to test the hypotheses. The nature of the data allowed the researcher to make generalizations to a more diverse population, including females, and the large sample size facilitated the development of both a matched and control sample that was not possible with the Glueck data utilized by Sampson and Laub (see Glueck & Glueck, 1950a). The development of two comparison samples allowed the researcher to examine the relative effect of incarceration on outcomes for an incarcerated group, a matched group that did not experience incarceration, and a comparison group.

The current study also utilized a relatively contemporary data set. A guiding assumption of lifecourse theories is that age-graded transitions are embedded in social institutions and are subject to historical change (Elder, 1975). It is important to consider the differential effect that lifecourse events may have on individual trajectories within different historical epochs. Researchers have amassed considerable evidence on the effect that economic and political changes can have on correctional policy and incarceration rates (Elder, 1975; Jacobs & Helms, 1996; Lessan, 1991; Michalowski & Carlson, 1999; Rusche & Kirchheimer, 1939). It follows that the influence of incarceration as a lifecourse event may also vary over time. The dramatic change in penal policy of the United States over the last two decades has changed the manner in which individuals experience incarceration (Irwin & Austin, 1994). Rehabilitation services have been replaced in prison with mechanisms of control. Consequently, the relative effect of incarceration on social bond development may be substantially different for an individual who was incarcerated in 1980 when compared with someone incarcerated in the 1950's. It is important to continue to examine the impact that incarceration has on lifecourse trajectories during different historical, economic, and political periods.

More importantly, this analysis expands the current body of research on the relationship between incarceration and social bond development. Although Sampson and Laub (1993) included measures of incarceration in their research, the current study extends their theoretical and empirical model. The addition of multiple measures of incarceration and the use of advanced statistical techniques allowed social bond development to be examined in relationship to the timing and nature of incarceration.

Sampson and Laub present a superb research study; however, their research was not designed to examine the intricacies of imprisonment or to end all research on lifecourse phenomenon. The goal of this research is to further validate the work of Sampson and Laub while contributing to the theoretical development of lifecourse perspectives on incarceration.

Overview of the NLSY

Data from the National Longitudinal Survey of Youth 1979 (NLSY) were used as the primary dataset in this research. The NLSY is a nationally representative sample of 12,686 young men and women who were 14-22 years old when they were first surveyed in 1979 (Center for Human Resource Research, 2001). Respondents have been interviewed for over two decades and were between the ages of 36 and 44 during the last interview period in 2001. Although the survey was originally designed to collect data on employment for a varied workforce, the survey currently includes extensive data on education, substance abuse, fertility, and family structure. Data for this study were collected yearly from 1979 to 1994, and biannually from 1996 to the present. In total, data have been collected on nineteen separate occasions.

The NLSY is comprised of three sub-samples. The main sample includes 6,111 respondents and was designed to be representative of the non-institutionalized civilian segment of young people living in the United States in 1979 and born between January 1, 1957, and December 31, 1964. All members of the first sample remained eligible to be interviewed during all data collection years.

The NLSY sampling design also facilitates research on groups such as Hispanics, Blacks, and the economically disadvantaged. A second sample includes 5,295 respondents and was designed to oversample civilian Hispanic, Black, and economically disadvantaged non-Black/non-Hispanic youth living in the United States during 1979. Following the 1990 interview, none of the 1,643 members of the economically disadvantaged, non-Black/non-Hispanic subsample were selected for interviews. The decision to eliminate both this subsample and part of the military sample was made for economic reasons and does not jeopardize the representativeness of the total sample.

Thirdly, a sample of 1,280 respondents was also included to represent the enlisted population. This sample includes individuals born between January 1, 1957, and December 31, 1961, who were enlisted in one of the four branches of the military (Army, Navy, Air Force, Marines) as of September 30, 1978. Following the 1984 interview, 1,079 members of the military subsample were no longer eligible for interview; 201 respondents randomly selected from the entire military subsample remained in the survey.

Description of Data Collection

A multi-stage stratified area probability sample of dwelling units in the United States was used to select eligible respondents for the research project. Researchers from NORC used two sampling procedures to select research participants. To select the representative sample, interviewers from NORC identified 1,818 sample segments within 202 primary sampling units. From the sample segments, over 75,000 dwellings were chosen for preliminary interviews. A random sample of these homes was then selected as

the sampling frame. NORC also extracted a random sample of Department of Defense records to ensure the survey was representative of members of the military. A basic screening questionnaire was administered to members of the households that were identified in this phase of the sampling design.

Information collected from the screening questionnaire was used to aid in the development of the final sample. Data on name, age, sex, race, and address were collected on more than 155,000 people. The demographic information was then used to identify all individuals aged 14 to 21 as of December 31, 1978. Each appropriately aged individual was then assigned to one of the sample groups. NORC interviewers invited all persons on this list to participate in the first NLSY79 interview, and each respondent who completed the first round interview was considered a member of the NLSY79 cohort. In total, 12,686 (87%) of the individuals who were identified as eligible for participation in the program completed the first round interview.

Data for the study were collected primarily through in person interviews; however, telephone contact was made with respondents under certain circumstances (e.g., where the respondent resides in a remote area or was incarcerated). During recent years respondents have expressed a preference for phone interviews, so more and more interviews are now conducted by phone. For example, in 1980 less than 5% of the sample was interviewed by telephone, but in 2000 over a third were contacted by phone. The interview takes approximately an hour to complete and each respondent is given a small monetary incentive to participate.

A high level of sample retention was maintained throughout the study. A retention rate of nearly 90% was sustained for the first 16 waves of the survey. The

retention rate dropped to 86% in 1996 and 80% in 2000. Excluding those individuals who have been dropped from the sample completely, respondents have completed, on average, 17.4 of the 19 interviews. In 2000, 64% of the sample had fully completed a survey in each of the data collection years.

Overall, the NLSY is a well-designed, comprehensive dataset that is appropriate to examine the research questions proposed by this study. The longitudinal nature of the study is especially well suited for the research at hand. Longitudinal data are essential for the study of continuity and change over the lifecourse. The nature of the data allow researchers to examine the natural history of development over the lifecourse, provides information on time ordering of events, and enhances a researchers ability to infer causation (Blumstein et al., 1988b).

Sample

This study utilized a sample of the data obtained through the National Longitudinal Survey of Youth 1979. The sample population was selected in two phases. The first phase of the process included the removal of participants from the dataset who became ineligible for participation due to project modifications, interview non-response, extended stays of incarceration, or death. During the course of the data collection period, two large sub-groups of the sample became ineligible for interviews because of changes to the study protocol. As of 1984, 1,079 of the 1,280 members of the military sample were no longer interviewed. In 1990, 1,643 individuals from the non-Black, non-Hispanic economically disadvantaged group were excluded from the sample. In addition, 335 people from the total sample had died during the course of data collection and were

removed from the sample. Seven sample members, incarcerated eleven or more time periods, were also excluded from the final sample. Finally, individuals who failed to participate in data collection six or more times were also omitted from the analysis group. A total of 8,872 individuals remained after the first phase of sample selection of which 493 (5%) had been incarcerated at some point from 1983-2001.

The second phase of sample selection involved the selection of three distinct subject groups. The first group, the incarcerated group, included all individuals who had been incarcerated during one or more interview periods from 1983-2000. The second group was constructed as a direct match to the incarcerated group. This group serves to partial out sample heterogeneity, and allows the researcher to consider social bond attainment for a similarly disadvantaged group that had not experienced adult imprisonment. The third group represented the median or 'average' person in the sample. Inclusion of this group in the study, aids the researcher in understanding the effect of lifecourse events on social bond development for an average person. Together, the matched and median groups were selected to provide greater context to the results obtained from the incarcerated group. For example, is the effect of military participation on marriage the same for the incarcerated group as the median and matched group, or does the incarceration event mitigate all lifecourse experiences?

After the matching had been conducted, three sample groups remained. In total, the sample included 1,504 individuals. The incarcerated and matched groups included 493 individuals, and the comparison group consisted of 518 individuals. A detailed description of the statistical technique used for the selection of both the matched and comparison group is presented below.

Matching

Incarceration, social capital, and social bonds are not assigned to members of the sample at random. Instead, social events and relationships develop through a process involving many unobservable or unknown variables. The central problem in observational studies is that treatment and control units may not be comparable prior to an event or intervention; hence, differences in outcomes between groups may or may not indicate the effect of a treatment (Rosenbaum, 1989). The concern with sample heterogeneity is further confounded with the process by which the intervention or treatment affect the outcome (Berk & Newton, 1985). For example, if all incarcerated sample members came from similar socioeconomic backgrounds, it would be difficult to differentiate the effect of incarceration from that of socioeconomic status. Matching serves as a tool to partial out the unobserved heterogeneity in the model. Thus, matching provides a statistical control by balancing the distributions of all relevant pretreatment variables (Rosenbaum & Rubin, 1983).

Traditionally, researchers have used individual matching techniques to select a comparison group. With this technique, researchers most often identified a small set of variables and then individual-by-individual selected a matching case based on identical matches of all identified matching criteria. For example, Sampson and Laub (1993) used gender, race, age, and neighborhood characteristics to develop their matched sample. Individual matching techniques are valuable in that they control for unobserved heterogeneity and can enhance the validity of the study. Traditional matching techniques also have many limitations. Individual matching techniques regard all covariates as equally important. Each individual is matched based on a set of characteristics and

primacy is usually not given to one variable. The algorithm used in this type of matching requires matches to be selected based on a series of separate decisions. If a match cannot be found, most researchers using this technique will discard the individual from the sample (Rosenbaum, 1989). Removing subjects from a dataset not only reduces statistical power, but can also bias the final analysis. Traditional matching techniques are also very labor intensive. With this technique researchers must search the database for exact matches based on a number of individual characteristics.

More recently, researchers have developed applied statistical techniques that allow a larger number of variables to be used in the estimation process while also facilitating the ease of the matching process. The matching technique used in this research involved the use of propensity scores. A propensity score is defined as the predictive probability of a single term of incarceration given a vector of observed covariates. In short, a model was developed to estimate the likelihood of incarceration based on a set of identified exogenous predictors. From the estimated likelihood, individuals can then be separated into groups and a matched and median group can be selected.

A two-step modeling technique is commonly used in developing propensity scores. First, the assignment process must be modeled using a logit formulation (Berk & Newton, 1985). The goal of this phase of the matching process is to identify a group of variables theoretically and empirically associated with the outcome and then to estimate a logistic regression based on those predictors. In this analysis, estimated propensity scores were developed from a vector of covariates that have been associated with incarceration risk. A relative likelihood of incarceration was produced from the logistic regression for

each member of the sample. The likelihood estimate can also be understood as the predicted probability of an individual experiencing a stay of incarceration based on the variables included in the model. The likelihood estimate was then used as the propensity score in all subsequent analyses.

The propensity score can then be used in two different ways to minimize the error from sample heterogeneity. First, the propensity score can be included in statistical models to condition any analyses of treatment effects. In this technique, the propensity score becomes another factor, or the sole covariate, in a statistical model and serves as a general control (see Berk & Newton, 1985). This technique is most appropriate for samples with little variation in the propensity score or if the treatment selection is partially deterministic (e.g., quasi-experimental designs) (Morgan, 2001:351). In these cases the homogeneity risk is less severe than that of the current research question; hence, it is more appropriate to use the propensity score as a control in the model.

Propensity scores were used in the current research to aid in the construction of a matched and comparison sample. The samples were examined using a series of subgroup analyses. To develop a matched sample, the propensity score for each individual in an identified group is matched to an individual with the same (or similar score). Because incarceration is both a rare and seminal event in the lifecourse, subgroup analyses were selected in lieu of conditioning the results with propensity scores. Including the propensity score as a control in the model would mitigate error associated with homogeneity of variance, but with this technique, analyses of within group variance are more difficult. The goal of this research was to examine the relative effect of incarceration on social bond development among similarly situated groups; hence, it is

more important to use propensity scores to develop comparison groups than to condition the entire sample.

Using propensity scores as a method for developing a matched sample offers many advantages over traditional techniques. One of the primary benefits of the propensity score model is the simplicity of developing a matched sample. Constructing individual matched samples can be labor intensive in that all elements must be matched pairwise; however, matching on propensity scores allows the researchers to match groups by the score itself or by mean scores of individuals within groups. The inclusion of a propensity score in a model also enhances the parsimony of a model. Individually controlling for all of the appropriate covariates in a model can be cumbersome, especially in analyses of groups with small sample sizes. Traditional matching techniques also regard all interactions among covariates as equally important; however, researchers (see Rosenbaum & Rubin, 1985b) have demonstrated that this methodology is not as efficient or valid as calculating a scalar of X as is conducted when computing propensity scores (see also Rubin & Thomas, 1996).

The propensity score matching algorithm is especially appropriate for the current study. Incarceration as an event of ‘treatment’ is very non-deterministic. Incarceration is not a forgone conclusion of the commission of a crime or even a criminal conviction; hence, it is important to control for a number of predictors that may be generally related to the outcome of incarceration. Propensity score techniques facilitate the inclusion of a large number of covariates; thus, use of the scores improves the validity of the comparison group. Moreover, the continuous nature of the score allows the researcher to understand the relative risk or inclination toward criminality of an individual in

comparison to all remaining sample members. The propensity scores were used in this model to develop a valid and efficient matched sample. In addition, the hierarchical nature of the scores also facilitated the selection of a comparison group comprised of individuals with a median propensity score. The development of such a group would not be possible with traditional matching techniques.

Propensity Score Model Specification

Variables were selected for this model based on their theoretical association with lifetime risk of incarceration. Overall, two categories of exogenous measures, including criminal history status and individual characteristics, were used in the model. In addition, individual measures of regional unemployment rate and family economic status were also included. All variables included in the model have been used as covariates in recidivism and decisionmaking studies because of their strong correlation with incarceration and criminal involvement (e.g. Gendreau et al., 1996; Sampson & Laub, 1993; Darrell Steffensmeier et al., 1998). Although researchers (Rosenbaum & Rubin, 1983, 1985b) have argued that the statistical significance of a predictor is not important when constructing a propensity score, it is important to consider parsimony when making the final model. Large models with extraneous variables may limit the ability of the researcher to develop an optimal matched sample. Multicollinearity is also a substantial concern when estimating models; hence, a correlation matrix of the all variables was constructed and variance inflation scores were estimated for each of the variables in the model.

In total, twelve variables were selected for use in the development of the final propensity score². All exogenous predictors were measured prior to 1983 and were designed to represent individual demographic and contextual characteristics. A general description of the model variables and the theoretical significance for their inclusion in the model is presented below. In addition, a description of the variables included in the propensity score model can be found in Appendix A and descriptive statistics for the total sample are included in Table 1.

Criminal History

Three measures of early involvement in delinquency and experience with the criminal justice system were included in the model. Researchers continue to stress the link between early criminality and subsequent adult criminal careers (Blumstein et al., 1986; Tracy & Kempf-Leonard, 1996; Wolfgang et al., 1987). It follows that those individuals who were involved in delinquency or with the criminal justice system at an early age would be of greater risk of future incarceration.

In 1980, a special self-administered crime addendum was included with the questionnaire to measure involvement in criminal behavior and contact with the criminal justice system among individuals in late adolescence and early adulthood. Data from this module were then used to develop the indicators of delinquency and involvement with the criminal justice system. The first measure, *self-reported delinquency*, was designed to capture involvement in major forms of delinquency using self-reported measures. Each

² Five additional variables were also included in preliminary models. Two demographic and contextual variables including region of the country, and urban classification were removed from the model because they were not significantly associated with the outcome. In addition parental education and family size were removed because of lack of statistical significance. Finally, parental employment was omitted because of multicollinearity.

respondent was asked if during the past year he or she had (1) assaulted someone (2) shoplifted (3) committed petty theft (4) sold drugs (5) committed auto theft (6) committed fraudulent behavior and (7) committed grand theft. Only five percent of the total sample (n=366) reported involvement in any form of delinquency and only 18% of individuals reporting delinquency indicated that they had participated in more than one delinquent activity. Because of the limited variation in the predictor, self-reported delinquency was operationalized as a dummy variable with those individuals who reported involvement in criminality as the reference category.

In addition to self-reported delinquency, two dichotomous measures of official involvement with the criminal justice system were also incorporated into the model. Individuals were asked if they had (1) ever had official contact with the police and (2) if they had been incarcerated at any point prior to their participation in the research study. Although the measurement of both variables was not optimal, the indicators did serve as proxies for involvement in the criminal justice system during late adolescence and early adulthood. Consistent with the state dependence framework, one would expect that prior experience with the criminal justice system would increase the likelihood of subsequent incarceration. As such, the *previous incarceration* and *contact with the police* variables were also included in the model as dichotomous controls.

Individuals were also queried as to their involvement with drugs as part of the 1980 addendum. Drug use is an important element in this model in that it has been highly correlated with criminal behavior (Menard, Mihalic, & Huizinga, 2001; H. White, Brick, & Hansell, 1993; H. White & Gorman, 2000; H. R. White, 1990). *Drug use* in this research was dichotomized into those individuals who had reported use of any illegal

substance during the last 30 days and those that did not report drug use of any kind. Only twenty percent of the sample reported drug use; hence, a more complex measure was not possible with the existing data.

Demographic Influences

Education represents an important turning point in the lifecourse of individuals in late adolescence and early adulthood. Research has reinforced the consequence of education in relationship to both desistance and abstinence from crime. Individuals who complete high school and reported high to moderate attachment to school are significantly less likely to be involved in criminality or to be incarcerated in the future (Arum & Beattie, 1999; Sampson & Laub, 1993). Although some of the research on the relationship between cognitive ability, education, and criminality has been controversial (see M. R. Gottfredson & Hirschi, 1990; Hirschi & Hindelang, 1977; Wilson & Herrnstein, 1985), education has proved to be a salient element in recidivism risk assessment instruments (e.g. Gendreau et al., 1996). As such, education and cognitive ability serve as central elements in the model.

Measures of both educational attainment and attachment to school were included in the model. The first measure is a general education measure that examines the attainment of a high school degree. *High school graduate* is a dummy measure with those reporting successful completion of high school equal to one. In addition to the global education predictor, a measure of school suspension is also included. School suspension was included in the model to serve as a proxy for attachment to school. The *suspension* indicator is dichotomized into self-reported suspension from school or otherwise (reference category).

Scores on the Armed Forces Qualifications Test (AFQT) were used to measure *cognitive ability*. Each respondent in the sample was administered the Armed Services Vocational Aptitude Battery (ASVAB) and results from sections of this battery were used to construct an Armed Forces Qualifications Test (AFQT) score for each youth. The ASVAB includes ten sections on general science, arithmetic reasoning, word knowledge, paragraph comprehension, numerical operations, coding speed, auto and shop information, mathematics knowledge, mechanical comprehension, and electronics information. The AFQT measure is first constructed as an additive score based on the arithmetic reasoning, word knowledge, paragraph comprehension, and one half of the score from the numerical operations sections of the ASVAB. The individual is then assigned a ranked percentile score based on his or her performance on the instrument. This measure was developed as an indicator of trainability for the armed forces and is used as the primary criterion for enlistment eligibility in the United States armed forces (Center for Human Resource Research, 2001).

Gender and race were also included in the model as demographic influences. The importance of extra-legal factors in the incarceration decision has been highlighted in current incarceration and decisionmaking literature. Minority males, after controls are included to reflect the seriousness of the offense and criminal history, are significantly more likely to be incarcerated than any other group (Spohn & Holleran, 2000; Darrell Steffensmeier et al., 1993; Darrell Steffensmeier et al., 1998; Zatz, 1987). This research is further reinforced by statistical estimates of lifetime likelihood of incarceration. Researchers have found that Blacks are six times more likely than Whites to be

incarcerated at some point during their life and men are eight times more likely to experience the incarceration event (Bonczar & Beck, 1997).

A series of dummy variables were constructed for the race and gender variables in the model. Gender was dichotomized into *male* and female (reference category). Two dichotomous measures of race, including *African American* and *Hispanic*³, were also included in the model. White and Other races served as the reference categories for the race variables.

Unemployment Rate of the Region

Neighborhood social context has emerged as an important predictor in the examination of criminality. A central assumption of social disorganization theory is that neighborhoods characterized by breakdown in the social institutions of the community will have higher rates of crime and disorder (Bursik & Grasmick, 1993; Shaw & McKay, 1942). With the breakdown in social institutions, individuals are less likely to experience informal forms of social control and are more likely to engage in criminality. The macro-individual link is yet to be fully understood; however, neighborhood context remains an important theoretical construct that should be considered when examining risk of incarceration.

A measure of the regional *unemployment rate* was included in this model as an indicator of neighborhood context. For each member of the sample, a measure of the employment rate of the local labor market was included. The variable consists of six categories with (1) <3.0%, (2) 3.0-5.9%, (3) 6.0-8.9%, (4) 9.0-11.9%, (5) 12.0-14.9%, (6) >15.0%. The unemployment rate measure incorporated in this model is dichotomous.

³ The African American and Hispanic variables are mutually exclusive.

Individuals living in regions with an unemployment rate greater than nine percent were coded as one with unemployment rates below nine percent as the reference category.

Family Economic Status

Family capital has emerged in the research as an important correlate of criminality, especially among juveniles. Researchers have tied low capital in families to a number of outcomes including deviance, behavioral problems, homelessness, and involvement with delinquent peers (see Coleman, 1990; Hagan & McCarthy, 1997; Parcel & Menaghan, 1993, 1994; Wright et al., 2001).

Family poverty status was included in this model as a measure of family human capital. It is important to include family poverty status in the model in that parental earnings provide the foundation for family social structures on which other forms of capital develop. Economic deprivation has also been shown to be negatively associated with favorable child development (Duncan & Brooks-Gunn, 1997; Duncan, Brooks-Gunn, & Klebanov, 1994).

The *family poverty status* measure was derived from two sources including (1) the respondent's family income for the past calendar year and is derived from either the total income information provided by the parent or guardian in the home in which the respondent was living or (2) the total income reported by the respondent if living apart from the family. The final measure of family poverty status was dichotomous with those children living in families above the poverty level as the reference category.

Table 1. Descriptive Statistics for the Variables Used in the Development of the Propensity Scores (N=8,872)

Variable	Mean	S.D.	Minimum	Maximum
Male	0.50	0.50	0.00	1.00
Hispanic	0.19	0.40	0.00	1.00
Black	0.29	0.45	0.00	1.00
Cognitive Ability	38.83	27.88	1.00	99.00
High School Graduate	0.77	0.42	0.00	1.00
Suspension	0.25	0.43	0.00	1.00
Poverty	0.25	0.43	0.00	1.00
Prior Incarceration	0.02	0.14	0.00	1.00
Contact with Police	0.18	0.38	0.00	1.00
Self-reported Delinquency	0.04	0.20	0.00	1.00
Drug Use	0.21	0.41	0.00	1.00
Unemployment Rate	0.15	0.36	0.00	1.00

Propensity Score Model Statistical Estimation

After the final variables for the propensity score model had been selected, they were regressed against the dichotomous incarceration measurement using a traditional logit model. As stated above, the goal of the propensity score technique is to derive the estimated likelihood of incarceration, or any event or decision, based on a series of exogenous predictors.

The results from the logit model are consistent with previous incarceration research (see Table 2). Minority males had the highest risk (or likelihood) of incarceration at some point during the study period. Prior incarceration and drug use

were also strong predictors. The unemployment rate of the region played little role in the model. Overall, the sum of the risk variables was effective in classifying individuals into groups with 94.4% of the sample correctly classified⁴.

Table 2. Logit Model for the Development of Propensity Scores (N=8,872)

	B	S.E.	Wald	df	Sig.	Exp(B)
Constant	-4.646	0.218	452.902	1	0.000	0.010
<i>Demographic Influences</i>						
Black	0.855	0.141	36.658	1	0.000	2.352
Hispanic	0.490	0.155	9.976	1	0.002	1.633
Male	2.084	0.165	159.542	1	0.000	8.037
Cognitive Ability	-0.023	0.003	49.850	1	0.000	0.978
High School Graduate	-0.606	0.118	26.393	1	0.000	0.546
<i>Criminal History</i>						
Contact with the Police	0.334	0.117	8.154	1	0.004	1.396
Suspension	0.768	0.113	46.562	1	0.000	2.155
Delinquency	0.492	0.188	6.824	1	0.009	1.636
Drug Use	0.710	0.111	41.319	1	0.000	2.035
Previous Incarceration	1.400	0.218	41.281	1	0.000	4.055
<i>Context Influences</i>						
Family Poverty	0.298	0.113	6.953	1	0.008	1.348
Unemployment Rate of Region	-0.118	0.157	0.563	1	0.453	0.889
Model Chi-square = 1153.436** Percentage Correctly Classified = 94.4						

⁴ The large size of the sample may increase the likelihood of significant relationships to be found between variables in the model. As such, a series of logit models were conducted using sub-samples of the data. No substantial differences in the strength or direction of the relationship were found in the analyses of the sub-samples.

As part of the logit model estimation, a propensity or likelihood score was generated. This score was calculated for each sample member and was used in later analyses to select a comparison and matched group. The score represents the theoretical likelihood of incarceration during the study period based on the vector of covariates selected for the model. The score itself cannot be interpreted in an exact sense; however, it can be used to examine the relative distance between individuals and to understand clustering of individuals within the sample. A series of tables was constructed for both the entire sample and a number of sub-groups to help illustrate the general distribution and variation of the propensity scores. Not only did the data provide a general description of the total sample, the scores also point to prominent sub-groups within the sample.

As evidenced in Figure 2 and Table 3, the distribution of propensity scores for the total sample was positively skewed. This is not surprising in that incarceration is a very rare event. Few sample members could be characterized by the totality of variables that have been associated with incarceration. What is critical is that substantial variation in scores exists for both the incarcerated and non-incarcerated groups (see Table 4). Although the propensity scores for the incarcerated sample were positively skewed, there were members from both the incarcerated and not-incarcerated group with very low and very high scores. This finding highlights the non-deterministic quality of the incarceration event. Although there are a number of predictors that can aid in the estimation of incarceration risk, the sample of incarcerated offenders was heterogeneous.

In the same light, there are a number of people who appear to have all the characteristics consistent with the incarceration group, but were not imprisoned during the study period.

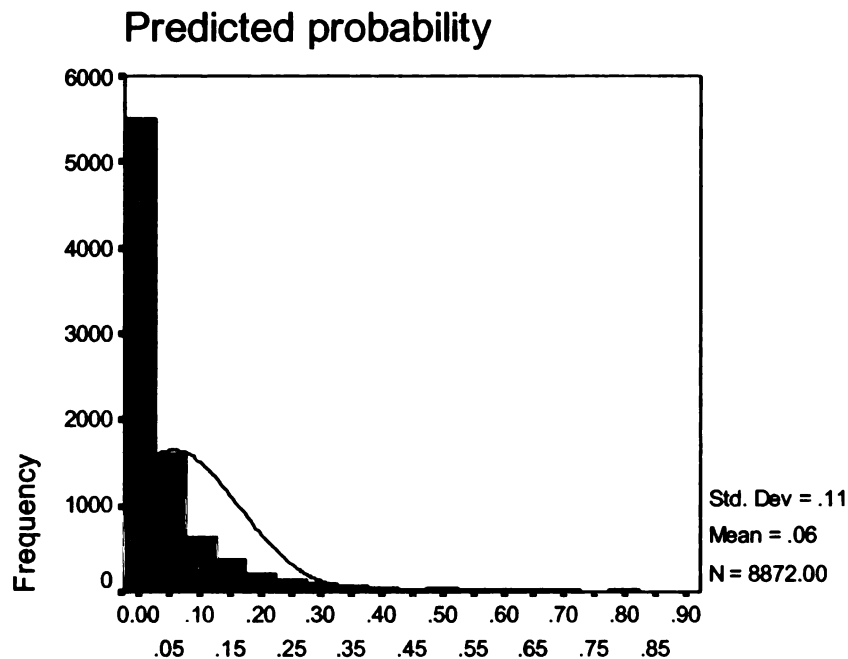


Figure 2. Distribution of propensity scores for the total sample

The most significant differences in propensity scores came from the gender comparisons (see Table 5). There was substantial variation in the scores for both men and women; however, the propensity score distribution for the female respondents was truncated in comparison to that for the male sample. Both the minimum and median scores for the male group were nearly ten times larger for that of the female group. The maximum score was also over three times greater for the male group.

Table 3. Distribution of the Propensity Scores for Incarceration

	<i>N</i>	<i>Minimum</i>	<i>1st</i>	<i>Percentile</i>	<i>20th</i>	<i>Percentile</i>	<i>40th</i>	<i>Percentile</i>	<i>Median</i>	<i>60th</i>	<i>Percentile</i>	<i>80th</i>	<i>Percentile</i>	<i>99th</i>	<i>Percentile</i>	<i>Maximum</i>
Total Sample	8,879	0.00049	0.00060	0.00323	0.00900	0.01379	0.02229	0.07453	0.56812	0.89653						
Incarcerated Persons	493	0.00127	0.00470	0.06664	0.13619	0.18134	0.24380	0.45158	0.86287	0.89653						
Sample with Incarcerated Group Removed	8,386	0.00049	0.00060	0.00295	0.00830	0.01237	0.01910	0.05915	0.41833	0.87808						

Table 4. Distribution of the Propensity Scores for Incarceration – Gender Contrasts

	<i>N</i>	<i>Minimum</i>	<i>1st</i>	<i>Percentile</i>	<i>20th</i>	<i>Percentile</i>	<i>40th</i>	<i>Percentile</i>	<i>Median</i>	<i>60th</i>	<i>Percentile</i>	<i>80th</i>	<i>Percentile</i>	<i>99th</i>	<i>Percentile</i>	<i>Maximum</i>
Women	4,484	0.00049	0.00057	0.00159	0.00329	0.00484	0.00677	0.01412	0.07667	0.27314						
Men	4,388	0.00394	0.00452	0.01399	0.03389	0.05026	0.07222	0.154127	0.70597	0.89692						

Table 5. Distribution of the Propensity Scores for Incarceration – Gender and Incarceration

	<i>N</i>	<i>Minimum</i>	<i>1st</i> <i>Percentile</i>	<i>20th</i> <i>Percentile</i>	<i>40th</i> <i>Percentile</i>	<i>Median</i>	<i>60th</i> <i>Percentile</i>	<i>80th</i> <i>Percentile</i>	<i>99th</i> <i>Percentile</i>	<i>Maximum</i>
<i>Women</i>										
Incarcerated	45	0.00129	0.00129	0.00652	0.01535	0.03096	0.04702	0.08168	0.27314	0.27314
Not Incarcerated	4,439	0.00049	0.00057	0.00159	0.00327	0.00481	0.000676	0.01381	0.07098	0.26317
<i>Men</i>										
Incarcerated	448	0.00857	0.01534	0.08615	0.15767	0.20269	0.26648	0.47527	0.86511	0.89692
Not Incarcerated	3,940	0.00394	0.00444	0.01287	0.02932	0.04156	0.06148	0.13078	0.52812	0.88203

Table 6. Distribution of the Propensity Scores for Incarceration – Gender and Race

	<i>N</i>	<i>Minimum</i>	<i>1st</i> <i>Percentile</i>	<i>20th</i> <i>Percentile</i>	<i>40th</i> <i>Percentile</i>	<i>Median</i>	<i>60th</i> <i>Percentile</i>	<i>80th</i> <i>Percentile</i>	<i>99th</i> <i>Percentile</i>	<i>Maximum</i>
<i>Women</i>										
White	2,329	0.00049	0.00056	0.00102	0.00174	0.00218	0.00268	0.00502	0.03059	0.27314
Minority	2,155	0.00091	0.00142	0.00523	0.00843	0.01033	0.01313	0.02282	0.09082	0.26317
<i>Men</i>										
White	2,291	0.00394	0.00444	0.00877	0.01598	0.02129	0.02886	0.06289	0.50037	0.79732
Minority	2,097	0.00724	0.01054	0.04629	0.08370	0.10678	0.13389	0.24508	0.78394	0.89692

When the propensity scores were further sub-divided by the incarceration event, the disparity in gender groups was even more apparent (See Table 5). For the non-incarcerated samples, the difference in minimum and medium scores was over seven times greater. The maximum male score was over three times higher than that of the female non-incarcerated group. Although women as a whole have a lower likelihood of incarceration, the divergence within groups for the incarcerated samples was not dramatically different from that of the male group. The median propensity scores for the female incarcerated group were six times higher than that of the non-incarcerated group. The disparity between groups of males was five-fold.

The range of scores did not vary substantially within gender groups when scores are further subdivided by gender and race (See Table 6), although the distribution of scores did vary by race. For women, there was little difference in the minimum and maximum scores by race, but for the twentieth through eightieth percentiles, the propensity scores for minority women were at least four times higher for that of the non-minority women. A similar pattern emerged for men. The minimum and maximum scores were slightly higher for minority men; however, the true difference in scores came in the median region of the distribution. For the twentieth through eightieth percentiles, the propensity scores were at least four times higher for minority men when compared to non-minority males.

The examination of the propensity scores in such a manner is helpful for understanding risk of incarceration in general and provides further context for the final statistical analyses. One of the most salient differences found in the propensity score analysis was that of gender. Overall, the scores across gender groups varied

substantially. More importantly, the median scores for the incarcerated male sample were nearly seven times that of the female sample, and the maximum scores were over three times larger. The disparity in scores speaks to the relative differences of women in the sample. Women, in general, were less likely to be considered at risk of incarceration based on this model. The dramatic differences in scores can also be seen as a signal of poor model fit for the women in the sample. A true, valid model of incarceration risk would be able to equally predict incarceration for women as well as men.

The difference in gender contrasts is not surprising in that most research on corrections has been based on male experiences (see Farr, 2000; Owen, 1998 for exceptions). Models of incarceration risk for women need to be considered more thoroughly. In order to further examine the validity of the propensity scores for the women in the current sample, a series of sub-group analyses were conducted. The statistical models are identical to those for the final propensity score model except gender has been removed from the models.

As shown in Table 7, there are substantial differences in the logit models for males and females. The coefficients for the male subgroup analysis were very similar to those of the original propensity score model. For women, less than half of the exogenous predictors were found to be significant. Only suspension from school, self reported delinquency, drug use, and cognitive ability were found to be significant in the female model. Nearly all (99.9%) of the women were correctly classified using the model; whereas, 90.3 percent of the male sample was correctly classified. The results of the model fit statistics are not surprising in that the female sample was substantially more homogenous than that of the male sample. In addition, only 45 (1%) of the female

sample were incarcerated at some point during the study period; hence, there was also little variation in the dependent variable in which to model. Although the models are limited by the small sample of incarcerated women, this analysis highlights the difference in propensity for men and women. It appears that risk models for women may be different for that of men. Further research is needed on this subject; however, for this research it is important to note the gender differences when interpreting the final results of the statistical analyses.

Table 7. Logit Model for the Development of Propensity Scores by Gender

	Female (N=4,484)		Male (N=4,388)		Total Sample (N=8,872)	
	<i>b</i>	S.E.	<i>b</i>	S.E.	<i>B</i>	S.E.
Constant	-4.75**	0.52	-2.51**	0.18	-3.25**	0.17
<i>Demographic Influences</i>						
Black	0.21	0.44	0.95**	0.15	0.86**	0.14
Hispanic	0.46	0.44	0.47**	0.17	0.49**	0.15
High School Graduate	-0.52	0.35	-0.63**	0.13	-0.62**	0.12
Cognitive Ability	-0.03*	0.01	-0.02**	0.00	-0.23**	0.00
<i>Criminal History</i>						
Contact with the Police	0.76	0.39	0.29*	0.12	0.70**	0.11
Suspension	1.50**	0.35	0.67**	0.12	0.86**	0.11
Delinquency	1.41*	0.56	0.43*	0.20	0.71**	0.18
Drug Use	0.97**	0.33	0.66**	0.12	0.82**	0.11
Previous Incarceration	1.23	0.73	1.46**	0.23	1.46**	0.21
<i>Context Influences</i>						
Family Poverty	-0.15	0.35	0.33**	0.12	0.16	0.11
Unemployment Rate	-0.05	0.43	-0.12	0.17	-0.17	0.15

* $p < .05$ ** $p < .01$ (two-tailed tests)

Female Sample -

-2 log likelihood = 400.92

99.9% correctly classified

Male Sample -

-2 log likelihood = 2,231.35

90.3% correctly classified

Total Sample -

-2 log likelihood = 2,888.07

94.7% correctly classified

Matched and Comparison Group Estimation

After the propensity scores were constructed, they were used to aid in the development of a matched and a comparison sample. As discussed above, in this study, each incarcerated person was matched to a control individual who had not experienced incarceration using the nearest available matching (Rubin, 1973) on the estimated propensity score. The optimal matching algorithm would involve exact matches for all members of the group, but this was not possible with the existing data set. Only 178 individuals in the control sample (36%) were selected based on exact matches and the nearest available match was utilized for the remaining 315 individuals (see Table 8). The nearest available match was selected by identifying the individual with the nearest propensity score to that of the incarcerated group. The selected score can be higher or lower than that of the treatment individual; the goal is to find the absolute closest match in regard to the propensity score. Although it is best to select exact matches for all members of the incarcerated sample, the technique of nearest available matching has been demonstrated as robust in previous research of this type (see Rosenbaum & Rubin, 1985a). As mentioned earlier, it is also advantageous to select a person with a close match than to omit the dyad from the sample completely.

Table 8. Number of Exact Propensity Score Matches

	<i>Frequency</i>	<i>Valid Percent</i>
Proximate Match	315	63.9
Exact Match	178	36.1
Total	493	100.0

For a small portion of the sample, multiple nearest available or exact matches were found. In this special case, the propensity score served as the primary filter for the

development of the control sample. When multiple suitable matches were found, matching was conducted on the basis of gender, age, and race. Gender was given primacy in matching so that the gender balance of the sample could be maintained for statistical analysis. If the sample needed to be narrowed further, the match was then selected based on age. Finally, matches were selected according to race, if necessary.

Overall, the propensity score technique was successful in selecting an appropriate matched sample (see Table 9). The mean difference in propensity scores between groups is 0.0199. Only the measure of juvenile incarceration was significantly different for the matched sample when compared to the incarcerated sample. This is not surprising in that those individuals who have served one stay of incarceration are significantly more likely to go on to be incarcerated again in the future (Langan & Levin, 2002). Overall, the matching technique was appropriate for this model in that a number of close matches were obtained, and the incarcerated group is not statistically different from that of the matched group.

Table 9. Descriptive Statistics for the Variables Used in the Development of Propensity Scores by Group

Variable	Incarcerated (N=493)		Matched (N=493)		Median Group (N=518)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Male	0.91	0.29	0.92	0.28	0.47	0.50
Hispanic	0.23	0.42	0.23	0.42	0.24	0.43
Black	0.53	0.50	0.53	0.50	0.27	0.45
Cognitive Ability	18.12	17.27	17.98	17.12	36.59	26.84
High School Graduate	0.44	0.50	0.43	0.50	0.77	0.42
Suspension	0.63	0.48	0.65	0.47	0.22	0.41
Poverty	0.41	0.49	0.38	0.49	0.24	0.43
Prior Incarceration*	0.18	0.38	0.11	0.32	0.00	0.00
Contact with Police	0.43	0.49	0.41	0.48	0.12	0.32
Self-reported Delinquency	0.20	0.40	0.15	0.36	0.02	0.14
Drug Use	0.43	0.50	0.42	0.49	0.19	0.39
Unemployment Rate	0.13	0.33	0.12	0.33	0.17	0.37
Propensity Score	0.26	0.22	0.24	0.19	0.01	0.00

*The incarcerated and matched group are statistically different at $p < 0.05$

As part of the matching phase of the analysis, a comparison group was also selected (N = 518). In order to develop the comparison group, all individuals with propensity scores equal to the median score of the total sample were chosen for inclusion in this group. In addition, individuals whose scores were within 0.002⁵ from the score were also incorporated. This technique facilitated the development of a median group

⁵ This number was chosen to aid in the selection of a comparison group that was similar in number to the incarcerated and matched group.

that was large enough for comparison with the incarcerated and matched groups. Descriptive statistics for the median group are presented in Table 9. This group was developed to represent the experiences of an average person in the sample. Because of the skewed nature of the data, the median group was selected in lieu of a comparison sample that was selected based on mean scores. This group provides further comparative information on the relative effect of lifecourse events on social bond development.

Sample Characteristics

As presented in Table 9, the characteristics of the incarcerated and matched sample are very similar. Members of the matched and comparison groups are primarily minority males with little education, living under the poverty level. Less than ten percent of the matched and incarcerated groups are female, one half are Black, and one quarter Hispanic. Two-fifths had incomes or lived in a family with economic means below the poverty level. Less than half of the sample members attained a high school degree, and three-fifths reported being suspended from school at some point.

Not surprisingly, members of both the matched and incarcerated groups reported substantial involvement in criminality prior to the sample period. Two-fifths of both groups reported prior drug use and contact with the police. Of the incarcerated group, 20% reported involvement with delinquency as a young adult or late adolescent, and 15% of the matched group reported similar behaviors. As discussed previously, the two groups are significantly different in their experiences with incarceration as a young adult and juvenile. Nearly one-fifth (18%) of the incarcerated group reported being imprisoned

prior to the study period; whereas 11% of the matched sample indicated previous incarceration.

The median group was much more homogeneous when compared to the incarcerated and matched groups. Nearly half of the group members are White males. The remaining sample members are split between Hispanic and African American racial groups. Three quarters of sample members graduated from high school and 25% reported suspension from school. In addition, a quarter of the sample reported living under the poverty level.

Members of the median group also reported substantially less involvement in criminality. None of the members of the median group experienced incarceration prior to the study period. Moreover, one-fifth reported previous drug use, 12% had prior contact with the police, and only 2% of the sample indicated involvement in delinquency.

The descriptive statistics reinforce the validity of the sample selected for the current study. The characteristics of the matched and incarcerated groups are very similar. Members of both groups reported considerable involvement with delinquency and the criminal justice system. They were also more likely to live in poverty and have less attachment to school. The nature of the incarcerated and matched groups facilitates the comparison of bond development between groups. In contrast, the median group was characterized by modest participation in delinquency and antisocial behavior. Members of the median group were also more likely to have completed high school and less likely to live in poverty when compared to the incarcerated and matched samples. The addition of the median group to the study furthers the consideration of the relative effect of incarceration, in comparison to other social events, on social bond development.

Analysis Plan

The larger goal of this research is to consider the effect of incarceration on the development and nature of social bonds to marriage. The research was designed to answer two primary research questions. First, are sample members able to attain bonds to employment and marriage following incarceration? Second, how is the quality of social bonds affected by the incarceration event? The following section details the hypotheses considered by the research. In addition, a discussion of the methodologies used to test the hypotheses is presented. A number of exogenous variables were included in each of the models to condition the estimation of the incarceration event on social bond development. A detailed description of each of the variables used in the models is provided in the following section.

Attainment of Social Bonds

The first part of the analysis plan addresses the attainment of social bonds to work and marriage following incarceration. As discussed above, incarceration can shut off legitimate opportunities, thus reducing the likelihood of developing social bonds (Coleman, 1988; Laub & Sampson, 1988a, 1993; Sampson & Laub, 1992, 1993). The following hypotheses have been suggested by the research conducted to date and serve to guide the analyses.

- H1: Incarcerated persons will be less likely to attain employment of any kind following incarceration⁶.

⁶For each of the hypotheses, it is expected that the effect of incarceration on social bond attainment be examined in light of both time invariant controls and other lifecourse events. Including the static factors in the model allows the researcher to consider the relative effects of both continuity and change in the model.

- H2: Incarcerated persons will be less likely to develop bonds to marriage following incarceration.

A series of logit models were estimated to address hypotheses H1 and H2. Because of the dichotomous nature of the dependent variables, the logit model is the most appropriate statistical model to address the research question (Long, 1997). This technique allows the researcher to understand the probability of marriage or work at one point in time after controlling for lifecourse, demographic, criminal history, and contextual variables. In the current research, the effect of incarceration on the likelihood of marriage and procurement of fulltime work in 2000, net of control variables, was considered.

A specialty form of hierarchical linear modeling that incorporates the logit function was also used to examine the relationship between incarceration, lifecourse events, and social bond attainment (Raudenbush & Bryk, 2002). This modeling technique allows conclusions to be made on the change in the probability of bond attainment over time in reference to both static (e.g., gender, race) and dynamic (e.g., incarceration by year) predictors.

Nature of the Social Bond

Not only are individuals less likely to attain bonds to marriage and work following incarceration, current research has suggested that the quality of the bond attained may also be attenuated by the incarceration event (Freeman, 1991; Waldfogel,

The addition of lifecourse events in the models facilitates the comparison of the predictive power of the state dependence and population heterogeneity perspectives.

1994; Western & Beckett, 1999; Western et al., 2001). Based on this literature, two hypotheses are presented.

- H3: The slope of the quality of employment measure will grow more slowly for the incarcerated group when compared with the matched and comparison groups.

The change in the quality of bonds to employment following incarceration was tested with this model. Growth curve modeling, a specialty form of HLM, was used to address this research question. The analysis procedure allows the researcher to examine the nature and rate of growth in social bonds for sample members. The current research includes incarceration as an intervention point and explores the character of change following the event.

- H4: Individuals who have been incarcerated will report a lower quality marital bond when compared with the non-incarcerated group.

Finally, the nature of the marriage bond developed following incarceration was studied. For individuals who had attained marriage following a stay of incarceration, a factor score was constructed based on the number of marriages the individual entered into after incarceration, the length of those marriage(s), and the age at first marriage. The operationalization of this aspect of the social bond is not optimal; however, attitudinal measures as to the quality of the marriage (e.g., how often the couple reports fighting) are not available with the current data set. The quality of marriage measure does expound on

the existing theoretical work conducted in this area and provides a proxy for a quality of marriage variable.

Ordinary Least Squares regression was used to test this hypothesis. In this model, demographic, criminal history, lifecourse events, and contextual indicators were regressed on a continuous factor score computed to represent the nature of marriage.

Measurement of Variables

The following section outlines the independent and dependent variables used in the current study. One of the secondary goals of this analysis was to understand how the predictive models of social bond quality and attainment vary for both the marriage and work outcomes. As such, the same statistical model was estimated for each of the dependent variables. A detailed description of the variables used in the current study is presented in Appendix A.

Measurement of Dependent Variables

Work

Measures of both the attainment of work and the indicators of the nature of employment attained were included in the model. Employment has been found to be significantly related to desistance from crime (Horney et al., 1995; Sampson & Laub, 1993; Uggen, 2000). Because of the relationship between work and desistance, it becomes important to examine what factors best predict employment following incarceration. Specifically, does the timing and nature of incarceration have differential effects on both the likelihood and nature of employment? Most of the current literature

indicates that incarceration has a small and often insignificant effect on the likelihood of employment in adulthood, but a negative relationship, albeit weak, has been confirmed between imprisonment and quality of employment (e.g. Waldfogel, 1994; Western, 2002). Current research on the timing of incarceration has also suggested that incarceration at an early age is more detrimental to employment outcomes when compared to later incarceration (Freeman, 1991; Western & Beckett, 1999). It appears that incarceration can negatively affect employment outcomes, but the true nature of the relationship should be explored further.

Three measures of employment were included in this research. First, a dichotomous measure of *employment* was developed. The employment measure was dichotomized into those individuals who reported working fulltime (more than 35 hours a week) during the study year and those that did not work or worked part time (reference category). Two additional constructs were developed to capture the nature and stability of employment. First, a measure of *tenure with employer* was developed which indicates the length of employment, in weeks, with the respondent's primary employer. An additional indicator was included which captured the *number of jobs* worked during the study year. The number of jobs is an additive measure. For example, the number of jobs worked in 1985 construct reflects the number of unique employment experiences reported by the respondent in 1983, 1984, and 1985.

The examination of the nature of employment in the current research is an important addition to the existing literature on social bond development. To date, most researchers have only examined the attainment of employment and wages garnered from work (Freeman, 1991; Waldfogel, 1994; Western, 2002; Western et al., 2001; Western &

Pettit, 2000). As suggested by social capital and control theorists, employment in and of itself is not as important to consider as is the attachment to work (Coleman, 1988, 1990; Hirschi, 1972; Laub et al., 1998; Sampson & Laub, 1993). It is the strong bond to work that insulates against further criminality.

Marital Attachment

Social bonding in the form of marriage has been linked with desistance (Horney et al., 1995; Laub et al., 1998). As such, the attainment of the social bond to marriage was used as an outcome measure in this research. The *marriage* dependent variable is dichotomous allowed the researcher to consider attainment of the bond of marriage at each of the fifteen interview points.

A measure of the *nature of the marital bond* was also included. Similar to the employment model, it was important to include an indicator of the nature of the marital bond in the model because researchers have associated stronger bonds with higher instances of desistance. The nature of the marital bond variable was operationalized using a three item factor score that included 1) the length of the respondent's first marriage in years and 2) the number of marriages entered into during the study period and 3) if the individual had been divorced at any point from 1983-2000 (eigenvalue 2.10, factor loadings > 0.757). To ease the interpretation of the dependent measure, the factor scores were multiplied by -1. As a result of the transformation, high scores on the dependent measure corresponded with strong bonds to marriage.

Measurement of Independent Variables

Two sets of independent variables were incorporated in this research. The first group included dynamic variables for which data had been obtained during each year of the study. Measures of incarceration, work, marriage, age and military involvement were added to the model to represent salient lifecourse events. The second group of independent variables comprised static measures and captured data on each individual prior to the study period. The static measures served largely as controls; although, these constructs also serve as proxies for the criminal propensity as suggested within the population heterogeneity framework (e.g. Gottfredson & Hirschi, 1990; Wilson & Herrnstein, 1985). The static predictors were selected to represent pivotal adolescent, individual characteristics that have been shown to have both direct and indirect effects on subsequent adult criminality. Descriptions of all variables included in the final statistical models are presented in Appendix A.

Dynamic Influences

Incarceration

Incarceration was included as the primary independent variable in the models. The NLSY does not include a specific measure of incarceration in the interview instrument, but imprisonment can be measured in relationship to the current residence of the individual at the time of interview. Respondents who were interviewed at a correctional facility, either by phone or in person, were considered as incarcerated during that particular year. Unfortunately, the NLSY does not capture information on individuals who may have been incarcerated for part of the year, but were not imprisoned

at the time of the interview. In light of the data collection protocol, the incarceration measures are more likely to represent those individuals who had been incarcerated for longer periods of time (e.g., prison) than an individual who experienced a short stay (e.g., jail).

Two separate measures of incarceration were used in this analysis. The first incarceration construct is a time-varying dummy variable. For each time wave, the incarceration variable was coded one if the individual was incarcerated at that time point and zero if the individual was not currently incarcerated. Using this type of construct as an independent variable allows incarceration to be viewed as a form of intervention in that it is possible to examine change in lifecourse trajectories following the event. This construct also facilitates the study of the timing of incarceration in relationship to social bond outcomes.

The second incarceration construct was developed to represent the cumulative effect of incarceration over time⁷. In addition to the dichotomous measures, an additional variable was included in the model to examine the cumulative nature of incarceration. The *incarceration count* measure was calculated for each subject at all fifteen time periods, and represents the number of time periods the individual was incarcerated prior to the current time period.

Research on incarceration as both an outcome and as a predictor has traditionally treated incarceration as a binary outcome, but over half of the current sample was

⁷ In the original research proposal, a number of categorical variables had been considered as representations of the nature of incarceration. Because of the lack of information on the length and character of confinement (e.g., jail v. prison and the number of days incarcerated), the original categorical variables were removed from the final analyses. Instead, the cumulative incarceration measure was constructed. This measure speaks to the additive effect of incarceration while not overstepping the bounds of the data available for the current study.

incarcerated multiple times. Research has indicated that the majority of offenders released to the community will be returned to prison within three years (Langan & Levin, 2002). It stands to reason that an extended stay of incarceration or multiple terms of incarceration would have a differential effect on work and family outcomes when compared with one incarceration event. The addition of a time varying covariate for the discrete and cumulative measure of incarceration extends the current knowledge of the relative effect of imprisonment on lifecourse trajectories.

Military Participation

Consistent with the work of Sampson and Laub (1996), participation in the military was used as a dynamic control in the model. Like prison, the military represents an important social institution. Involvement in this institution can affect lifecourse trajectories. Military service also removes an individual from the conventional workforce and can limit avenues for traditional employment and interaction with the opposite sex. In addition to acting as a control in the models, military service also served as a comparison for the institutional effect of incarceration.

Work and Marriage

Employment and marital status functioned as both statistical controls and as exogenous variables in the model. Researchers have argued that the presence of one type of social bond increases the likelihood of developing subsequent bonds (see Coleman, 1988; Coleman, 1990). One would expect that individuals whom are gainfully employed would also be more likely to attract a marriage partner; therefore, it is important to

control for marital status when modeling bonds to employment and vice versa. In order to control for social bond development, a series of dummy variables were constructed, by year, for both marriage and employment.

Age

A measure of age at each interview point was also used as a dynamic predictor in the model. The age variable in the model was centered using an arbitrary point of reference. For each individual, the age measure was calculated by subtracting 21 years from the age variable. The centering point of 21 was selected because it represents the midpoint of the age range for the respondents at the first phase of data collection for the current study. This centering technique is common in the literature and serves to reduce multicollinearity when multiple model fit estimators are included (Jang, 1999; Raudenbush, 2001). In addition, a polynomial of the centered age predictor was also incorporated into select models to control for non-linear growth (Murphy & Welch, 1990). The most appropriate functional form of these variables are further examined in Chapter 4 of this research.

Static Influences

A series of demographic measures were also included in the model as controls. The static influences chosen for this model serve as the basis of the population heterogeneity model and allow researchers to further explore the effect of life events net of immutable individual differences. Two categories of individual difference predictors were included. The first group incorporated cognitive ability, education, race, and gender

and was used as the primary measure of individual difference. A set of criminal history predictors was also included. With the exception of antisocial behavior measure, the operationalization of the static influences did not vary from those included in the propensity score models. A general discussion of the variables is provided below.

Demographic Influences

Similar to the propensity score model, education and cognitive ability were included as predictors. Graduation from high school represents a seminal event in the lifecourse (Arum & Beattie, 1999). Cognitive ability, although controversial, has been included as a central exogenous predictor in the state dependence models (see Gottfredson & Hirschi, 1990; Hirschi & Hindelang, 1977; Wilson & Herrnstein, 1985). As such, *high school graduate* and *cognitive ability* were included in the social bond models.

Gender and race were also incorporated in the model as demographic influences. The incarceration decisionmaking literature has highlighted the importance of extra-legal factors in the decision to incarcerate (Spohn & Holleran, 2000; Steffensmeier et al., 1998; Zatz, 1987). A series of dummy variables were constructed for race and gender variables in the model. Gender was dichotomized into *male* and female (reference category). Two dichotomous measures of race, including *African American* and *Hispanic*, were also included in the model. White and Other races served as the reference categories for the race variables.

Criminal History and Involvement in Delinquency

Two measures of involvement in delinquency and criminality, including *prior incarceration and antisocial behavior*, were included in the models. Contact with the criminal justice system and participation in delinquency and drug use at a young age can mortgage an individual's tie to society, reducing the likelihood of development of positive social bonds in the future (Coleman, 1988; Sampson & Laub, 1993). In addition, antisocial behavior, even in adolescence, has been linked with work and family problems (Moffitt, Caspi, Harrington, & Milne, 2002). The criminal history measures were used in the analyses as controls and allow the relationship between incarceration and bonds to be examined, net of deviance and delinquency as youth and young adults.

Both criminal history measures were included in the model as dummy variables. *Antisocial behavior* was dichotomized into those individuals who had reported involvement in criminality of any kind, including drug use, before 1980 and those that did not indicate delinquency involvement. The *previous incarceration* measure queried individuals if they had been incarcerated at any point before their involvement in the survey.

Analytic Technique

Three multivariate analytic techniques were used in this research including Ordinary Least Squares regression, Logistic regression, and Hierarchical Linear Modeling. A description of each technique is provided below.

Ordinary Least Squares Regression

Ordinary Least Squares (OLS) regression was used in this analysis to understand the relationship between incarceration and the nature of the marital bond. OLS is an appropriate statistical technique for models that involve a continuous dependent variable and multiple independent variables. OLS regression is generally used to provide an estimate of the dependent variable as a linear function of a number of dependent variables plus error (Bachman & Paternoster, 1997).

The OLS model rests on a number of assumptions. In OLS models, all variables must be normally distributed and observations should be randomly selected. The error term should be randomly distributed, constant across all levels of x, independent of all exogenous predictors, and have an expected value of zero. Exogenous variables must also not be correlated with each other (Bachman & Paternoster, 1997).

OLS regression was the most appropriate technique to examine the nature of the marital bond because the research question involved examining the matrimonial relationship at one point in time; hence, a longitudinal form of analysis was not appropriate. The functional form of the dependent variable was also well suited for OLS regression. Because the nature of marriage indicator was derived from factor analyses, the dependent measure had a mean of zero and a standard deviation of one. The factor score was also normally distributed. In addition, regression diagnostics did not uncover possible problems due to multicollinearity (see Appendix A).

The OLS model was only used in the estimation of the nature of marriage in 2000. The remainder of the models involved dependent measures of a dichotomous nature or

the analysis questions necessitated the use of longitudinal methodologies; hence, OLS regression was not appropriate for these models.

Logistic Regression

Logistic regression is a specialized form of OLS and is most appropriate for testing models that involve a dichotomous dependent variable. This technique was used in this analysis to determine the likelihood of marriage and employment in 2000 in relationship to lifecourse events, demographic predictors, criminal history indicators, and contextual influences. In many ways, the OLS and logistic models are similar. Both require multiple independent variables to be included in the model, observations to be independent, and data to be randomly selected (Bachman & Paternoster, 1997).

The distribution of the dependent variable separates logistic regression from that of OLS. In logistic regression the functional form of the dependent measure is dichotomous. In the current study, respondents were either classified as married or not and employed or unemployed. The coefficients derived from the model allow the researcher to ascertain the probability of an event (e.g., marriage) occurring during a specified time period. The method required to estimate the coefficients is also different for logistic regression. In logit models, coefficients are estimated using the maximum-likelihood estimation method (MLE) (Long, 1997).

Several logistic regression models were estimated. The first set involved the examination of the attainment of the bond to marriage and work in 2000. These analyses comprised the entire sample population. A series of sub-group analyses by sample groups were also conducted to examine the differences in the likelihood of attainment of

social bonds for the incarcerated, matched, and comparison groups. In addition, a specialty form of logistic regression was used in conjunction with Hierarchical Linear Modeling. Specifics on this technique are presented below.

Hierarchical Linear Modeling

A specialty form of hierarchical linear modeling (HLM), deemed growth curve analysis, was used as the primary analytic technique for this research (Raudenbush & Bryk, 2002). This technique was selected to facilitate the examination of change in social bonds over time. This statistical technique is designed to model longitudinal data and can be considered an advanced method for understanding repeated measures data. Growth curve analysis models are based on the assumption that the underlying path of change is similar for all individuals in the study; however, this technique also allows researchers to model the effect that dynamic factors (e.g., incarceration) have on trajectories of change net of time-invariant individual differences (e.g., cognitive ability). This technique is appropriate for the current study in that it allows the researcher to consider the relationship between incarceration and the likelihood of social bond attainment over time, while controlling for the effect of individual demographic characteristics (e.g., race).

HLM models are traditionally estimated on two levels, making it especially well suited to evaluate theories that incorporate both continuity and change (e.g., lifecourse perspectives). The first level of the HLM model is designed to assess individual trajectories of growth as characterized by an intercept and a rate of change. The second level of the model is a between-persons model with the slope and intercept of the Level I variables as outcome variables and static factors as predictors (Johnson, Hoffmann, Su, &

Gerstein, 1997). The objective of the Level II model is to identify factors that are related to the extent of individual differences in growth curve parameters. Level II describes how these relationships vary over a population of persons. The factors included in the second level of the model are time-invariant.

HLM is an appropriate statistical technique to address the proposed research questions. The multi-level nature of the technique allows social bond development to be modeled simultaneously in relationship to static time-invariant variables (e.g., age or gender) and time-variant covariates (e.g., incarceration). HLM was used in the current analyses to test two hypotheses. First, the logistic form of HLM was employed to examine the change in the likelihood of marriage and fulltime employment. The second set of models was designed to consider the variation in the nature of employment over time as measured by number of jobs employed and tenure with current employer.

Research Implications

The research plan has been designed to facilitate the discussion of a number of research propositions. The fixed-effect logit models allow the researcher to understand social bond development among sample members. In this model, the probability of fulltime employment and marriage in 2000 were modeled in relationship to lifecourse events, demographic influences, criminal history, and context influences. In addition, a series of sub-group analyses were also estimated to explore the variation in social bond attainment across sample groups.

This analysis was also designed to examine the social bond development in a new light. By using longitudinal data in conjunction with growth curve modeling techniques,

the researcher was able study change in the likelihood bond development and the nature of bonds attained over the lifecourse, while controlling for time invariant factors (e.g., race). The use of longitudinal data is especially important in light of the current desistance literature. Desistance and bond development do not occur spontaneously (see Laub & Sampson, 1988b). Instead, bonds develop over time.

Finally, using longitudinal data that include yearly measures also allows the researcher to consider the effect of timing and nature of the incarceration event on social bond development. Specifically, the cumulative effect of incarceration was examined in this research. Traditionally, researchers have compared juvenile to adult incarceration (e.g. Western & Beckett, 1999); however, the nature of this research design will facilitate conclusions on the specific timing of incarceration and social bond development. A pictorial of the general analytical framework is presented in Appendix B.

Chapter 4: Results of Analyses

As indicated in Chapter 1, the goal of this research was to examine the attainment of social bonds to marriage and work following incarceration. A secondary focus was to explore how the nature of these bonds was affected by the incarceration event. As such, a series of statistical equations were estimated that model both the attainment and the nature of the bond in relationship to incarceration and other salient life events, net of controls. The hypotheses were tested using data from the National Longitudinal Survey of Youth. The research design included three samples. The incarcerated sample consists of all individuals incarcerated at some point from 1983-2000 (n=483), the matched sample represents similarly situated individuals to the incarcerated group that have not experienced incarceration (n=483), and a comparison group (n=512) includes individuals with a median propensity of incarceration. In total, the sample comprises 1,478 individuals.

The analyses were conducted in two phases. The first phase included a series of logit models designed to examine social bond attainment. The second aspect of the research design was centered on the estimation of the nature of the social bond. Hierarchical Linear Modeling (HLM) and ordinary least squares regression were used for this phase of the research. Theoretically, it was expected that those individuals who experience a stay of incarceration would be less likely to develop positive social bonds to marriage and work. In the same light, of people who attain social bonds, it was hypothesized that the nature of the bond would be negatively affected by incarceration.

Fixed-Effect Models of Social Bond Development

Marital Bonds

The goal of the first phase of the analysis was to examine the attainment of the bond to marriage. It was hypothesized that individuals who had experienced a stay of incarceration would be less likely to attain social bonds. The incarceration event, like other salient life experiences (e.g., substance abuse), can sever ties to conventional social relationships reducing the likelihood of attainment of social bonds (Sampson & Laub, 1993). As such, it has been theorized that those individuals who experienced one or more incarceration events during the study period would be less likely to be married, even after controlling for individual demographic characteristics, criminal history, and contextual influences.

In order to understand attainment of the marital bond, marriage was operationalized using a binary measure. The *marriage* dependent variable was coded as “1” if the respondent was married at some point from 1983-2000. As shown in Table 10, incarcerated persons were less likely to become married during the sample period with 38% of the sample reporting at least one marriage during the study period. Nearly half (47.3%) of the match group reported being married, and 62% of the median group attained marriage during the study period. Based on the results of the chi-square test, the differences between groups are statistically significant ($\chi^2=57.59$, d.f.=2, $p<0.001$). In short, individuals who have had at least one stay of incarceration are less likely to achieve the bond of marriage.

Table 10: Attainment of Marital Bond (N=1,478)

	Married during Study Period	
	Yes	Percent
Matched group	228	47.3%
Incarcerated sample	182	37.8%
Median group	317	61.6%

$$\chi^2=57.59, \text{ d.f.}=2, p<0.001$$

Attainment of Marriage

As evidenced by the chi-square analysis, the incarceration event is an important factor in understanding the attainment of marital bonds. Since the bivariate relationship has been established, it is important to further specify the relationship between incarceration and marriage. The following research questions were addressed in the subsequent analyses. Does the relationship between incarceration and marriage remain significant after controlling for lifecourse events, demographic influences, criminal history and context influences? Moreover, does the association between exogenous predictors and marital attainment vary across sample groups and with the timing and nature of the incarceration?

A series of logistic regression models were estimated to address each of the research questions. In order to understand the causal order of lifecourse events, *marriage* was operationalized in this model as a binary measure and dichotomized into individuals who were married in 2000 and otherwise. The *absence from work* and *military status* variables were also dichotomized with individuals reporting an absence from work or participation in the military from 1983 to 1998 as the reference category. In addition, *employment* was included in the model as a continuous count measure representing the number of study periods in which the subject reported being employed on a fulltime

basis. A subject was considered employed fulltime if over 35 hours of work per week were reported.

Before the models of social bond attainment were estimated, general diagnostic procedures were used to assess the general statistical validity of the predictive models. In order to examine the statistical appropriateness of the exogenous predictors, a correlation matrix for each of the social bond models was constructed and VIF values estimated. Results from these analyses for the marriage model are presented in Appendix C and D. Although some of the tolerance and VIF statistics are higher than would be optimal, the coefficients do not suggest severe problems with multicollinearity that would bias the statistical estimates ⁸.

Judging from the results from the logistic regression model, incarceration remains a salient predictor in the model after controlling for lifecourse events, demographic and context influences, and criminal history (see Table 11). Incarceration during the research period was significantly and negatively associated with marriage, but incarceration that occurred before the sample period had no effect. The effect of incarceration was large. Individuals who had been imprisoned at one point during the study period were 62% less likely to be married in 2000.

⁸ In addition to examining the VIF and Tolerance scores for the model, polychoric correlations were also estimated. A number of borderline multicollinearity problems were highlighted by this analysis. In specific, it appears that previous incarceration is highly correlated with antisocial behavior. Although these variables will not be removed from the current analyses, the problem of multicollinearity with the predictors will be addressed in future research.

Table 11. Marital Attainment in 2000 for Total Sample (N=1,478)

	B	s.e.	Odds
Constant	-0.24	0.55	0.79
<i>Lifecourse Events</i>			
Incarceration	-0.98***	0.16	0.38
Work	0.13***	0.02	1.14
Military	0.68**	0.24	1.97
Absence from Workforce	0.06	0.15	1.06
<i>Demographic Influences</i>			
Age	0.00	0.03	1.00
Hispanic	0.02	0.17	1.02
African American	-0.94***	0.17	0.39
Male	-0.26	0.16	0.78
Cognitive Ability	0.00	0.00	1.00
High School Graduate	-0.01	0.15	0.99
<i>Criminal History</i>			
Antisocial Behavior	-0.32**	0.13	0.73
Previous Incarceration	-0.27	0.25	0.77
<i>Context Influences</i>			
Family Poverty	-0.34	0.14	0.71

*** p<.001 ** p<.01 (two tailed tests)

-2 log likelihood = 1655.35

Nagelkerke R^2_L = 0.26

Cox & Snell = 0.18

In contrast to incarceration, both employment and military participation increased the likelihood of marriage. The effect of military participation was particularly strong. Individuals who had participated in the military at some point during the study period had nearly two times the log odds of being married. Although there is little theoretical precedence to this finding, it appears that individuals who maintain steady work or associations with stable social institutions like the military are more likely to develop bonds to marriage. It may be that marriage and employment are interrelated. The coalescence of employment, marriage, and participation in social institutions like the military aid the individual in presenting a 'respectability package' (Giordano, Rossol, & Cernkovich, 2003) that increases the likelihood for development of subsequent social bonds.

Both demographic influences and criminal history predictors also conditioned the marital attainment model. African American sample members were significantly less likely to become married. Based on the odds ratio statistic, the explanatory power for race was similar to that of incarceration. African American persons who had been incarcerated at some point during the sample period were dramatically less likely to become married. Furthermore, individuals who demonstrated antisocial tendencies as young adults through drug use and criminality were also less likely to be married.

Marital Attainment by Group

In order to further understand the development of the bond to marriage across groups, sub-group analyses were conducted. Consistent with the models presented above, logistic regression was used as the primary analytic technique. In addition, Z

scores were calculated for each of the pairs of exogenous predictors in the models according to the formula presented by Brame, Paternoster, Mazerolle, and Piquero (1998; 1998). The results provided a richer understanding of the possible differential effects of lifecourse events, demographic characteristics, criminal history, and context influences on marriage for the incarcerated, matched, and comparison samples.

The most striking finding from the analyses is that work is significantly and positively associated with marriage across groups (see Table 12). Individuals who were employed fulltime were more likely to attain a marital bond. Based on the standardized coefficients, the strength of the relationship is small, but the consistency in the relationship across sub groups is important. This finding speaks to the importance of examining existing social bonds when studying the development of social relationships.

Military participation and absence from work were also important predictors in the models. Enlistment in the military was significantly associated with marriage for the matched sample but not for the incarcerated and median groups. Absence from the workforce was negatively associated with marriage for the incarceration model, but did not achieve a level of significance in the median and matched groups. Interestingly, for the absence from work variable, the Z coefficient for the median, incarcerated group contrast was statistically significant (see Table 13). This outcome suggests that absence from work had a disparate, negative impact on marital bond attainment for the incarcerated group when compared to the median group. It may be that the absence from participation in the traditional workforce confounds the effect of incarceration making attainment of marriage less likely. The multiplicity of absence from the workforce and incarceration reduces the time spent by the individuals in conventional society; thus, the

time allowed for courtship would be reduced and the social presentation of respectability compromised.

Race was the only salient demographic predictor of marital bond attainment in the model. Across groups, African American respondents were significantly less likely to be married during the study period. The results from the odds ratio calculations suggest that race may have a stronger impact on the probability of marriage for the incarcerated sample; although, additional analyses would need to be conducted to further validate this claim.

Table 12. Marital Attainment in 2000 by Group (n=1,478)

	Incarceration (n=484)			Match (n=484)			Median (n=518)		
	b	s.e.	odds	b	s.e.	odds	b	s.e.	Odds
Constant	-1.83	1.29	0.16	-0.23	0.97	0.80	0.11	0.88	1.11
<i>Lifecourse Events</i>									
Work	0.13*	0.05	1.13	0.15**	0.03	1.16	0.13**	0.03	1.14
Military	0.16	0.58	1.18	0.80*	0.36	2.23	0.77	0.43	2.15
Workforce	-0.80*	0.42	0.45	-0.07	0.23	0.93	0.42	0.25	1.52
<i>Demographic Influences</i>									
Age	0.01	0.06	1.00	-0.00	0.05	0.99	0.01	0.05	1.00
Hispanic	-0.09	0.35	0.91	0.23	0.30	1.25	-0.27	0.30	0.76
African American	-1.17***	0.35	0.31	-0.64*	0.28	0.53	-1.07**	0.39	0.01
Male	0.74	0.59	2.10	-0.50	0.39	0.61	-0.20	0.58	0.82
Cognitive Ability	0.00	0.01	1.00	0.00	0.01	1.00	-0.00	0.01	0.99
High School	0.78	0.30	0.01	-0.13	0.23	0.88	-0.61	0.32	0.54
<i>Criminal History</i>									
Antisocial Behavior	-0.46	0.30	0.63	-0.20	0.21	0.82	-0.36	0.31	0.70
Previous Incarceration	0.19	0.39	1.21	-0.49	0.36	0.62	****	****	****
<i>Context Influences</i>									
Family Poverty	-0.21	0.29	0.81	-0.27	0.22	0.76	-0.64**	0.27	0.53
	-2 log likelihood = 370.243			-2 log likelihood = 602.09			-2 log likelihood = 646.90		
	Nagelkerke $R^2_L=0.18$			Nagelkerke $R^2_L=0.16$			Nagelkerke $R^2_L=0.17$		
	Cox & Snell = 0.11			Cox & Snell = 0.10			Cox & Snell = 0.11		

*p<0.05 **p<0.01 ***p<0.001 (two-tailed test)

**** None of the members of the median group reported incarceration prior to 1980; hence, prior incarceration represents a constant and was removed from the analysis.

Across models, criminal history variables were not significantly associated with marriage, but the contextual measure of family poverty was negatively related with attainment of the marital bond for the median group. Individuals from the median group that grew up in impoverished circumstances nearly half as likely to be married. The Z scores from the poverty model were not significantly different. Despite the difference in the significance levels of the coefficients, the effect of adolescent or early adulthood economic status and marriage did not vary significantly between groups.

Table 13. Z Score Coefficients for Sub Groups Comparisons – Marital Attainment Model

	Incarcerated and Matched Groups	Incarcerated and Median Groups
Marriage	-0.34	0.00
Military	-0.94	-0.84
Absence from Workforce	-1.52	-2.50*
Age	0.13	0.00
Hispanic	-0.69	0.39
Black	-1.18	-0.19
Male	1.75	1.14
Cognitive Ability	0.00	0.00
High School	2.41*	3.17*
Antisocial Behavior	-0.71	-0.23
Previous Incarceration	1.28	****
Poverty	0.16	1.09

* $p < .05$

**** This contrast was not estimated because no members of the median group reported a stay of incarceration prior to the study period.

Timing and Nature of Incarceration

Based on the results of the analyses presented to this point, it is evident that incarceration can affect life trajectories. Individuals who experienced incarceration at some point during the study period were significantly less likely to become married, net of traditional control measures. What is not known from this research is the possible differential relationship between the nature and timing of the incarceration event and the attainment of social bonds to marriage. The theoretical foundation of the work is drawn from social capital literature as posited by Sampson and Laub (1993) and Coleman (1990; 1988). Based on this framework, one would expect that individuals who were incarcerated at an early age would be less likely to attain marriage because avenues to traditional interaction (e.g., employment, school) would be limited. For example, individuals incarcerated at an early age are less likely to participate or complete secondary or post-secondary education (Arum & Beattie, 1999). Degree completion not only increases one's human capital, it also affords opportunities to build relationships that may increase social capital (e.g., marriage). In the same light, multiple periods of incarceration would limit participation in society; thus, reducing the likelihood of developing positive social bonds to marriage.

In order to test the relationship between the timing of the incarceration event, the number of incarceration periods, and marriage a series of logit models were estimated. The models are identical to those estimated previously except for the inclusion of a multiple incarceration and an age at incarceration variable. The *multiple incarceration* measure is dichotomous with those individuals incarcerated at more than one point from

1983-2000 as the reference category. The *age at incarceration* represents the age of the subject at their first adult incarceration experience.

The age at incarceration and multiple incarceration measures had disparate effects on the attainment of marriage. Age at incarceration was not significantly related to marriage. Including the age at incarceration actually reduced the explanatory power of the model by nearly half. In addition, when age at incarceration was added to the model, the work variable became insignificant and the high school graduate measure became insignificant.

As expected, those individuals who were incarcerated at more than one time period during the study period were significantly less likely to be married in 2000 (see Table 14). Within the incarcerated group, individuals who were incarcerated multiple times were 44% less likely to become married. While the inclusion of this particular variable did not change the model fit dramatically, the results do illustrate the importance of examining the nature of incarceration. What is more interesting is that addition of this variable did not change the relationship between work and marriage. Individuals with steady employment histories were significantly more likely to be married, net of the incarceration experience.

Table 14. Nature of Incarceration and Marriage – Incarcerated Sample Only (n=418)

	Base Model			Age at Incarceration			Multiple Incarceration		
	<i>b</i>	s.e.	odds	<i>b</i>	s.e.	odds	<i>b</i>	s.e.	odds
Constant	-1.83	1.29	0.16	-0.01	0.93		-1.64*	0.74	0.19
<i>Lifecourse Events</i>									
Work	0.13*	0.05	1.13	0.10	0.06	1.11	0.10*	0.05	1.11
Military	0.16	0.58	1.18	0.47	0.61	1.61	0.04	0.58	1.05
Workforce	-0.80*	0.42	0.45	-1.01*	0.47	0.36	-0.63	0.42	0.53
Multiple	--	--	--	--	--	--	-0.58*	0.30	0.56
Age at Incarceration	--	--	--	-0.05	0.03	0.95	--	--	--
<i>Demographic Influences</i>									
Age	0.01	0.06	1.00	****	****	****	****	****	****
Hispanic	-0.09	0.35	0.91	-0.09	0.38	0.91	-0.12	0.35	0.89
African American	-1.17***	0.35	0.31	-1.06**	0.38	0.35	-1.15**	0.35	0.32
Male	0.74	0.59	2.10	0.84	0.68	2.31	0.86	0.58	2.36
Cognitive Ability	0.00	0.01	1.00	0.00	0.01	1.00	0.01	0.01	1.01
High School	0.78	0.30	0.01	0.83**	0.32	2.30	-0.12	0.35	0.89
<i>Criminal History</i>									
Antisocial Behavior	-0.46	0.30	0.63	-0.46	0.32	0.63	-0.48	0.30	0.62
Previous Incarceration	0.19	0.39	1.21	0.20	0.44	1.22	0.29	0.39	1.34
<i>Context Influences</i>									
Family Poverty	-0.21	0.29	0.81	-0.39	0.31	0.68	-0.15	0.29	0.86
	-2 log likelihood = 370.243 Nagelkerke $R^2_L=0.18$ Cox & Snell = 0.10			-2 log likelihood = 319.71 Nagelkerke $R^2_L=0.10$ Cox & Snell = 0.06			-2 log likelihood = 366.42 Nagelkerke $R^2_L=0.19$ Cox & Snell = 0.10		

*p<0.05 **p<0.01 ***p<0.001 (two-tailed tests)

****Age was excluded from Model II and III because of multicollinearity with the added variables.

Nature of the Marital Bond

The results presented above suggest that incarceration can attenuate the development of social bonds. In the same light, the possession of existing social bonds increases the likelihood of developing subsequent social relationships. The research presented to this point has only focused on the attainment of bonds; however, researchers have suggested that it is not the bond per se that mitigates involvement in negative behaviors (e.g., delinquency, drug use). Rather, it is the capital and the informal social control that is derived from a strong and involved bond that increases the likelihood of both the initiation of a criminal career and desistance from criminality and other problem behaviors (Coleman, 1988, 1990; Sampson & Laub, 1993).

The goal of the following analysis is to understand the relationship between incarceration and the nature of the marital bond. Based on the research conducted to date, it is hypothesized that for those individuals who do become married, that the nature of the marriage will be diminished as a result of incarceration.

In the current study, the *nature of the marital bond* was operationalized using a factor score. The three item factor score included 1) number of marriages reported 2) length of first marriage and 3) if the respondent had been divorced at any time in the study period (eigenvalue 1.94, factor loadings > 0.74). The variable was then transformed by multiplying the factor score by -1. As a result of the transformation, individuals that reported a stronger bond to marriage had a higher score for the dependent measure. The independent predictors included in the model are identical to those included in the previous marital bond models.

Similar to the results from the logit models, individuals who had been incarcerated at some point during the study period were less likely to attain strong marital bonds; whereas employment enhanced the bond to marriage (see Table 15). Contrary to the dichotomous model, military participation was associated with a diminished social bond. Individuals who entered the military were more likely to become married but the nature of the relationship was diminished as a result of the event. Judging from the standardized Beta coefficients, employment had the strongest relationship to quality of marriage of all the lifecourse predictors.

Individuals of Hispanic ethnicity or African American race also reported a strong bond to marriage. These findings contradict the results from the dichotomous marriage model, where African Americans were significantly less likely to attain the bond to marriage. It appears that once an African American individual attains marriage, that the bond to marriage is likely to be stronger and to be sustained for a longer period of time. In addition, the relationship between race, ethnicity and marriage was strong. The Beta coefficient for African American race and Hispanic ethnicity was identical to that of the employment measure and greater than that of incarceration.

Antisocial behavior was the only other significant predictor in the model with individuals reporting involvement in criminality or drug use prior to the study period less likely to maintain quality marital relationships. Together, the variables explained little variation in the dependent measure as the R^2 for the model was small at 0.06.

Table 15. Nature of Marital Bond in 2000 for Married Sample (N=810)

	<i>b</i>	s.e.	Exp(B)
Constant	-0.67	0.38	
<i>Lifecourse Events</i>			
Incarceration	-0.25*	0.12	-0.10
Work	0.04**	0.14	0.14
Military	-0.31*	0.15	-0.09
Absence from Workforce	0.09	0.10	0.05
<i>Demographic Influences</i>			
Age	0.02	0.02	0.05
Hispanic	0.31**	0.11	0.14
African American	0.30**	0.11	0.14
Male	0.15	0.11	0.07
Cognitive Ability	0.00	0.00	0.04
High School Graduate	-0.17	0.10	-0.08
<i>Criminal History</i>			
Antisocial Behavior	-0.22*	0.09	-0.10
Previous Incarceration	-0.18	0.16	-0.05
<i>Context Influences</i>			
Family Poverty	-0.10	0.10	-0.05

* $p < 0.05$ ** $p < 0.01$ (two tailed tests)

$R^2 = 0.062$

Bonds to Employment

Similar to the bond to marriage, an individual's ability to secure employment may also be tempered by the incarceration event (e.g. Freeman, 1991; Kling, 1999; Waldfogel, 1994). The goal of this phase of the research was to examine the procurement of employment following incarceration. Based on the extant research, it was expected that individuals who experienced one or more stays of incarceration would be significantly less likely attain a job and the stability and nature of the employment would be diminished in comparison to those individuals who did not experience incarceration.

The overwhelming majority of individuals were employed for at least one full year over the study period (Table 16). Less than five percent of the matched (4%) and median groups (8%) did not garner employment during the study period; while, twenty-three percent of the incarcerated group remained unemployed from 1983-2000. Despite the similarity in employment for matched and median groups, the differences between groups in reference to employment over the study period are statistically significant ($\chi^2=94.44$, d.f.=2, $p<0.001$).

Table 16. Attainment of Employment by Group (N=1,478)

	Employed during Study Period	
	Yes	Percent
Incarcerated Group	374	77.3%
Matched Group	464	95.9%
Median Group	478	92.3%

$\chi^2=93.44$, d.f.=2, $p<0.001$

To further explore the relationship between employment and incarceration, a series of logit models were estimated. The first model includes the entire sample and was designed to test the relative effect of incarceration on employment in relation to other lifecourse events (e.g., marriage). For example, does the incarceration event outweigh that of obtaining a high school diploma or serving in the armed forces? Second, separate predictive models were estimated for individuals in the median, incarcerated, and matched groups. As part of this analysis, the equivalency of coefficients across groups was also tested. Finally, the relationship between the timing and nature of incarceration and employment was further examined using the sample of incarcerated persons.

Consistent with the operationalization of measures for the marriage dependent variable, the *employment* measure used in the following models is dichotomous and represents fulltime employment (employed for more than 35 hours per week) in 2000. Each of the lifecourse event variables is dichotomous and represents the presence of the event during the study period from 1983 to 1998. In addition, a series of control variables were included in the models. The control variables were measured prior to the study period and were designed to further condition the social bond analyses.

The bivariate analysis of attainment of employment in 2000 further confirms the negative relationship between incarceration and work (see Table 17). One third of the incarcerated group reported fulltime participation in the workforce. The employment rates for the median and matched groups were nearly identical with nearly 70% of the sample members in each group demonstrating fulltime employment in 2000. The difference between sample groups was statistically significant ($\chi^2=180.01$, d.f.=2, $p<0.001$).

Table 17. Fulltime Employment in 2000 (N=1,478)

	Yes	Percent
Incarcerated Group	156	32.2%
Matched Group	329	68.0%
Median Group	362	69.9%

$$\chi^2=180.01, \text{ d.f.}=2, p<0.001$$

Attainment of Employment

As evidenced by the chi-square analysis, the incarceration event is an important factor in understanding the attainment of employment. The following logit models further specify the relationship between incarceration and employment. General diagnostics were conducted prior to the estimation of the final models. The correlation matrix and VIF and tolerance estimates are presented in Appendix E and F. As with the marriage model, a number of variables had moderate tolerance estimates, but none of the coefficients were such to suggest a serious threat to the validity of the model as a result of multicollinearity.

The contribution of lifecourse events in understanding the attainment of employment was further reinforced in the logit model for the total sample (see Table 18). Each lifecourse event including marriage, military participation, incarceration, and absence from workforce was significantly associated with the dichotomous measure of employment. Individuals who had spent time in the military, been absent from the workforce, or had been incarcerated were substantially less likely to be employed in 2000. The strength of the relationships between the variables and employment was also

very strong. Incarceration reduced the likelihood of employment by 69% and military participation and absence from the workforce reduced the odds by nearly half. Military service, incarceration, and absence from workforce all represent events that separate the individual from the conventional employment market. It appears that removal from the workforce at any period can mediate meaningful employment.

Conversely, marriage was found to be both significantly and positively related to employment; although, the relationship was not strong. This finding demonstrates the reciprocal nature of social bond development. Individuals who have attained social bonds were more likely to impart a feeling of social respectability. The results also substantiate the relationships observed between employment and marriage in previous models. Even after controlling for negative lifecourse events (e.g., incarceration) married individuals were more likely to attain fulltime employment.

Demographic indicators also conditioned the employment model. Individuals who tested high on cognitive ability tests and had a high school diploma were more likely to be employed. This is not surprising in that both education and cognitive abilities are representations of human capital. It would follow that individuals with more human capital would also be more likely to attain employment. In addition, individuals of Hispanic ethnicity were less likely to be employed; whereas, gender was positively associated with employment. Males were also one and a half times more likely to be employed.

Interestingly, the criminal history predictors and context influences were not significantly associated with employment. It appears that sample members were able to overcome the experience of incarceration and involvement in adolescent antisocial

behaviors when those events occurred in early adulthood and late adolescence; however, incarceration in adulthood significantly reduced the likelihood of obtaining employment.

Table 18. Employment in 2000 for Total Sample (N=1,478)

	<i>b</i>	s.e.	Exp(B)
Constant	1.14	0.54	
<i>Lifecourse Events</i>			
Incarceration	-1.17**	0.14	0.31
Marriage	0.06**	0.01	1.06
Military	-0.62*	0.24	0.54
Absence from Workforce	-0.86**	0.15	0.42
<i>Demographic Influences</i>			
Age	-0.03	0.03	0.97
Hispanic	-0.33*	0.17	0.72
African American	-0.03	0.17	0.97
Male	0.40*	0.15	1.49
Cognitive Ability	0.01*	0.00	1.01
High School Graduate	0.37**	0.14	1.45
<i>Criminal History</i>			
Antisocial Behavior	-0.03	0.13	0.97
Previous Incarceration	-0.10	0.22	0.90
<i>Context Influences</i>			
Family Poverty	-0.19	0.13	0.83

*p<.05 **p<.01 (two-tailed tests)

-2 log likelihood = 1715.55

Nagelkerke R^2_L =0.26

Cox & Snell = 0.19

Employment by Group

In the sub-group analyses, lifecourse events remained significant predictors of marriage. Across all models, married individuals were significantly more likely to attain fulltime employment (see Table 19). The results from the military participation and workforce absence models varied across groups. Individuals in the median group that had participated in the military at some point in the study period were significantly less likely to be employed fulltime. Military participation was not significant for the incarcerated or matched groups. Absence from the workforce was also negatively associated with employment for the incarcerated and matched groups. This finding is not surprising in that separation from the workforce limits the human and social bonds that can be built through steady employment, thereby, reducing the likelihood of employment.

The demographic influences associated with employment vary widely across sample groups. For the median group, males were significantly more likely to have attained employment. Cognitive ability was significantly and positively associated with employment for the matched sample; while, high school education was the sole significant, demographic predictor for the incarcerated group.

Criminal history variables played a very small role in the models. Antisocial behavior was the only significant predictor of employment and only for the median model. Individuals in the median group that reported drug use or involvement in criminal behavior as youth were significantly less likely to be employed in 2000. In addition, the Z score was significantly different for contrast of the incarceration and matched groups (see Table 20).

Table 19. Employment in 2000 by Sample Group (N=1,478)

	Incarceration (n=484)			Match (n=484)			Median (n=518)		
	b	s.e.	odds	B	s.e.	odds	b	s.e.	Odds
Constant	-0.43	0.99	0.65	2.05*	1.03	7.73	0.53	0.94	1.69
<i>Lifecourse Events</i>									
Marriage	0.07*	0.03	1.07	0.07**	0.02	1.07	0.05*	0.02	1.05
Military	-0.53	0.49	0.59	-0.20	0.38	0.82	-1.29**	0.43	0.28
Absence from Workforce	-0.47	0.36	0.62	-0.89**	0.22	0.41	-1.09**	0.27	0.34
<i>Demographic Influences</i>									
Age	-0.03	0.05	0.97	-0.07	0.05	0.94	0.01	0.05	1.00
Hispanic	-0.49	0.30	0.62	-0.30	0.31	0.75	-0.02	0.33	0.98
African American	-0.29	0.27	0.75	0.01	0.31	1.00	0.67	0.42	1.98
Male	0.76	0.42	2.14	-0.08	0.39	0.92	1.49*	0.64	4.46
Cognitive Ability	-0.00	0.01	0.99	0.02*	0.01	1.02	-0.00	0.01	0.99
High School Graduate	0.54*	0.22	1.72	0.18	0.24	1.20	-0.12	0.34	0.98
<i>Criminal History</i>									
Antisocial Behavior	-0.12	0.22	0.89	-0.23	0.22	0.80	0.75*	0.36	2.11
Previous Incarceration	-0.08	0.29	0.93	-0.01	0.35	0.99	****	****	****
<i>Context Influences</i>									
Family Poverty	-0.14	0.21	0.87	0.02	0.22	1.02	-0.40	0.27	0.67
	-2 log likelihood = 582.60 Nagelkerke R ² _L =0.07 Cox & Snell=0.08			-2 log likelihood = 564.16 Nagelkerke R ² _L =0.12 Cox & Snell =0.04			-2 log likelihood = 544.78 Nagelkerke R ² _L =0.22 Cox & Snell=0.16		

*p<0.05 **p<0.01 p<0.001 (Two-tailed tests)

**** None of the members of the median group reported incarceration prior to 1980; hence, prior incarceration represents a constant and was removed from the analysis.

It is also important to consider the relative fit for the models. Based on the Nagelkerke R^2_L , the totality of variables in the median model explain more variance in employment than either the matched or incarcerated groups. In fact, the model for the median group explained three times the variance when compared to the incarcerated group and twice that of the matched sample. This finding reinforces the need for additional research on models of employment for individuals who tread non-traditional employment paths (e.g., seasonal employment, part-time work). Clearly, models that are adapted from research predicting participation in the fulltime, mainstream employment market are not as efficient in predicting employment for the incarcerated and matched groups.

Table 20. Z Score Coefficients for Sub Groups Comparisons – Employment Attainment Model

	Incarceration and Matched	Incarceration and Median
Marriage	0.00	0.55
Military	-0.53	1.17
Absence from Workforce	1.00	1.38
Age	0.57	-0.57
Hispanic	-0.44	-1.05
Black	-0.73	-1.92
Male	1.47	-0.95
Cognitive Ability	-1.41	0.00
High School	1.11	1.63
Antisocial Behavior	0.35	-2.06*
Previous Incarceration	-0.15	****
Poverty	-0.53	0.76

* $p < .05$

**** This contrast was not constructed because zero members of the median group reported a stay of incarceration prior to the study period.

Timing and Nature of Incarceration

Consistent with the modeling techniques used for the marriage dependent variable, it is also important to examine the relationship between the timing and nature of incarceration and employment. While research conducted in this area is still in its infancy, current thinking suggests that early incarceration may be more detrimental than that of adult incarceration (Kling, 1999; Waldfogel, 1994; Western & Beckett, 1999).

Based on the social capital framework, one would expect that individuals who were incarcerated multiple times would be less likely to be able to attain the human capital to obtain a job. In the same light, incarceration at an early age may hinder an individual's ability to successfully secure future employment by limiting opportunities to gain an education and to build social relationships.

A series of logit models were estimated to examine the relationship between employment and the nature and timing of incarceration. The models are identical to those estimated previously except for the inclusion of a multiple incarceration and age at incarceration variable. The *multiple incarceration* indicator is dichotomous with those individuals incarcerated at more than one point from 1983-2000 as the reference category. The *age at incarceration* represents the age of the subject at their first adult incarceration experience.

Both the number of stays of incarceration and the timing of those events were not significantly associated with employment for the incarcerated the sample. What is more interesting is that inclusion of the multiple incarceration variables into the model changes the relationship between marriage and work. It appears from this model that multiple terms of incarceration do counteract in some manner the positive effects of marriage. This is an important finding in that the majority of sample members experienced multiple stays of incarceration. The model fit and coefficients did not change dramatically by adding the age at incarceration measure.

Table 21. Nature of Incarceration and Employment – Incarcerated Sample Only (n=418)

	Base Model			Age at Incarceration			Multiple Incarceration		
	b	s.e.	odds	B	s.e.	odds	b	s.e.	odds
Constant	-0.43	0.99	0.65	-0.10	0.94	0.99	-0.90	0.59	0.41
<i>Lifecourse Events</i>									
Marriage	0.07	0.03*	1.07	0.53	0.23*	1.70	0.39	0.22	1.47
Military	-0.53	0.49	0.59	-0.38	0.51	0.56	-0.59	0.49	0.55
Absence from Workforce	-0.47	0.36	0.62	-0.63	0.40	0.53-	-0.52	0.36	0.59
Multiple	--	--	--	--	--	--	-0.12	0.22	0.89
Age at Incarceration	--	--	--	-0.04	0.02	0.96	--	--	--
<i>Demographic Influences</i>									
Age	-0.03	0.05	0.97	****	*****	****	****	****	****
Hispanic	-0.49	0.30	0.62	-0.44	0.32	0.64	-0.48	0.29	0.62
African American	-0.29	0.27	0.75	-0.11	0.29	0.90	-0.28	0.27	0.76
Male	0.76	0.42	2.14	0.73	0.45	2.01	0.79	0.42	2.19
Cognitive Ability	-0.00	0.01	0.99	-0.00	0.01	0.99	-0.00	0.01	0.99
High School Graduate	0.54	0.22*	1.72	0.54	0.24*	1.71	0.50	0.22*	1.65
<i>Criminal History</i>									
Antisocial Behavior	-0.12	0.22	0.89	-0.16	0.23	0.85	-0.13	0.22	0.88
Previous Incarceration	-0.08	0.29	0.93	-0.26	0.32	0.77	-0.06	0.29	0.95
<i>Context Influences</i>									
Family Poverty	-0.14	0.21	0.87	-0.12	0.22	0.89	-0.13	0.21	0.88
	-2 log likelihood = 582.60			-2 log likelihood = 519.78			-2 log likelihood = 544.12		
	Nagelkerke R ² =0.07 Cox & Snell =0.04			Nagelkerke R ² =0.08 Cox & Snell =0.04			Nagelkerke R ² =0.07 Cox & Snell =0.04		

*p<0.05 **p<0.01 ***p<0.001

**** Age was excluded from Model II and III because of multicollinearity with the age at incarceration and multiple variables.

Summary

From the series of logit models constructed, it is apparent that incarceration during the lifespan has great potential to mitigate the development of bonds to marriage and work. Across all models estimated, incarceration remained both a strong and a negative predictor of social bond development. In the marriage model, multiple terms of incarceration also reduced the likelihood of bond attainment; however, the inclusion of the additive incarceration measure did not improve the model fit or explanatory power.

Surprisingly, previous incarceration was not found to be significant in any of the models estimated. Incarceration as an adolescent or young adult had little effect on the development of bond to marriage or work. It appears that individuals were able to overcome the handicap of incarceration in adolescent and early adulthood; however, incarceration in early to middle adulthood mortgaged the respondents' ability to develop positive social bonds. This finding is inconsistent with other research that has identified a strong, negative relationship between youth incarceration and employment, but have not found similar negative effects for adult incarceration (Freeman, 1991; Western & Beckett, 1999).

The importance of lifecourse events in the development of social bonds was also reinforced by the analyses. The reciprocal nature of the social bond development to work and marriage was the most surprising finding of the analyses. Individuals who had been married were significantly more likely to attain fulltime employment. In the same light, employment was significantly associated with marriage.

Military participation was also significant across models; however, the relationship between military participation and social bond development varied by model.

Military participation was positively associated with marriage, but individuals who had participated in the military were less likely to report fulltime employment in 2000. In the marriage model, military participation appears to represent stability and social attachment to a potential mate; thereby, increasing the likelihood of marriage. In relation to employment, military participation removes the individual from the traditional workforce limiting avenues for participation in the mainstream workforce.

Overall, lifecourse events are important in understanding social bond development. None of the demographic, criminal history, or poverty measures had a consistent effect on social bond attainment to marriage or work. Only African American race was a significant predictor of marriage across models. The results of the analyses provide support for the lifecourse theoretical perspective. Although individual, demographic influences were significant predictors in a few of the models, most of the model variation was due to the inclusion of the lifecourse predictors, specifically incarceration, employment, and marriage.

Models of Individuals Change

As stated above, lifecourse events had a consistent and salient effect on social bond attainment to work and marriage. The following analyses further explore the relationship between lifecourse events, demographic influences, and social bonds. First, a series of models were estimated to understand the nature of change in the probability of attainment of bonds to marriage and work over time. These models served to validate the findings of the logit models and to further examine the relationship between incarceration and the attainment of social bonds. The second group of models was

designed to examine the change in the nature and stability of employment over time as measured by tenure with primary employer and number of jobs worked. Together the analyses aid in the understanding of both individual differences at the initiation of the research and the character of change in social bonds over time. The structure of the analyses also allows the researcher to draw conclusions across models as to similarities in salient predictors of social bond attainment. For example, does incarceration affect the likelihood of employment over time, net of controls? In addition, does the predictive model for the probability of employment model differ from that estimated for the tenure with employer dependent measure?

The theoretical questions posed by this research were tested using Hierarchical Linear Modeling (HLM) (Raudenbush & Bryk, 2002). The first part of the following section outlines the statistical technique. The subsequent sections present the results from both the probability of social bond attainment and the nature of employment models.

The HLM Model

Hierarchical Linear Modeling (HLM) was selected as the primary analytic technique for this research. HLM is the most appropriate technique because it allows data from individual periods in the lifecourse to be nested within persons while modeling variation in the outcomes of marriage and work. Traditionally, researchers were forced to either examine the nature of individual change over time without controlling for a number of time-invariant demographic variables (e.g., repeated measures design) or to aggregate individuals into groups to model change. Both methodologies involve

eliminating data points; hence, reducing the power of the statistical model and the validity of the results. HLM is a superior modeling technique in that it allows researchers to study the effect of time-varying covariates on dependent measures while controlling for time-invariant measures. In this model, HLM was used to estimate the relationship between lifecourse events, specifically incarceration, and social bond attainment, net of traditional controls. HLM is also more flexible than traditional longitudinal modeling techniques. For example, the nested structure of the HLM model facilitates the valid estimation of models when both the spacing and the number of observations vary by individual. This functionality of the HLM technique is important for this research in that 65% (968) of respondents could not be interviewed at one or more data collection points during the study period.

The modeling functions for growth curve analysis used in this research were conducted in a manner that is consistent with the techniques proposed by Raudenbush and Bryk (2002:160-204). The general methodology employed in Hierarchical Linear Modeling is presented below.

Estimation of the HLM Model

Level I Model

Growth curve models were estimated on two levels⁹. The first level of the model is a within-individual model and includes repeated measures of individuals. In the current study, individuals were observed yearly and bi-annually and each measurement point represents a data point in the model. Respondents were interviewed a total of

⁹ It is possible to include additional levels in a HLM model. The research questions presented do not warrant the estimation of a third level; hence, the discussion will be limited to the traditional two-level model.

fifteen times over the study period. It is important to note that the individual respondent is not the subject in the Level I model. Instead, the Level I model serves to examine the individual at multiple points in time; hence, the time or interview event is the focus of the Level I model (Cherlin, Chase-Lansdale, & McRae, 1998). The primary goal of the Level I model is to assess the individual trajectory of growth characterized by an intercept and a rate of change (Raudenbush & Xiao-Feng, 2001). A general representation of the Level I model estimated in the following analyses is presented below.

$$\text{Tenure with employer}_{ti} = \pi_{0i} + \pi_{1i} \text{age}_{ti} + \pi_{2i} \text{Incarceration}_{ti} + e_{ti} \quad (1)$$

For each individual in the model, Y_{ti} represents the likelihood of employment, likelihood of marriage, tenure with employer, or the number of jobs worked. Each dependent measure was estimated for each individual i at time t and was modeled in relationship to both growth curve and random error. Models were constructed for $i = 1, \dots, 1,466$ ¹⁰ individuals. The constant for the model is represented by π_{0i} and the slope as π_{1i} . The error term e_{ti} is assumed to have a simple error structure. Error terms estimated for each individual are assumed to be independently and normally distributed with a mean of zero with a variance σ^2 constant across individuals.

The nature of the growth trajectory was modeled using age of the participant (age_{ti}). The age variable in the model was centered using an arbitrary point of reference. For each individual the age measure was calculated using age-21. The centering point of 21 was selected because it represents the midpoint of the age range for the respondents at

¹⁰ Twenty individuals were excluded from the final analyses because they did not report employment at any period in the study; hence, there was zero variation in which to model in the tenure and jobs worked models.

the first phase of data collection for the current study. The age term was centered to aid in the interpretation of the coefficients. In addition, centering the age measure and its squared term reduces the colinearity between the two constructs (Cohen & Cohen, 1983). This modeling technique is common in criminology and the social sciences (e.g. Jang, 1999; Raudenbush & Xiao-Feng, 2001).

In addition to the general model discussed above, a series of time-varying covariates were also included in the Level I model. The variables are dichotomous and represent the presence of a lifecourse event for person i at time j . Five time-varying covariates were included at Level I in the final models presented below. Consistent with the logit models presented above, dichotomous measures of incarceration, employment, marriage, and absence from the workforce were estimated for subject i at time t . In addition to the dichotomous measures, an additional variable was included in the model to examine the cumulative nature of incarceration. The *incarceration count* measure was also calculated for each subject i at time j , and represents the number of time periods the individual was incarcerated prior to the current time period.

The inclusion of time-varying covariates is not commonly used in HLM models. In traditional time-series models, only the polynomial of age or time is included in the Level I model as an indicator of change with the remainder of covariates included in the model at Level II. Integrating covariates at Level I allows researchers to model the time varying effect of a predictor. For example, the addition of incarceration as a time-varying covariate improves on the current incarceration research in that the nature of the imprisonment experience is examined in light of both the presence and the timing of the

event. This modeling technique improves the statistical power of the model, in addition to, the validity of the conclusions that can be drawn from the results.

Level II Model

The Level II model is designed to ascertain the nature of the change in trajectories across the population (Raudenbush, 2001). In the Level II model, the slope and intercept of the Level I variables are included as outcome variables and static factors as the predictors (Johnson et al., 1997). The objective of the Level II model is to identify predictors that are related to the extent of individual differences in both the coefficients for the base rate and the growth curves. The factors included in the second level of the model are time-invariant. The final Level II model is presented below¹¹.

$$\begin{aligned}\pi_{0i} = & \beta_{00} + \beta_{01} (\text{Hispanic}) + \beta_{02} (\text{African American}) + \beta_{03} (\text{male}) \\ & + \beta_{04} (\text{cognitive ability}) + \beta_{05} (\text{high school graduate}) \\ & + \beta_{06} (\text{antisocial behavior}) + \beta_{07} (\text{previous incarceration}) \\ & + \beta_{08} (\text{family poverty}) + r_{0i}\end{aligned}\tag{2}$$

$$\begin{aligned}\pi_{1i} = & \beta_{10} + \beta_{11} (\text{Hispanic}) + \beta_{12} (\text{African American}) + \beta_{13} (\text{male}) \\ & + \beta_{14} (\text{cognitive ability}) + \beta_{15} (\text{high school graduate}) \\ & + \beta_{16} (\text{antisocial behavior}) + \beta_{17} (\text{previous incarceration}) \\ & + \beta_{18} (\text{family poverty}) + r_{1i}\end{aligned}$$

¹¹ Research on propensity scores has suggested that it is most appropriate to include the propensity score at Level II as the sole predictor of the outcome (e.g., Morgan, 2002). In the current analyses, a set of individual-level variables was included at Level II in lieu of the propensity scores. This decision was made to facilitate the discussion of the specific effects of individual variables on the marriage and work outcomes. For example, this modeling decision allowed the author to describe the attainment of work in light of antisocial behavior instead of a representation of propensity. To better examine the validity of the current modeling technique, the final models were replicated using propensity scores. Results are presented in Appendix G and H.

The inclusion of predictors at Level II allows the researcher to estimate the effect of a variable on both the intercept of the line in addition to the slope. In equation 2, a group of predictors were included to represent the effect of demographic influences, human capital, criminal history, and family poverty on an outcome at the beginning of the study and the change the dependent measure as a function of age.

In summary, HLM involves the estimation of models on two levels. Level I represents change in which all covariates are allowed to vary for each time or interview period. The Level II model represents the ‘person’ model; hence, all predictors included are time-invariant (e.g., race) and are incorporated to provide greater context to period-specific change. Because of the multi-level nature of the estimation technique, a number of preliminary models must be constructed before the final model can be estimated. Consistent with traditional HLM methodology (Raudenbush & Bryk, 2002), three preliminary models were estimated for each dependent measure. The following section outlines the general modeling technique used for the preliminary and final models.

Model Estimation

In total, four separate models were estimated for each dependent variable including three preliminary models and the final estimation. The first model constructed was an unconditional base model. The unconditional model includes only the variables included as estimates of individual change. An essential part of the estimation of the base model involves the proper identification of the appropriate coefficients of change. The nature of the growth curve can be determined using theoretical expectations for change in conjunction with graphical analyses of the data. Two measures of growth were included

in the models presented below. In each model, a_{ti} , represents linear growth over time. In select models, an additional variable was included to capture the acceleration or the non-linear change in the growth trajectory. For example, in the likelihood of marriage model, the growth trajectory for the total sample increases dramatically in the first half of the study period and then levels off and even declines. Because of the curvilinear nature of the trajectory, the quadratic function of age a^2_{ti} was included as an estimate of the growth model. The quadratic function of age was also included in the tenure model. The use of the quadratic function to model trajectories of this nature is common in the criminological literature (see Jang, 1999; Raudenbush & Chan, 1992).

The unconditional model also provides estimates of model fit that serve as the baseline for future analyses. First, a reliability coefficient is estimated for the growth parameter(s). The coefficient provides the researcher with an estimation of the ratio of true parameter variability to model error. In addition, a test for homogeneity of the slope and intercept is also conducted. The test involves the use of the χ^2 statistic and identifies significant individual variation in the growth parameters. Together, the model fit estimates can be used to judge the validity of the use of HLM for a specific statistical model. Models with significant variation in the growth parameters and moderate to high estimates of reliability are appropriate to examine using HLM.

The second model estimated is the random-coefficient model, and includes the examination of the nature of the individual variation in the predictors over time. This model tests if the relationship between the time-variant variables and the dependent measures vary across the population of subjects. For example, is the relationship between incarceration and tenure different for individual I at time 3 when compared to

individual 66 at time 4? If variance in the slopes is significantly different than zero, it is assumed that the variation in the time-level slopes is a result of individual differences (Kreft and De Leeuw, 1998, p. 43).

The third preliminary model estimated was the fixed-effect model. All independent, period specific, covariates were considered “fixed” in this model that also serves as the final Level I model. The individual-level variables were used as controls in the final models, so there was little utility in modeling the variation in these variables between individuals. In addition, meaningful variation was not found in the covariates; thus, constraining the variation for these variables improved the efficiency of the model. The age variables were not considered fixed in the preliminary or the final model. In each of the model estimates, there was significant variation in the model fit coefficients; hence, it was important to allow them to vary in all subsequent models.

The final model estimated merges the final Level I model with the demographic, human capital, criminal history, and family poverty indicators as predictors of the slope and intercept. From this model it was possible to ascertain the relative impact of individual-level predictors on social bond attainment, net of the time-variant covariates. Because the Level II model contained a number of variables consistent with the population heterogeneity framework (e.g. cognitive ability), the estimation of the final model allowed the researcher to understand the relative predictive power of variables associated with the population heterogeneity framework, net of predictors associated with the state dependence theory. For example, does cognitive ability have a significant effect on the change in both the base rate and the likelihood of employment over time, even after controlling for salient life events?

Likelihood of Attainment of Social Bonds to Marriage and Work

As found in the logit models, incarceration had a significant, negative effect on social bond attainment. The following models expanded on the logit models by examining the change in likelihood of marriage and fulltime employment over the lifecourse. The importance of examining social bond attainment in a longitudinal manner has been reinforced in the literature. Researchers have found that incarceration can have a dramatic initial effect on employment, but that the impact of the event subsides over time (Western, 2002). The opposite appears to be the case for marriage. Laub, Sampson, and Nagin (1998) found that the deterrent effect of marriage was initially weak, but gradually grew in strength over time.

Model Estimation

Consistent with traditional HLM methodology, three general statistical models were estimated for each of the dependent variables. It is important to note, that the following estimation techniques diverged from that of traditional HLM methodology. A linear model was not appropriate for the test of this hypothesis due to the binary nature of the dependent variable. Instead, the Bernoulli probability model was used to estimate the likelihood of marriage and employment.

The first equation estimated was the unconditional model; however, before the final base model can be estimated it was important to examine the nature of the growth parameters. In the employment model, the pattern of growth approximated a linear

pattern; therefore, the centered age measure was included in the model as an estimate of change¹² (see Figure 3).

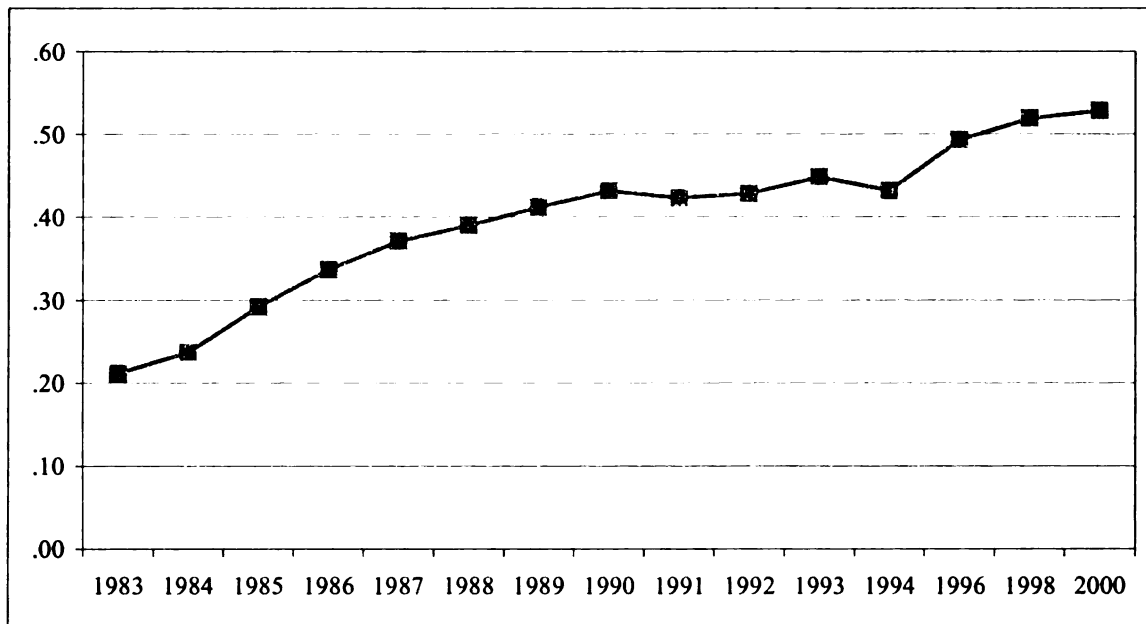


Figure 3. Likelihood of Employment 1983-2000 (N=1,466)

The growth trajectory for the marriage dependent measure was not linear (see Figure 4). Instead, the likelihood of marriage increased rapidly for the first six years of the study period and then increased slowly. This finding is not surprising in that most people enter into marriage in their 20's and there are fewer people that enter into marital relationships later in life. Because of the acceleration in the dependent measure, the centered age variable was included as a measure of linear growth and the quadratic function of this variable was used to estimate acceleration.

¹² In all four models, individual growth trajectories were also graphed to ascertain the true nature of change over time. Each of the individual figures further validated the nature of change as suggested in the aggregate graphs.

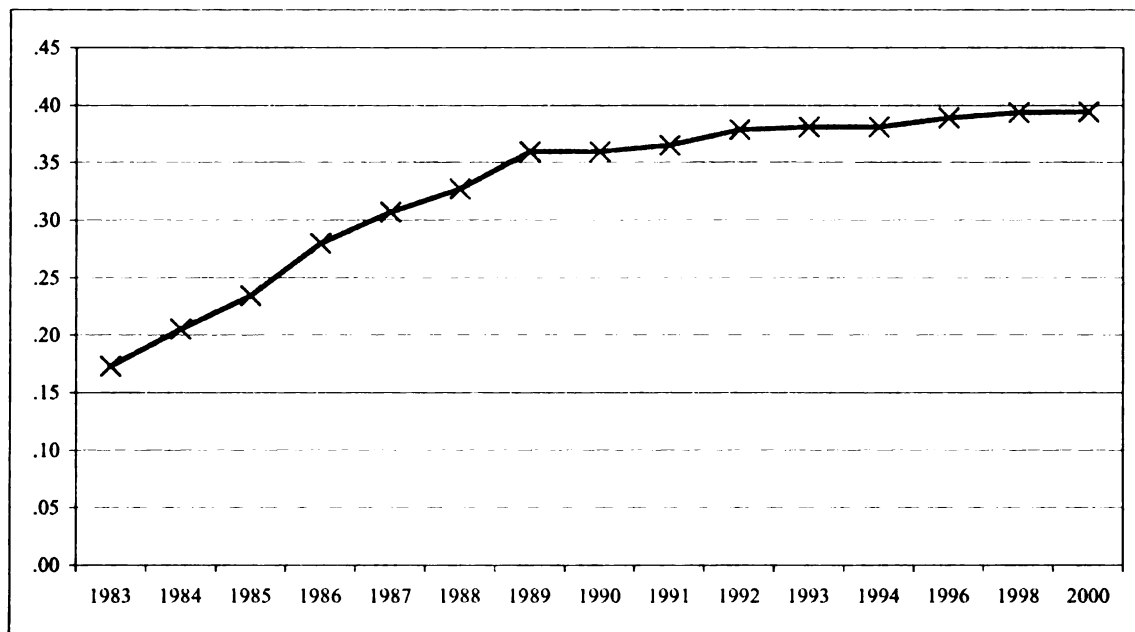


Figure 4. Likelihood of Marriage 1983-2000 (N=1,466)

Now that the general form of the model has been designated, it is important to consider the reliability and variability of the coefficients. As shown in Table 23, the reliability estimate of the sample mean for marriage and employment was very high. The sample mean for marriage was $>.79$ and $>.82$ for employment. Both dependent measures are appropriate indicators of the sample mean. Finally, the variability of the coefficients was estimated using the homogeneity of variance test. For both models, significant differences were found in the average likelihood of marriage and employment. Because of the variability in the initial statuses and growth rate of participants, the use of HLM was an appropriate technique for addressing the hypothesis proposed.

Table 22. Variance Components for Random Effects - Likelihood of Marriage and Work Models

	<i>Unconditional Model</i>			<i>Conditional Model</i>		
	Reliability	Variance	X ²	Reliability	Variance	X ²
<i>Marriage</i>						
Intercept	0.79	6.80	7,924.13***	0.75	5.80	7,103.84***
Age	0.33	0.33	2,130.87***	0.31	0.31	1,997.26***
(Age) ²	0.23	0.00	1627.14**	0.22	0.00	1,587.30*
<i>Work</i>						
Intercept	0.82	2.61	7,498.33***	0.66	1.19	4,633.63***
Age	0.43	0.02	2,826.07***	0.25	0.01	1,937.27***

*p<0.05 **p<0.01 ***p<0.001 (two-tailed tests)

Next, two random-coefficient models were estimated (results not shown).

Significant variation was not found in any of the time-varying covariates included in both models estimated; therefore, they were considered fixed in the final models. In addition, a separate random coefficient model for the dichotomous incarceration measure was estimated. Even in the reduced model, the effects of incarceration on marriage and work did not vary significantly by individual. The incarceration event had the same effect for an individual imprisoned at age 25 as it did for someone aged 35 and incarcerated in 2000. This is an important finding in that the researches within the lifecourse perspective have argued that lifecourse events are embedded in social institutions and are subject to historical change (e.g., Elder, 1985). Based on this assumption, one would expect that the effect of incarceration, or a similar event like marriage, would change over time. This was not the case with the current analyses and warrants further examination.

The third model estimated was the fixed-effects model. This model is similar to the random-coefficient model, although in the fixed-effects models, occasion of measurement-level slopes were constrained to be constant across individuals. In this model, the lifecourse event variables were modeled on the intercept and slope across individuals. The model fit predictors were allowed to vary in this and the final model.

As shown in Table 23, incarceration was a significant predictor of both the likelihood of employment and marriage. Individuals who were incarcerated at least one time during the study period were significantly less likely to attain a bond to marriage or work. In fact, individuals who had been incarcerated were approximately 30% less likely to be married and 34% less likely to be employed fulltime. The cumulative number of incarceration events was also significantly associated with a reduced likelihood for employment but had no effect on marriage.

Marriage was also positively related employment; likewise, work was a significant predictor of marriage. Judging from the standardized coefficients, it appears that effect of work on marriage is larger than that of marriage on work. Being married increased the log odds of employment by 1.63, but employment only increased the log odds of being married by 1.16.

The remainder of the lifecourse event predictors had disparate effects on the attainment of bonds to work and marriage. In both models, military participation was strongly related with the likelihood of social bond attainment; however, the effect was positive for the marriage model and negative for the employment model. Individuals who had served in the military were significantly more likely to be married but less likely to be employed. In the work model, the effect of military participation far outweighed

the influence of incarceration on social bond development. Military participation reduced the likelihood of employment by 78%; incarceration was associated with a subsequent reduction of 34%. Absence from the workforce also had a strong negative effect on employment. Individuals who had been absent from the workforce at any point were approximately 80% less likely to become employed.

Consistent with the hypothesis presented, incarceration reduced the likelihood of attaining bonds to marriage and work. In reference to marriage, lifecourse events that tie individuals to conventional social institutions, like work and the military, increase the likelihood of marriage. For the employment model, positive social bonds to marriage can also improve the likelihood of social bond attainment (e.g., marriage); yet, events that remove the individual from the traditional employment pool reduced the probability of employment quite dramatically.

In addition, it appears that the Level I predictors, taken together, are better able to explain variation in the likelihood of marriage than work. The Nagelkerke R^2_L for the work model was 0.34; whereas, lifecourse events only explained 12% of the variation in the likelihood to develop bonds to marriage. This finding is surprising in light of the results from the dichotomous logit models. The pseudo- R^2 measures for the two social bond development models were nearly identical at 0.26. Not only did the HLM employment model explain more individual variation than the marriage model, it also accounted for more variation than either of the logit models, using less than half the number of variables. By using HLM to estimate the variability in lifecourse events over time, the power of the model to explain variance has been enhanced, especially for the dichotomous employment model.

Table 23. Fixed Effects of Occasion of Measurement Variables on Likelihood of Attainment of Social Bonds (N =19,823)

	Marriage			Work		
Independent Variable	β	SE	Exp(B)	β	SE	Exp(B)
Intercept	-0.70***	0.07		-0.15**	0.04	
<i>Lifecourse Events</i>						
Incarceration	-0.36***	0.08	0.70	-0.41***	0.09	0.66
Incarceration Count	-0.07	0.04	0.93	-0.22***	0.03	0.80
Marriage	--		--	0.49***	0.05	1.63
Work	0.15***	0.04	1.16	--		--
Military	0.37*	0.18	1.45	-2.09***	0.19	0.12
Absence from Workforce	-0.06	0.05	0.94	-1.60***	0.05	0.20
<i>Model Fit</i>						
Age	0.12***	0.02	1.23	0.10***	0.00	0.90
Age Squared	-0.00***	0.00	1.00	--		--
Variance Explained at Level I	14% ¹³			34%		
*p<0.05 **p<0.01 ***p<0.001 (two-tailed tests)						

Results from the final model are presented in Table 24. The purpose of this model was to test if the relationship between lifecourse events, marriage, and work were maintained after individual-level controls had been added. Does incarceration remain a significant predictor of employment and marriage even after controlling for criminal

¹³ The proportion of variance explained for both the marriage and work dichotomous models was developed using the Nagelkerke R^2_L . The Cox & Snell coefficients for the work and marriage are 0.25 and 0.10 respectively. Because of the experimental nature of the pseudo- R^2 coefficients, it is important to interpret the variance estimates with a great deal of caution. The coefficients should be used to provide a general estimate of the variance explained and should not be used to make general statements regarding the generalizability of the model.

history and demographic factors? A set of eight fixed-effect predictors at Level II was included in the model. It was hypothesized that the predictors were related to both the initial status and the growth rate.

There were substantial differences in the estimated models for the work and employment dependent variables. In the work model, human capital, criminal history and context influences had the largest effect on the initial likelihood of employment. Male, high school graduates with high AFQT test scores had a significantly higher probability of employment at the outset of the study; whereas, previous incarceration, antisocial behavior, and family poverty reduced the base rate of employment. Gender and education had particularly strong effects on the initial likelihood of employment. Males with high school diplomas were nearly 1.5 times more likely to have been employed at the onset of this study when compared with females and individuals who did not complete high school.

Collectively, criminal history predictors reduced both the probability of employment at the onset of the study and negatively affected the growth in the likelihood of work over time. Previous incarceration had the largest effect on the initial status of participants. Individuals who had experienced a stay of incarceration prior to the study period were 40% less likely to be employed in 1983. Previous incarceration also had a significant effect on the rate of growth over time, but the strength of the relationship was very small. Participation in antisocial behavior also reduced the initial likelihood of employment by 34%; but a similar relationship was not found between the variable and the rate of change over time. The coefficient for the previous incarceration was opposite of what would be expected. Individuals who were incarcerated prior to the study were

actually more likely to attain employment over time. Even though the effect was very small, the finding is surprising in light of the current literature on this topic. Further examination of this phenomenon is needed.

African American race and antisocial behavior were the only significant predictors in the marriage model. African individuals had a 43% lower chance of being married at the onset of the study; whereas, participation in antisocial behavior reduced the likelihood of employment by 34%. In fact, antisocial behavior had a much stronger effect on the initial likelihood of marriage than for work. None of the demographic, human capital, criminal history or context influences were significant predictors of the nature of change over time for the marriage model.

As a whole, the demographic, criminal history, and contextual factors explained a moderate amount of variation in parameter variance at the initial status. In the marriage model, a total of 17% of the parameter variance in the intercept was explained by the variables, and 20% of the variance in initial status was explained in the work model. Very little variance was explained by the variables for the estimates of the slope. The variables, as a whole, explained about five percent of the variation in the slope for the marriage indicator and less than one percent for the work model. It appears that the static-individual level predictors did have some effect on the initial work and marriage statuses of the sample, but the variables taken together explained little variation in the rate of change.

Table 24. The Effects of Individual-Level Variables on Likelihood of Marriage and Employment (N = 1,466)

Independent Variable	Marriage			Work		
	β	SE	Exp(B)	β	SE	Exp(B)
Intercept	-0.13	0.21		-0.80***	0.12	
Hispanic	-0.06	0.18	0.94	-0.05	0.10	0.95
African American	-0.56**	0.17	0.57	0.08	0.09	1.08
Male	-0.25	0.15	0.78	0.47***	0.08	1.60
Cognitive Ability	0.00	0.00	1.00	0.01***	0.00	1.01
High School Graduate	0.02	0.14	1.02	0.35***	0.08	1.42
Antisocial Behavior	-0.41**	0.13	0.66	-0.17*	0.07	0.84
Previous Incarceration	0.09	0.22	1.09	-0.52***	0.12	0.59
Family Poverty	-0.23	0.13	0.79	-0.25**	0.07	0.78
Slope	0.09**	0.03		0.12***	0.01	
Hispanic	0.00	0.02	1.00	-0.01	0.01	0.99
African American	-0.01	0.02	0.99	-0.01	0.01	0.99
Male	0.02	0.02	1.02	-0.01	0.01	0.99
Cognitive Ability	0.00	0.00	1.00	0.00	0.00	1.00
High School Graduate	0.02	0.02	1.02	-0.01	0.01	0.99
Antisocial Behavior	-0.01	0.02	0.99	-0.00	0.01	1.00
Previous Incarceration	-0.02	0.02	0.98	0.03*	0.02	1.03
Family Poverty	-0.02	0.02	0.98	0.01	0.01	1.01
Variance Explained at Level II - Initial Status ¹⁴	17%			20%		
Variance Explained at Level II – Growth Rate	5%			<1%		
*p<0.05 **p<0.01 ***p<0.001 (two-tailed tests)						

¹⁴ The proportion of variance explained is the difference between the total parameter variance obtained from the unconditional model and the residual parameter variance from the fitted model divided by the total parameter variance (Raubenbush & Bryk, 2002:168).

Finally, it is important to consider the results from the Level II models in light of the Level I predictors that are also included in the model. The coefficients for the Level I model (see Table 25) remained relatively unchanged as a result of the inclusion of the Level II predictors. Even after including a host of individual factors in the model, the time-varying covariate predictors remained significant predictors of the likelihood of employment and marriage. In the same light, the relationship between early antisocial behavior, incarceration, and the social bonds were maintained even after controlling for lifecourse events at the event level. It is also important to note that, in the employment model, the Level II predictors accounted for substantially less variation when compared with that of Level I factors. In the marriage model, Level II predictors explained nearly the same amount of variation as the Level I variables.

The results from this analysis confirm the theoretical propositions presented by lifecourse researchers. Negative life events in early adolescence, like drug use and crime, can initially close doors to future opportunities like employment and marriage. However, judging from the explained variance for the estimates of the slope, individual traits have little effect on the subsequent change in the likelihood of bond development over time. In contrast, the lifecourse event variables, especially in the employment model, explained a considerable proportion of the total model variation. Static predictors aided in determining the initial status of an individual, but life events were more efficacious in explaining variation over time.

Table 25. Fixed Effects of Occasion of Measurement Variables on Likelihood of Attainment of Social Bonds – Level II (N =19,823)

Independent Variable	Marriage			Work		
	β	SE	Exp(B)	β	SE	Exp(B)
<i>Lifecourse Events</i>						
Incarceration	-0.34***	0.08	0.71	-0.43***	0.09	0.65
Incarceration Count	-0.04	0.04	0.96	-0.22***	0.03	0.80
Marriage	--		--	0.48***	0.05	1.62
Work	0.15***	0.04	1.16	--		--
Military	0.41*	0.18	1.51	-2.28***	0.18	0.10
Absence from Workforce	-0.07	0.05	0.93	-1.66***	0.06	0.19
<i>Model Fit</i>						
Age	0.09**	0.03	1.09	0.12***	0.01	1.13
Age Squared	-0.00***	0.00	1.00	--		--

*p<0.05 **p<0.01 ***p<0.001 (two-tailed tests)

Nature of Employment

The purpose of the following analyses was to examine the relative effect of incarceration on the nature and stability of employment. Consistent with social bond theory, it is important to understand the strength and nature of social bonds. The research presented to this point has only focused on the attainment of bonds; however, researchers have suggested that it is not the bond per se that mitigates involvement in negative behaviors (e.g., delinquency, drug use). It is the capital and the informal social control that is derived from a strong and involved bond that increases the likelihood of both the

initiation of a criminal career and desistance from criminality and other problem behaviors (Coleman, 1988, 1990; Sampson & Laub, 1993).

The statistical models estimated for the following analyses varied from those used in the binomial change models. Both dependent variables, tenure with primary employer, and number of jobs worked represent counts of an event; hence, the binomial and traditional OLS algorithms used in HLM are inappropriate. In conventional HLM methodology Ordinary Least Squares regression is used; however, OLS assumes that random errors are independent, normally distributed, and have constant variance (Bryk & Raudenbush, 1992:15). In both sets of models, the assumption was violated. The distribution for both tenure with employer and number of jobs worked were highly skewed. Significant overdispersion of the dependent variables violated the OLS assumptions. An overdispersed Poisson model was used instead of the default OLS model in this analysis to compensate for the distribution of the dependent variables. Overdispersed Poisson models calculate a factor to correct the inferential statistics; therefore, statistical reliability is not compromised (Gardner, Mulvey, & Shaw, 1995).

The first task in the estimation of an HLM equation is the delineation of the most appropriate growth model. The aggregate growth models for the tenure and jobs worked model are presented in Figures 5 and 6. As shown, the growth rate for the tenure model was not linear (see Figure 5). The growth rate increased quickly for the first four to five time periods, then lags, and increases again during the last fourth of the time period. The non-linear growth curve is further confirmed when individual growth trajectories are examined (not shown). To account for the non-linear growth in the dependent measure, two variables were included in the model as estimates of change. The centered age

variable was included to capture linear growth; whereas, the quadratic form of age was used to model non-linear acceleration.

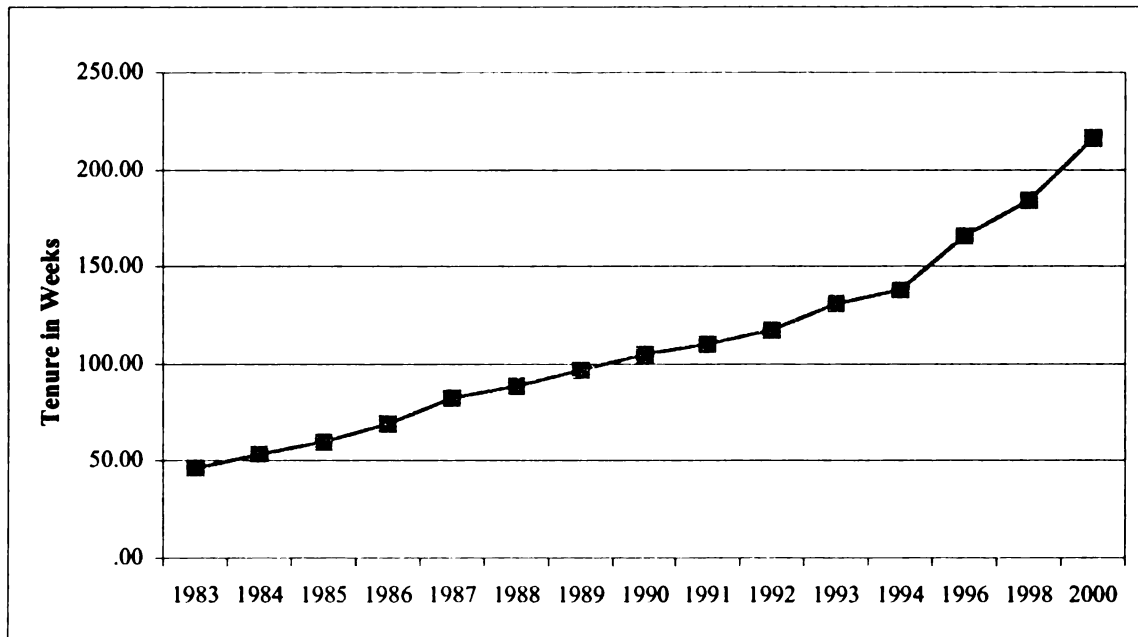


Figure 5. Tenure with Primary Employer 1983-2000 (N=1,466)

As presented in Figure 6, the rate of growth for number of jobs worked was linear. Because of the nature of the trajectory, only the age variable was included in the model as an estimate of growth.

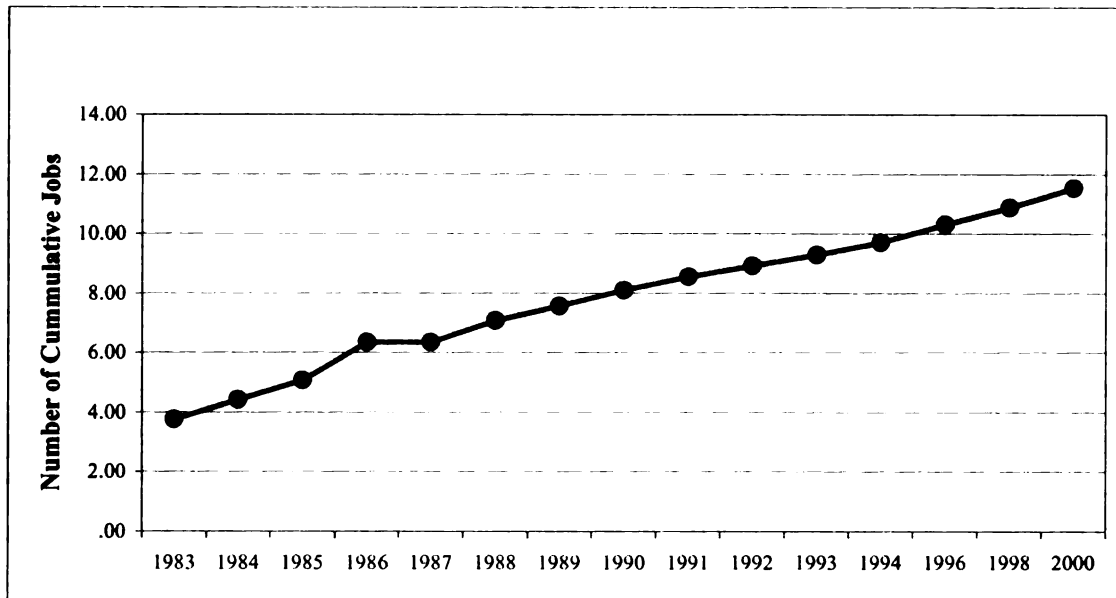


Figure 6. Number of Jobs Worked 1983-2000 (N=1,466)

Now that appropriate growth models have been determined, it is important to examine the reliability and variation in the coefficients for the base, unconditional model. As evidenced in Table 26, there was significant and reliable mean variation in both the estimates of the slope and intercept. The reliability estimates of the intercept and slope predictors were high with 0.99 for the intercept, 0.85 for the age predictor, and 0.79 for the quadratic measure. For the number of jobs worked, the reliability estimate for the intercept was 0.96 and 0.41 for age. The homogeneity test was also significant for both the slope and the growth rate. Based on these statistics, it is possible to conclude that individuals vary significantly in their tenure with employer and the number of jobs worked at the beginning of this study. In addition, there was also sufficient variation in the mean growth rates among sample members. Judging from the estimates presented in Table 25, it was valid to proceed with the analyses using HLM.

Table 26. Variance Components for Random Effects for Nature of Employment Models

	<i>Unconditional Model</i>			<i>Conditional Model</i>		
	Reliability	Variance	X ²	Reliability	Variance	X ²
<i>Tenure</i>						
Intercept	0.99	1.67	1,119,617***	0.99	1.49	958,861***
Age	0.85	0.03	20,227.53***	0.85	0.03	20,165.1***
(Age) ²	0.79	0.00	12,423.45***	0.79	0.00	12,566.9***
<i>Jobs</i>						
Intercept	0.96	0.37	54,542.46***	0.96	0.33	48,269.6***
Age	0.41	0.00	2,681.31***	0.40	0.00	2,572.39***

*p<0.05 **p<0.01 ***p<0.001 (two-tailed tests)

Consistent with findings from the dichotomous growth curve models, all of the time-varying covariates were considered fixed in each of the following tenure and jobs worked models. In the random-coefficient analyses (not shown), significant variation in the time-varying covariates was not found. The effect of incarceration did not vary by individual. The incarceration event had the same effect on the nature of employment for individual incarcerated in 1983 or in 2000. The model fit estimates were allowed to vary in all of the models.

The results of the fixed effect models are presented in Table 27. Although the tenure and jobs worked variables were designed to reflect the stability of employment by the respondents, the predictive models vary substantially. The findings obtained from the tenure model are very similar to that of the logit and HLM employment models.

Confirming the hypothesis presented, both the dichotomous and additive incarceration measures of incarceration were significant, negative predictors of tenure. The strength of the relationship between incarceration and tenure was moderately low. In fact, the

dichotomous incarceration measure played a larger role in the likelihood of work model than in the tenure model. The standardized coefficient for incarceration was 0.65 in the dichotomous employment model and 0.90 in the tenure model.

Marriage and participation in the military were both significant predictors for the tenure model. Consistent with the results from the likelihood of employment models, married respondents were more likely to maintain long-term relationships with employers, and enlistment in the military further reduced the length of tenure with employer. The relative size of the standard coefficients for the marriage and military predictors was relatively small for the tenure model, in comparison to the likelihood of employment model. Contrary to the findings from the dichotomous employment model, absence from the workforce was not significantly associated with employee tenure.

Participation in the military and absence from the workforce were the only significant predictors of the number of jobs worked. Individuals who had been absent from the workforce or participated in the military reported a smaller number of unique employment experiences. Although the explanatory power of both variables was small, military participation was the strongest predictor in the jobs worked model. Participation in the military reduced the number of jobs worked by 11%.

Interestingly, both the dichotomous and additive incarceration predictors were not significantly associated with the number of jobs worked. It appears that while incarceration reduced the likelihood of employment and the opportunity to build long-term bonds with an employer, incarceration did not impact the number of unique job experiences.

Table 27. Fixed Effects of Occasion of Measurement Variables on Nature of Work Dependent Variables (N =1,466)

Independent Variable	Tenure with Employer			Number of Jobs Worked		
	β	SE	Exp(B)	β	SE	Exp(B)
Intercept	0.06***	0.03		2.07***	0.02	
<i>Lifecourse Events</i>						
Incarceration	-0.10***	0.01	0.90	0.02	0.01	1.02
Incarceration Count	-0.16***	0.00	0.85	-0.00	0.00	1.00
Marriage	0.03***	0.00	1.03	0.01	0.01	1.01
Military	-0.11***	0.02	0.90	-0.23***	0.03	0.79
Absence from Workforce	-0.01	0.00	0.99	-0.07***	0.01	0.93
<i>Model Fit</i>						
Age	0.31***	0.00	1.36	0.05***	0.00	1.05
Age Squared	-0.01***	0.00	0.99	--	--	

***p<0.001 (two-tailed tests)

Results from the two full hierarchical models are presented in Table 28. The goal of these analyses was to test the effects of demographic, human capital, criminal history, and contextual influences on both the base rate of tenure with employer and the number of jobs worked during the study period and the change in the nature of the bonds over time.

The Level II models estimated for the jobs worked and tenure with employer dependent variables were very different. Human capital and criminal history predictors were the most significant predictors of both the intercept and the rate of growth for the tenure model. Males and high school graduates and individuals with a high AFQT score

had a higher initial tenure measure; whereas, family poverty and antisocial behavior negatively affected the initial starting point for the tenure measure. Although all but two of the variables were significant predictors of the intercept, the predictors accounted for very little variance as a whole. Together, the variables explained only 11% of the variation in the slope.

In addition, females and African American individuals and respondents with a high AFQT score were most likely to report a positive growth in tenure over time; however, the predictive power of the variables was very low. The standardized coefficients for these variables range from 0.99 to 1.03. Together, the variables explained less than one percent of the variation in the slope.

Previous incarceration was also found to be a significant predictor of both the intercept and the slope in the tenure model. Individuals who had experienced incarceration prior to the study period reported less established relationships with their employer at the onset of this study. In fact, previous incarceration reduces initial tenure with employer by 33%. Surprisingly, incarceration at an early age increases the likelihood of positive growth in tenure with employer. Although the relationship is quite weak, this finding is contrary to the findings from established research studies and the current work. Future examination of this relationship is needed.

The original hypotheses were not confirmed for the number of jobs worked model. It was expected that individuals who had experienced a stay of incarceration would be more likely to have transient work experiences and move from job to job. This was not the case. Neither the additive of the dichotomous measures of incarceration were significantly associated with number of jobs worked. Instead, demographic influences

played the largest role in this model. Minority females reported the lowest number of jobs worked at the beginning of the study. In contrast, respondents who indicated participation in antisocial behaviors reported a high number of unique employment experiences at the onset of the study. The predictive power of these variables was very low, only nine percent of the variation in the slope coefficients could be accounted for with these variables.

In reference to the growth in employment experiences over time, Caucasian respondents with a high school diploma and elevated AFQT scores were significantly less likely to experience a substantial increase in the number. Similar to the tenure model, inclusion of the predictors of the slope added little to the study. The individual predictors explained only six percent of the variation in the slope for the jobs worked model.

Table 28. The Effects of Individual-Level Variables on Nature of Work (N = 1,466)

Independent Variable	Tenure with Employer			Number of Jobs Worked		
	β	SE	Exp(B)	β	SE	Exp(B)
Intercept	5.88***	0.11		1.89***	0.05	
Hispanic	0.07	0.09	1.07	-0.09*	0.04	0.91
African American	0.06	0.09	1.06	-0.15**	0.04	0.86
Male	0.31***	0.08	1.36	0.23***	0.04	1.26
Cognitive Ability	0.01**	0.00	1.02	-0.00	0.00	1.00
High School Graduate	0.29***	0.07	1.34	-0.00	0.04	1.00
Antisocial Behavior	-0.16*	0.07	0.85	0.20***	0.03	1.22
Previous Incarceration	-0.40**	0.12	0.67	0.07	0.05	1.07
Family Poverty	-0.32***	0.07	0.73	0.01	0.03	1.02
Slope	0.30***	0.01		0.06***	0.00	
Hispanic	0.01	0.01	1.02	0.00	0.00	1.00
African American	0.02**	0.01	1.02	0.01**	0.00	1.02
Male	-0.01*	0.01	0.99	-0.00	0.00	1.00
Cognitive Ability	0.00**	0.00	1.00	-0.00*	0.00	1.00
High School Graduate	0.01	0.01	1.02	-0.00**	0.00	1.00
Antisocial Behavior	-0.00	0.00	1.00	-0.00	0.00	1.00
Previous Incarceration	0.03***	0.01	1.03	-0.00	0.00	1.00
Family Poverty	-0.01	0.01	0.99	0.00	0.00	1.00
Variance Explained at Level II – Initial Status		11%			9%	
Variance Explained at Level II – Growth Rate		<1%			6%	
*p<0.05	**p<0.01	***p<0.001 (two-tailed tests)				

Like the previous growth curve models presented, inclusion of the Level II predictors in the model did little to change the Level I coefficients (see Table 29). Even after controlling for demographic influences, absence from the workforce and military participation remained significant predictors of number of jobs worked. Incarceration, marriage, and military participation endured as significant predictors of tenure with employer.

Table 29. Fixed Effects of Occasion of Measurement Variables on Nature of Work Dependent Variables – Level II (N =1,466)

Independent Variable	Tenure with Employer			Number of Jobs Worked		
	β	SE	Exp(B)	β	SE	Exp(B)
<i>Lifecourse Events</i>						
Incarceration	-0.10***	0.01	0.90	0.01	0.01	1.01
Incarceration Count	-0.16***	0.01	0.85	-0.01	0.00	0.99
Marriage	0.03***	0.00	1.03	0.02*	0.01	1.02
Military	-0.11***	0.01	0.90	-0.25***	0.03	0.78
Absence from Workforce	0.01	0.00	1.01	-0.07***	0.01	0.93
<i>Model Fit</i>						
Age	0.30***	0.01	1.35	0.06***	0.00	1.06
Age Squared	-0.01***	0.00	0.99	--	--	

***p<0.001 (two-tailed tests)

Summary

In Chapter 3, three specific research questions were outlined. The relevant results for each question posed are presented below. First, the relationship between incarceration and social bond development was considered. Specifically, were incarcerated sample members able to develop social bonds to work and marriage and how did the development of bonds among the incarcerated group vary from that of a similarly situated group that did not experience incarceration? Apart from the number of jobs worked model, incarceration was a significant, negative predictor of both the likelihood of social bond attainment and the nature of the bond developed. The strength of the relationship between incarceration and social bond outcomes was found to vary by model. Judging from the standardized coefficients, it appears that incarceration had a stronger effect on the likelihood of work and marriage than in the nature of the bond models. Incarceration reduced the likelihood of employment and marriage by nearly one third in both the logit and dichotomous growth curve models, but the relationship was very weak for the nature of marriage and tenure with employer models. The current research highlights the negative effect that incarceration can have on opportunities to develop bonds. That said, once an individual has attained the bond, the stability or nature of the bond is not reduced substantially as a result of the incarceration event.

The relationship between previous incarceration and social bond attainment was not as strong when compared to the effect of adult imprisonment. In fact, the relationship between incarceration that occurred before the study period and marriage was not significantly significant, in either the dichotomous or nature of bond models. Previous incarceration did have a moderate effect on employment outcomes, especially in the

growth curve models. Individuals who had been incarcerated prior to the study period were nearly 40% less likely to report bonds to work at the onset of the research and tenure with employer was reduced by nearly a third at the initiation of the research as a result of this event. Prior incarceration was also significantly related to the growth in both the likelihood of attainment and the stability of employment overtime; however, the relationship between the variables was contrary to what was hypothesized. Individuals who had been incarcerated prior to the study period had significantly more growth in the likelihood and stability of employment over time, although the relationship was quite weak. It may be that growth in the parameters over time serves to compensate for the disadvantage posed by previous incarceration on the initial employment status of the individual, but this theory cannot be validated with the available data.

The findings from the present analyses augment the current incarceration literature. Consistent with prior research, incarceration at an early age does appear to close doors to adult employment opportunities, at least initially (Fagan & Freeman, 1999; Grogger, 1995). However, the effect of previous incarceration does not have a strong effect on change in the nature and likelihood of bonds over time. The effect of previous incarceration on the slope for the tenure and dichotomous work models was very small and in the opposite direction than was hypothesized. Incarceration during the study period did have strong enduring effects on the change in the likelihood and the nature of bonds to work over time. Individuals who were incarcerated during the study period were less likely to attain bonds to marriage and work and the quality of the social bonds developed were also diminished.

The second goal of the research was to understand the relative effect of incarceration on social bond development in relationship to both lifecourse event variables and demographic controls. For example, can incarceration outweigh the effect of marriage or educational attainment? In the logit and growth curve models, incarceration remained a significant, negative predictor of social bonds to marriage and work even after controlling for a host of individual, static predictors (e.g., race). Antisocial behavior was the only individual demographic predictor that was consistently related to both the attainment and quality of social bonds. Individuals who had reported delinquency or drug use prior to the study were significantly less likely to attain social bonds to work or marriage and the quality of the social bonds developed were reduced as result of the behavior. African American race was the only predictor consistently related to marital outcomes. African American respondents were significantly less likely to be married, but once the bond had been achieved, they were more likely to report a positive growth in the bond over time. Not surprisingly, deficits in human capital (e.g., cognitive ability, high school education) identified prior to the study were also associated with a lower likelihood and stability of work. The findings from the analyses highlight the importance of certain individual traits, like cognitive ability, in understanding the attainment of social bonds. Although, the significant, negative effect of static factors on social bond outcomes were not permanent. Individual, time invariant factors were only found to be significant predictors of the initial status and were not associated with change over time.

Together, the lifecourse event variables were consistently related to both social bond development and stability. Except for the number of jobs worked model,

employment and marriage, as exogenous predictors, were significant, positive predictors of both the attainment and nature of marriage and work. Individuals who were employed were more likely to develop bonds to marriage; conversely, respondents who reported being married had an increased likelihood of subsequent employment. Even though the relationships were relatively weak, the findings highlight the importance of considering multiple lifecourse event indicators when studying social bond outcomes. Even in the analyses that involved only the incarcerated group, employment and marriage remained significant, further highlighting the impact that life events can have on social bond development.

Military participation also played a substantial role in the models, although the effect of the predictor varied by dependent measure. Military participation increased the likelihood of obtaining and achieving a stable marriage, but the opposite relationship was found for the employment models. Absence from the workforce was also a significant, negative predictor in all of the employment models. The military represents an important social institution; hence, it would be expected that participation would increase social capital and the likelihood of obtaining social bonds. The hypothesized relationship holds true for marriage, but it appears that any event or institution (e.g. absence from work) that removes the individual from the traditional workforce will affect employment. Taken as a whole, the findings speak to the importance of social events in understanding both the likelihood of obtaining bonds and the nature of change in social relationships over time.

Finally, the research was designed to consider if the timing of the incarceration event differentially affected the likelihood of developing bonds to work and marriage, and if the nature of the bonds were diminished over time as a result of the event.

Surprisingly, the timing of the incarceration event was not significantly related to the nature or development of social bonds in any of the models estimated. In the dichotomous logit models, a predictor of age at first incarceration was included in a subgroup analysis of the incarcerated sample, but this predictor was not significantly related to attainment of marriage or fulltime employment in 2000. In the HLM models, a preliminary, random-coefficient model was estimated. This model allowed the researcher to test if the effect of incarceration on marriage and work varied by person. In the dichotomous and nature of work models, the effect on incarceration did not vary by person. For example, the effect of incarceration on the likelihood of marriage for a subject who was incarcerated in 1983 is not different from someone who was incarcerated in 1998. Because the timing of the event is an important topic for consideration under the lifecourse framework, further research on this topic is warranted.

The research was also developed to test if the likelihood of attainment and nature social bonds was further reduced for individuals who had experienced multiple stays of incarceration. Multiple terms of incarceration did reduce the likelihood of marriage in 2000, but a similar relationship was not found in the employment model. The effect of multiple terms of incarceration further reduced the likelihood of obtaining fulltime employment, but had no effect on the probability of marriage. It does appear that multiple terms of incarceration can reduce the likelihood and nature of social bonds to marriage in some manner, but the relative effect varies across models.

Chapter 5: Conclusions

The difficulty in integrating individuals back into society following a stay of incarceration has challenged the criminal justice system since the inception of penal confinement. The issue of prison reentry has once again entered the political arena due to changes in the nature of incarceration. Never before have more people been incarcerated (Beck et al., 2002). On average, terms of incarceration are also increasing. In 1990 inmates served on average 28 months before being released; whereas, inmates released from prison in 1999 served a total of 34 months prior to release (Hughes, Wilson, & Beck, 2001). More importantly, the current criminal justice system has few resources to address the needs of this population. Most offenders are not avowed of services while imprisoned (Lynch & Sabol, 2001). Once released, offenders often get little supervision or guidance. Parole caseloads have almost doubled in the last three decades. An average caseload in 1970 included 45 parolees; today, most caseloads have risen to about 70 (Petersilia, 2000). Large caseloads do not facilitate effective supervision of parolees; nor, is the parole officer able to effectively link the offender with needed services. Under the current conditions, prison remains a revolving door.

The costs of imprisonment and subsequent reentry are very high. State prison expenditures have risen dramatically. Spending on corrections increased nearly five fold in 15 years. In 1982, total prison expenditures totaled \$9 billion in 1982 and rose to \$44 billion in 1997 (BJS, 2001). Economic costs are not the only consequence of rising incarceration rates; imprisonment also exacts costs on the community. For example, reentry has collateral consequences on the family. More than half of all men incarcerated

have at least one child; approximately eighty percent of incarcerated women are mothers of young children with the majority being under the age of 10 (Snell, 1994).

In light of the dramatic rise in incarceration over the past twenty years and the collateral consequences that this event can have on the community, there has been a heightened demand for programming that promotes successful reintegration (Petersilia, 2001). Reducing the number of individuals returned back to prison each year could alleviate some of the economic burden placed on state and local governments to house such a burgeoning population. In addition, developing programming that is designed to facilitate long-term reintegration could have far-reaching benefits for prisoners, their families and communities (Travis, Solomon, & Waul, 2001).

Despite the possible social and economic advantages of promoting successful reentry, most of the research conducted to date on prisoner reentry has centered on the study of recidivism (e.g. Gendreau et al., 1996). Although important, this research does not consider factors associated with resiliency following incarceration and eventual desistance from crime. The current study was designed to address some of the limitations of current research. Using a large, longitudinal dataset allowed the researcher to examine how incarceration alters life trajectories. Specifically, the research was focused on the effect that incarceration has on the attainment and the nature of social bonds to work and marriage, in light of other lifecourse events (e.g. military participation) and static, demographic influences.

Results

As discussed in Chapter 2, three central theoretical perspectives have been developed to explain changes in involvement in criminality and other behaviors over the lifecourse. The population heterogeneity framework rests on the assumption that latent traits, developed in early childhood, determine involvement in criminality over the lifecourse (e.g. M. R. Gottfredson & Hirschi, 1986; Wilson & Herrnstein, 1985).

According to research conducted within this perspective, individual characteristics (e.g., antisocial personality, I.Q.), solidified by age four or five, determine the life chances of an individual. Because individual traits become immutable after early childhood, there is very little that can be done to divert lifecourse trajectories, especially in adulthood.

Conversely, state dependence researchers assert that behaviors arise out of direct interaction with the environment and are not determined in any way by personal disposition (e.g. Blumstein et al., 1986; Hirschi, 1972). Individual traits do not play a role in the state dependence framework. Instead, life events (e.g., marriage, imprisonment) determine social outcomes.

The lifecourse perspective blends the state dependence and population heterogeneity perspectives and posits that criminality arises from both continuity and change (Sampson & Laub, 1993). Individual, time-invariant traits (e.g., cognitive ability) can limit avenues for future social bond attainment, but lifecourse events in adulthood serve to determine an individual's ultimate trajectory. For example, individuals who exhibit antisocial behaviors in early childhood may be more likely to be removed from traditional educational settings, reducing the likelihood that the individual will develop positive bonds to school. Reduced social bonds to school have been associated with

subsequent involvement in criminality and incarceration in adulthood (Arum & Beattie, 1999; Sampson & Laub, 1993). According to researchers in this perspective, antisocial behaviors, and related behavioral traits, do not determine life chances. Instead, individual traits can close doors to positive bond development, increasing the likelihood of involvement in deviance or criminality.

The lifecourse perspective was used in the current study to explore the effect of incarceration on social bond development. Specifically, it was hypothesized that individuals who experienced one or more stays of incarceration would be less likely to attain bonds to marriage and work and that the nature of these bonds would be affected as a result of the imprisonment experience. Using longitudinal data and advanced statistical techniques allowed the researcher to compare the effect of incarceration on social bonds, relative to other lifecourse events and net of time-invariant individual traits.

The results from this research confirm the theoretical propositions presented by lifecourse theorists, and consequently also substantiate the hypotheses outlined at the initiation of the research study. In each of the dichotomous social bond models estimated, individuals who had experienced incarceration during the study period had a lower likelihood of marriage and work. This finding confirms the original hypothesis that stated that individuals who were incarcerated during the study period would be less likely to attain social bonds to work and marriage. In two of the three models estimated, incarceration was also negatively associated with the nature of the bond attained. Individuals who had been incarcerated during the study period were significantly more likely to report improved bonds to marriage and lengthy tenure with employer. A significant relationship was not found between number of jobs worked and incarceration.

A secondary goal of this study was to test the relative effect of incarceration in reference to other lifecourse events. Each of the lifecourse predictors was significantly related to social bond outcomes in at least one model estimated. One of the most striking findings from this study was the significant, strong effect that participation in the military had on marriage and work outcomes. Military participation was positively associated with both the likelihood of development and the nature of marital bonds, but was coupled with a decrease in the probability of employment and reduced tenure with employer. The negative relationship between military participation is especially striking in that previous researchers have observed that participation in the military is one of the few social institutions that can spark social change (Caspi & Moffitt, 1993; Sampson & Laub, 1996).

Work and marriage were also significantly and positively related to social bond development in all models, except the jobs worked analysis. Individuals who were employed were more likely to develop bonds to marriage; conversely, respondents who reported being married had an increased likelihood of subsequent employment. Finally, individuals who reported being absent from work at one time were less likely to have positive employment outcomes. The findings from the current analysis highlight the importance that development of multiple social relationships can have on subsequent social bond achievement. Although interaction analyses were not conducted as part of the current study, it does appear that social bonds can work in concert to increase the likelihood of positive social outcomes. It may be that after individuals have been able to develop one positive social bond, even after controlling for negative life events, would be better able to present a public image of respectability (Giordano et al., 2003); thereby

increasing the probability of developing positive social relationships. Negative lifecourse events are important, but the relative effect of the incarceration event may not outweigh that of positive social bonds.

In addition to the examination of the relative effects of lifecourse events on social bond attainment, a number of individual-level variables were included in the models as controls. Consistent with the lifecourse framework, individual, demographic characteristics were related to the life circumstances of the participants at the beginning of the study, but the same variables added little to the explanation of change over time. For example, individuals who were incarcerated prior to the study period were less likely to be employed at the onset of the study, but previous incarceration had little effect on the change in the likelihood of work over time. There was also little consistency in the predictors significantly associated with social bond development. Antisocial behavior was the only significant predictor of social bond development across models. The variance estimates obtained for growth curve models highlight the diminished power that static, individual factors can have in explaining model variation, especially that for growth over time. Together, the static individual predictors account for less than one-fifth of all variance in the initial status of respondents and less than six percent of the total variation in estimates of the slope. Individual, static influences can affect social bond outcomes, but the impact is early and does not endure over time.

Overall, the results from this analysis confirm the theoretical propositions presented by lifecourse researchers. Negative life events in early adolescence, like drug use and crime, can initially close doors to future opportunities. However, judging from the explained variance for the estimates of the slope, individual traits have little effect on

the subsequent change in the likelihood of bond development over time. In contrast, the lifecourse event variables, especially in the employment model, explained a considerable proportion of the total model variation. Static predictors aid in determining the initial status of an individual, but life events are more efficacious in explaining variation over time.

In summary, incarceration in adulthood can have significant, negative effects on the chances of realizing employment and marriage, as well as, the nature of the bond attained. The relative effect of predictors associated with the population heterogeneity model (e.g., cognitive ability) on social bonds is less clear. The results from the current research suggest that individual traits can shut doors to social bond attainment in early adolescence, but do little to explain meaningful individual change over time. Although the character of the relationship needs to be considered further, the results of the analyses also point to the importance of positive life events as predictors of social bond development. It appears from the current research that involvement in social institutions (e.g., military participation, marriage or work) can ameliorate some of the negative effects of incarceration on subsequent bond development.

Limitations

Before research implications can be drawn from the current study, it is important to note any limitations of the work. The most substantial limitations of the current study result because of measurement bias. The NLSY was designed to track changes in labor patterns and was intended largely for econometric purposes; therefore, detailed data on incarceration, social bond development, and child psychopathology were not collected.

Additional limitations of the study also arise due to the scope of the research and the nature of the sample. The following section outlines the limitations of the current study and provides insight into possible improvements that could be addressed by future research.

Measurement of Dependent Variables

The operationalization of the nature of social bonds constructs was not optimal. For example, the marriage factor only included indicators of the timing of the marriage and the number and length of first marriage. Unlike the construct developed by Sampson and Laub, (1993) data were not available on the attitudinal assessment of the relationship. For example, subjects were not queried as to the frequency of fighting, or the quality of communication, or the characteristics of the conjugal relationship. The nature of employment measures also fail to capture the qualitative aspect of the social bond. Tenure with employer and number of jobs worked speak to the stability of employment, but the attachment to the job or employer was not addressed with this construct. In light of social bond theory, it is important for future researchers to capture data that provide adequate representations of the attachment, involvement, and belief that individuals have for social institutions. This problem can be resolved by including both quantitative and qualitative elements in future studies, similar to the methodologies employed by Sampson and Laub (1992).

The scope of the social bond model is also limited. First, only two indicators of social bonds were included. Although marriage and work have been the most studied of all social bonds indicators, researchers have also linked participation in religious

institutions (Coleman, 1988, 1990) and strong peer networks (Warr, 1998) to desistance. Including multiple measures of social bonds will refine social bond theory and can facilitate broader generalizations from the research. As such, future researchers should consider incarceration in reference to a number of different social bonds.

Measurement of Independent Variables

The precision of the incarceration measure was also limited. In the current research, incarceration was considered in relationship to the respondent's housing situation at the time of the interview. If an individual, when contacted for the interview, was living in a correctional facility, he or she was coded as imprisoned for that year or interview period. Persons that may have been incarcerated at another point during the year were not identified as incarcerated. Conversely, subjects that were released from a correctional facility shortly following the interview were described as imprisoned. Because of the nature of the data collection protocol, the imprisonment measure largely reflects individuals who had been incarcerated for a longer period of time; the experiences of subjects who had experienced a short stay of incarceration (e.g., jail) may not have been fully captured by this data.

From this research it is possible to assert that longer stays of incarceration have a strong negative effect on social bond attainment; however, caution should be exercised when making generalizations from this study to shorter stays of imprisonment. Future data collection efforts should be designed to capture data on both the nature of the incarceration event (e.g., jail v prison) and the length of the stay (e.g., number of days served). Without this information, it is impossible to understand the nature or the dosage

of the incarceration event. Inclusion of these variables in future research would enhance the precision of the studies.

Second, this study lacked adequate statistical controls for involvement in delinquency and with the criminal justice system. In specific, the previous incarceration measure was not optimal. This construct was developed as a proxy for juvenile incarceration; however, because of the cohort nature of the data collection design, the meaning of the measure varies by cohort. For example, the previous incarceration measure represents the presence of a stay of incarceration prior to age 15 for the youngest cohort but indicates imprisonment prior to age 23 for the oldest cohort. The lack of consistency and precision in measurement of this variable severely limits the generalizations that can be made on the impact of previous incarceration on social bond development. In addition, information was not available in the dataset on the type of conviction that lead to the incarceration event. The goal of this research was to examine the effect of incarceration as a lifecourse event on social bond development; hence, the nature of the conviction has little theoretical significance to the study at hand. That said, researchers have found that incarceration for certain classes of crimes (e.g., white collar crimes) had disparate effects on employment opportunities (Kling, 1999); therefore, researchers should strive to collect detailed criminal history information in future research studies.

In the same light, the validity of the latent trait predictors was compromised because of the character of the data. Individuals in the sample were 15 to 23 at the outset of data collection; therefore, the latent trait predictors represented adolescent conditions for some of the sample but not all. This research was also lacking a pre-adolescent

baseline of information on family structure, antisocial behaviors, and demographic influences. Although this is a common limitation in research of this type (Cernkovich & Giordano, 2001; Nagin & Paternoster, 1991), it is important to consider the results of the current study in light of this omission.

Nature of the Conceptual Model

A limitation of this specific study, and most of lifecourse research in general, is the simplicity of the statistical tests used in proportion to the complexity of the theoretical models. In the current study, marital and work outcomes were modeled in relationship to a series of time-variant and invariant covariates. The assumption of this model is that entrance into a social state (e.g., incarceration), net of time-invariant demographic characteristics, will consequently alter an individual's chances of attainment of marriage and work over time. The analytic model, although easily tested with modern statistical methods, fails to capture the dynamic and emotional nature of change. This criticism is especially poignant when considering desistance from crime. Individuals do not develop social bonds and immediately desist from crime. Change takes time and is most often accompanied by psychological and emotional modifications (see Maruna, 2001). Most lifecourse theorists have failed to consider the slow, socio-emotive changes that accompany desistance.

The limited breadth of the current predictive model was evidenced in the model fit statistics. The R^2 and pseudo R^2 statistics presented for the estimated equations are moderately low; hence, the statistical models as presented fail to explain a substantial variation in the dependent variables. Considering the emotional changes that accompany

a lifecourse event may improve model fit (see Maruna, 2001). Nonetheless, researchers should strive to develop both theoretical and statistical models that capture the dynamic nature of change. The challenge of this research is to involve a large sample to facilitate generalizations to a broad subject population while maintaining the integrity and complexity of individual-level data collection that would be needed to further consider lifecourse change.

Nature of the Sample

Finally, it is also important to consider the results from the current study in light of the sample that was used for the analyses. As discussed in Chapter 3, three sample groups were selected for the present study. The incarcerated group represents all individuals in the study that had been incarcerated one or more times during the data collection period. Using a propensity score matching technique, an individually matched sample was also selected. The final sample group included individuals with median propensity scores and served as a comparison group in the study. The matched group was selected for this study to partial out sample heterogeneity. In addition, the comparison group was included as a representation of the average sample member. Taken together, the data represent only half of the distribution of the total sample. Individuals with a low propensity for incarceration (e.g., White women) are not fully represented in the dataset. The nature of the sample does not pose any potential problems for the current study; however, it is important to consider the nature of the study sample when making generalizations to other populations.

Implications

Theoretical Implications

This research has important implications for the study of criminology in general and the lifecourse perspective in specific. The findings from this research reinforce the lifecourse theoretical perspective. Specifically, the results as a whole suggest that lifecourse events in adulthood can have dramatic consequences for likelihood of attainment of social bonds to marriage and work. Individual predictors, or latent traits, most often associated with the population heterogeneity perspective (e.g. cognitive ability) had little effect in the models. In the growth curve models, the predictors were able to explain a small amount of variation in the initial statuses of the sample members, but together the variables were not able to explain a substantial amount of variation over time. Consistent with the lifecourse framework, individual, static predictors are important as controls, but adult lifecourse events are more valuable for understanding change in lifecourse trajectories.

The importance of social bond attainment in adulthood is further reinforced when considering the relative effect of incarceration. Across all of the models estimated, the effect of incarceration during the study period far outweighed that of previous incarceration. Research of late has downplayed the relationship between adult incarceration experiences and employment outcomes (e.g., Grogger, 1995; Western & Beckett, 1999); however, the results from this study confirm that incarceration in adulthood can interrupt life trajectories, especially in relationship to employment outcomes.

The use of multiple predictors of lifecourse events is also reinforced by the results of the current study. The results of this research point to the importance of considering the effect of incarceration experiences in light of other life events. Current lifecourse research has also reinforced this finding. For example, Giordano, Rossol, and Cernkovich (2003) argue that resiliency is best understood in relationship to the total presentation of self. Employment and marriage work together to develop a respectability package that can sustain a move away from criminality. Again, incarceration is an important lifecourse event; however, research that fails to incorporate measures of positive social bonds in statistical models may overestimate the impact of the imprisonment event.

The findings from the research also have important methodological implications. Because both cross-sectional and longitudinal analyses were conducted as part of the research study, it was possible to compare the efficacy of the models in explaining differences in social bond outcomes. From the results of the analyses, it appears that the lifecourse models are better able to explain variation in the likelihood of marriage and work. Although the pseudo- R^2 coefficients for the models estimated are not optimal, they do suggest that the growth series models are able to explain more variation in the outcomes when compared to the cross-sectional models. By using HLM to estimate the variability in lifecourse events over time, the power of the model to explain variance has been enhanced. In addition, using longitudinal methodologies allows the researcher to separate the relative effect of the predictors on the initial status to that of the slope. This technique is especially well suited for lifecourse studies and should be utilized by future researchers who examine phenomenon of this type.

Policy Implications

A number of policy implications also follow from this study. First, the importance of employment related services and programming was confirmed by this study. The incarceration event is terribly stigmatizing. Researchers have discovered that employers indicate that they are significantly less likely to hire recently paroled individuals even when compared with individuals on welfare and with less relevant experience (Holzer, 1996). As shown in the current study, sample members that had experienced a stay of incarceration were significantly less likely to obtain work and the quality of employment was diminished as a result of the event. In addition, incarceration also limits avenues for developing positive social bonds to marriage, further restricting an individual's ability to gain employment and weakening already fragile ties to society.

Research on work and crime has confirmed the importance of employment in both initiating and maintaining desistance (see Fagan & Freeman, 1999 for a review). Even in controlled experimental studies, participation in employment programming reduced the likelihood of subsequent criminality (Berk, Lenihan, & Rossi, 1980; Uggen, 2000). Employment can play a powerful role in assisting individuals in overcoming negative life events and can further promote the development of social capital.

Despite the link between employment and desistance, prisons are currently not equipped to provide work-related programming for inmates. Lynch and Sabol (2000) found a decrease in services provided to state inmates from 1991 to 1997, despite the rise in imprisonment. Around 27% of the 1997 cohort participated in vocational programming and 12% of the population were offered prerelease services. In being

removed from the community, the social resources and capital of the inmates are reduced, and the lack of reentry and social services further handicaps the released offender.

This research also highlights the importance of multi-faceted rehabilitative programming. As demonstrated by the results of the current study, lifecourse events do not work in isolation. Attaining one social bond increases the likelihood of developing subsequent bonds. For example, addressing the employment needs of a released individual will not be as effective as a program that incorporates employment training, with family programming or substance abuse services. Incarceration can have collateral consequences on the offender's family, social environment, and community. Addressing multiple correlates of positive social bonds will increase the likelihood of resilience and eventual desistance.

The research findings also have important implications for the study of parole. With the increase in use of determinate sentencing in many states, prisoners are being released after they have completed their sentence and are not being afforded services of any kind. Nearly twenty percent of parolees that left prison in 1998 did so without any post custody supervision (Beck, 2000). Of those that are placed on parole, only 6% were assigned to an intensive parole (Beck, 2000). The remainder were given regular parole which rarely affords the offender more than two short contacts with the parole agent a month (Petersilia, 1999). This is not enough time to address the problems associated with reentry and to provide needed services to ensure success.

The point of discharge from prison represents an opportune time to intervene in the life of offenders. In many ways release from prison is as much of a turning point in the lifecourse as is incarceration. Despite the importance of the topic, researchers have

not considered this subject with the same detail that has been afforded to the study of incarceration and even probation. Research that incorporates the study of parole will not only aid in the understanding of why people do well following incarceration, it may also put pressure on policymakers to invest in the post release supervision of inmates (Petersilia, 2001).

Finally, the results from the current study also point to the importance of considering the unique imprisonment experiences of women and minorities. The rise in incarceration and subsequent reentry has had a disproportionate effect on minorities. The statistics on minority imprisonment are striking. Each day, one out of eight Black males between the ages of twenty-five to thirty-four is in prison (Mauer & Chesney-Lind, 2002). Compared with White men, African American males are six times more likely to be admitted to prison during their lifetime (Bonczar & Beck, 1997). Western and Pettit (2000) found that on an average day in 1996 more African American high school dropouts aged 20 to 35 were in some form of custody than employed.

Despite the dramatic growth in the incarceration of minorities, few researchers have examined the differential effect of incarceration on social outcomes for this group. Western (2002) found that the wages for African Americans when compared to Whites were initially reduced as a result of incarceration; however, the discrepancy between groups closed over time. This study provides a solid framework for future analyses, but additional research is needed in this domain.

Women have also been differentially affected by incarceration. Women are statistically less likely to be incarcerated; however, the rate of growth in imprisonment for women has been nearly twice that of men (Mauer & Chesney-Lind, 2002). African

American women have also been disproportionately affected by the rise in incarceration. In addition to the rise in incarceration, there is initial evidence that women may experience incarceration different from that of men. Women's facilities are typically older and offer less services than that of men's (Chesney-Lind, 2002). The combination of isolation from family and lack of adequate services for women further increases the pains of imprisonment for women. It is important for future research on correctional outcomes and penal research in general, to consider the disparate effect that imprisonment can have on women and subsequent reentry outcomes.

Research conducted to date on the relationship between incarceration and work experiences have omitted women from the sample (e.g., Western, 2002). Women are already marginalized when they enter the employment market. It would follow that women may be disproportionately affected by a stay of incarceration because of their minority status. The current research is an improvement over the existing research because women are included in the sample; however, further sub-group analyses are needed to fully explore the relationship between incarceration and social bond development.

APPENDICES

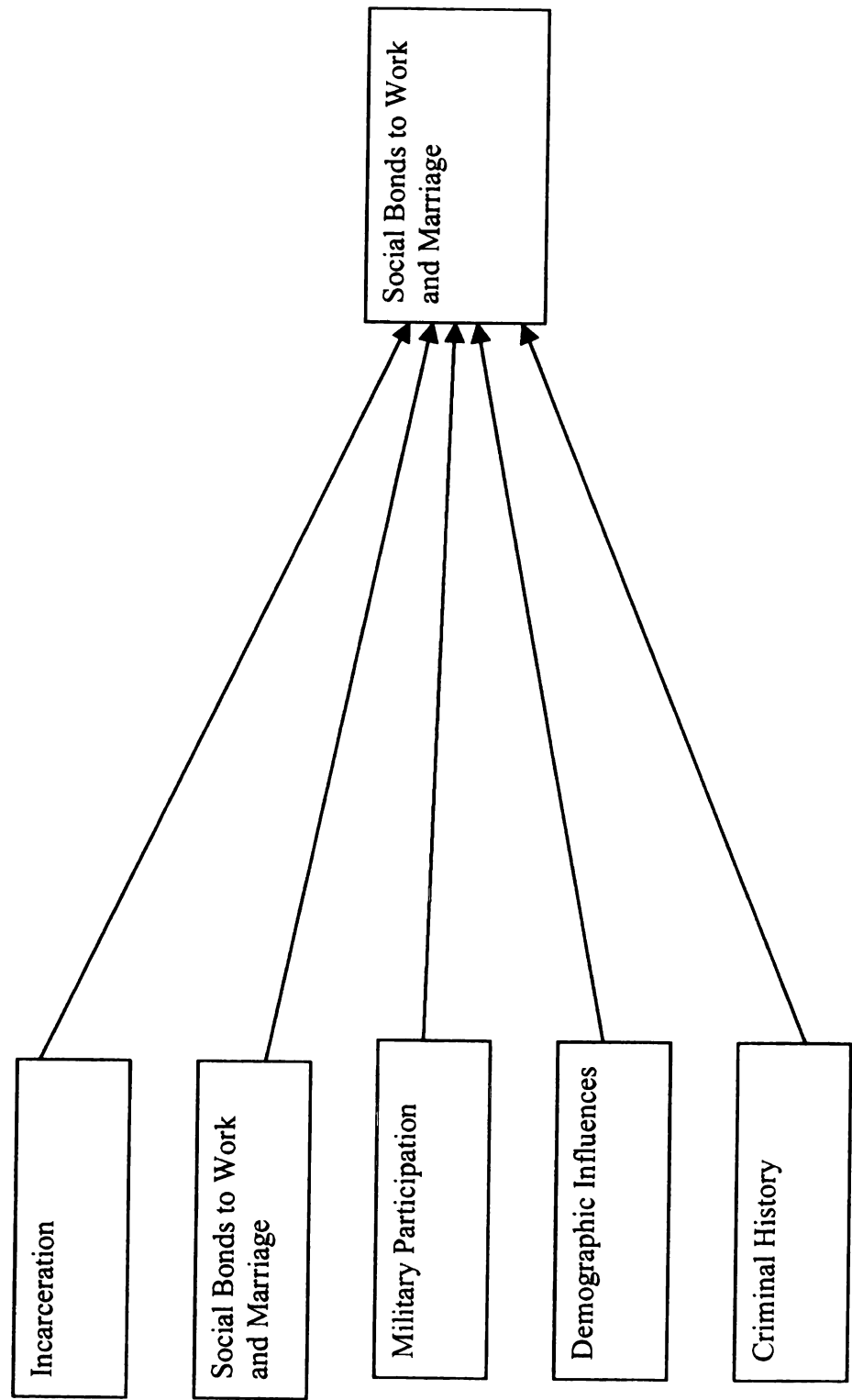
Appendix A: Description of Variables

Variable	Description	Years Collected
Outcome Variables		
Employment	A dummy variable with fulltime employment (>35 hours) during the current year = 1.	1983-2000
Tenure with Employer	Length of tenure in weeks with current employer.	1983-2000
Number of Jobs Worked	A cumulative measure of number of jobs worked since the inception of the study.	
Marriage	A dummy variable with marriage during the current year = 1.	1983-2000
Quality of Marriage	Three item factor score 1) length of the respondent's first marriage in years 2) number of marriages the subject entered into during the study period 3) a dichotomous measure of divorce during the study period (eigenvalue 2.10, factor loadings > 0.757)	1983-2000
Dynamic Predictors		
Incarceration	A dummy variable with incarceration at any point during the past year =1.	1983-2000
Marriage	A dummy variable with marriage at any point during the past year =1.	1983-2000
Employment	A dummy variable with fulltime employment (>35 hours) during the current year = 1.	1983-2000
Military	A dummy variable with participation in any branch of the military during the current year =1.	1983-2000
Out of Labor Force	A dummy variable with respondent unable to participate in the workforce due to disability, attendance in school, or family responsibilities = 1.	1983-2000
Age	A centered variable with age measured in years – 22.	1983-2000
Age ²	The squared function of the centered age variable	1983-2000

Appendix A: Description of Variables (cont'd)

Static Predictors		
<i>Demographic Influences</i>		
Gender	A dummy variable with male = 1.	1983
African American	A dummy variable with African American = 1.	1983
Hispanic	A dummy variable with Hispanic = 1.	1983
Cognitive Ability	Percentile score on the Armed Forces Qualification Test.	1981
High School	A dummy variable with graduation from high school = 1.	1983
School Behavior	A dummy variable with suspension from school at any time = 1.	1980
<i>Criminal History</i>		
Prior Incarceration	A dummy variable with incarceration prior to 1980 = 1.	1980
Contact with the Police	A dummy variable with prior history of contact with the police = 1.	1980
Self-reported Delinquency	A dummy variable with self-reported delinquency = 1.	1980
Drug Use	A dummy variable with self-reported drug use = 1.	1984
Antisocial Behavior	A dummy variable with self-reported delinquency or drug use = 1.	
<i>Contextual Predictors</i>		
Unemployment Rate	A dummy variable with individuals living in regions with an unemployment rate greater than nine percent = 1.	1980
Poverty	A dummy variable with family income under the poverty level = 1.	1980

Appendix B: Analytical Model



Appendix C. Correlation Matrix for Social Bond to Marriage Model

	Military	Out	Age	AFQT	Inc	Gender	Black	Hispanic	HS	Poverty	Antisocial	Pre Inc
Work	-.056 .030	-.530 .000	.113 .000	.356 .000	-.396 .000	.183 .000	-.096 .000	-.086 .001	.291 .000	-.211 .000	-.092 .000	-.161 .000
Military	1	-.103 .000	-.002 .932	.135 .000	-.057 .028	.141 .000	.019 .475	-.066 .010	.168 .000	-.021 .423	-.101 .000	-.037 .159
Out		1	-.175 .000	-.215 .000	.339 .000	-.163 .000	.075 .004	.064 .013	-.162 .000	.103 .000	.047 .071	.057 .027
Age			1	.120 .000	-.043 .097	-.025 .336	.060 .022	-.025 .332	.161 .000	-.069 .008	.038 .145	.117 .000
AFQT				1	-.202 .000	.201 .000	-.395 .000	-.065 .013	.434 .000	-.319 .000	-.015 .574	-.102 .000
Inc					1	.249 .000	.123 .000	-.010 .696	-.161 .000	.098 .000	.177 .000	.197 .000
Gender						1	-.058 .026	-.123 .000	.009 .725	-.074 .004	.147 .000	.155 .000
Black							1	-.495 .000	.044 .087	.243 .000	.016 .548	-.047 .068
Hispanic								1	-.213 .000	.043 .098	-.025 .336	.039 .129
HS									1	-.134 .000	-.119 .000	-.160 .000
Poverty										1	-.007 .794	.021 .424
Antisocial											1	.333 .000

Appendix D. Collinearity Diagnostics for the Bond to Marriage Model

	Tolerance	VIF
Work	.540	1.853
Military	.881	1.136
Absence from Workforce	.656	1.525
Age	.900	1.111
Antisocial Behavior	.526	1.901
Gender	.725	1.380
Black	.517	1.934
Hispanic	.646	1.549
High School	.694	1.440
Family Poverty	.854	1.171
Antisocial	.852	1.174
Previous Incarceration	.812	1.232
Incarceration	.670	1.492

Appendix E. Correlation Matrix for Social Bond to Employment Model

	Military	Age	AFQT	HS	Poverty	Antisocial	Pre_inc	Inc	Black	Hispanic	Marry	Gender
Out	-.103 .000	-.175 .000	-.215 .000	-.162 .000	.103 .000	.047 .071	.057 .027	.339 .000	.075 .004	.064 .013	-.227 .000	-.163 .000
Military		-.002 .932	.135 .000	.168 .000	-.021 .423	-.101 .000	-.037 .159	-.057 .028	.019 .475	-.066 .010	.098 .000	.141 .000
Age			.120 .000	.161 .000	-.069 .008	.038 .145	.117 .000	-.043 .097	.060 .022	-.025 .332	.127 .000	-.025 .336
AFQT				.434 .000	-.319 .000	-.015 .574	-.102 .000	-.202 .000	-.395 .000	-.065 .013	.214 .000	.201 .000
HS					-.134 .000	-.119 .000	-.160 .000	-.161 .000	.044 .087	-.213 .000	.090 .001	.009 .725
Poverty						-.007 .794	.021 .424	.098 .000	.243 .000	.043 .098	-.162 .000	-.074 .004
Antisocial							.333 .000	.177 .000	.016 .548	-.025 .336	-.148 .000	.147 .000
Pre_inc								.197 .000	-.047 .068	.039 .129	-.069 .007	.155 .000
Inc									.123 .000	-.010 .696	-.313 .000	.249 .000
Black										-.495 .000	-.262 .000	-.058 .026
Hispanic											.091 .000	-.123 .000
Marriage												-.051 .048

Appendix F. Collinearity Diagnostics for the Bond to Employment Model

	Tolerance	VIF
Absence from Workforce	.776	1.289
Military	.928	1.078
Age	.888	1.126
Cognitive Ability	.535	1.868
High School Graduate	.710	1.408
Poverty	.861	1.162
Antisocial	.845	1.184
Previous Incarceration	.819	1.221
Incarceration	.704	1.420
Hispanic	.646	1.548
Black	.504	1.983
Marriage	.804	1.244
Gender	.766	1.306

Appendix G. Final Statistical Models for the Likelihood of Work and Marriage
Dependent Variables – Propensity Score Only Analyses (N =1,466)

Independent Variable	Employment		Marriage	
	β	SE	β	SE
Intercept	-0.05	0.06	-0.43	0.09***
<i>Lifecourse Events</i>				
Incarceration	-0.21	0.08*	-0.28	0.08***
Incarceration Count	-0.18	0.03***	-0.04	0.04
Marriage	0.31	0.05***	--	--
Work	--	--	0.11	0.04**
Military	-1.45	0.18***	0.25	0.18
Absence from Workforce	-0.97	0.05***	-0.05	0.05
<i>Model Fit</i>				
Age	0.09	0.01***	0.14	0.02***
Age Squared	--	--	-0.00	0.00***
Level II Propensity Score (Intercept)	-1.50	0.23***	-1.39	0.32***
Propensity Score (Slope)	0.01	0.02	-0.09	0.04*

***p<0.001 **p<0.01 *p<0.05 (two-tailed tests)

Appendix H. Final Statistical Models for the Nature of Work Dependent Variables – Propensity Score Only Analyses (N =1,466)

Independent Variable	Tenure with Employer		Number of Jobs Worked	
	β	SE	β	SE
Intercept	0.46	0.04***	1.97	0.02***
<i>Lifecourse Events</i>				
Incarceration	-0.10	0.01***	0.01	0.01
Incarceration Count	-0.16	0.01***	-0.00	0.00
Marriage	0.03	0.00***	0.02	0.01*
Military	-0.11	0.02***	-0.21	0.03***
Absence from Workforce	0.01	0.00	-0.06	0.01***
<i>Model Fit</i>				
Age	0.31	0.01***	0.05	0.00***
Age Squared	-0.01	0.00***	--	--
Level II				
Propensity Score (Intercept)	-1.01	0.17***	0.51	0.08***
Propensity Score (Slope)	-0.01	0.01	0.01	0.00

***p<0.001 **p<0.01 *p<0.05 (two-tailed tests)

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