

Incarceration and Family Transitions in Young Adulthood

By
Jessica Jakubowski

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The dissertation is approved by the following members of the Final Oral Committee:

James Raymo, Professor, Sociology (Chair)
Gary D. Sandefur, Professor, Sociology
Pamela Oliver, Professor, Sociology
Christine Schwartz, Associate Professor, Sociology
James Walker, Professor, Economics

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ABSTRACT

Incarceration rates in the United States have grown so dramatically over recent decades that some researchers and policy makers are calling the current situation a regime of *mass incarceration*. The numbers of men and women moving through local, state, and federal correctional institutions in the United States have risen to unprecedented levels. While researchers have begun to examine the consequences of incarceration for marriage, family stability, and family well-being, scholars still know very little about the influence of incarceration on the experience of family transitions among members of recent cohorts.

I make three contributions to family demographic research on the effects of incarceration on family processes. First, I revisit the question of the influence of incarceration on family formation and family stability using data that are better suited to the measurement of these events than the data used in previous research. Using life history calendar data from the National Longitudinal Survey of Youth 1997 (1997-2009), a longitudinal study of 8,984 men and women in the United States, I establish the timing of incarcerations relative to the following family transitions: entry into cohabiting and marital unions and exit from cohabiting and marital unions. Second, I conduct the first prospective study of the consequences of incarceration for the timing of childbearing among adolescents and young adults. Third, I use new and theoretically relevant measures of incarceration to provide richer detail regarding the nature of the relationship between incarceration and these family processes. Specifically, I take into account the timing, frequency, and durations of incarcerations experienced in adolescence and young adulthood. Individuals who experience multiple incarcerations or lengthy incarcerations may be qualitatively different than those who have a single short stay in a correctional facility. Analysis of the timing of incarcerations relative to family transitions provides evidence about the causal mechanisms

that link incarceration to these events. In addition, accounting for the length of stays in correctional facilities allows me to examine whether the association between family transitions and incarceration occurs because of physical incapacitation or because of the length of time an individual is removed from the community.

I examine the consequences of incarceration for three family transitions: entry into cohabitation and marriage, exit from cohabitation and marriage, and the timing of childbearing. The analytical results suggest that incarceration may lead to the delay, avoidance, or forfeiture of cohabiting and marital partnerships in young adulthood. In addition, incarceration may help create barriers to marriage for cohabiting couples. I find no evidence that the duration of incarcerations is associated with the subsequent likelihood of entering into a marriage or cohabitation.

In addition, the findings support the hypothesis that the detrimental effects of incarceration on partnerships may operate through direct pathways such as relationship stress and financial hardship, rather than indirect pathways such as diminished employment opportunities and earnings capacity. I find that incarceration during a union is directly associated with the dissolution of cohabiting and marital unions. I find only modest evidence that the number of incarcerations prior to a union is associated with the dissolution of that union. There is little evidence that the amount of time spent incarcerated prior to entry into a union is indirectly associated with the dissolution of that union.

Finally, I examine the relationship between incarceration and the timing of childbearing for both men and women. I find that men with a history of incarceration start childbearing earlier than men who have never been incarcerated; however, men who have been incarcerated delay or space-out higher-order

births. The amount of time spent incarcerated was not associated with childbearing for men. I found little evidence of an association between childbearing and women's incarceration. Early childbearing in the incarcerated population could lead to the expansion and persistence of child poverty, as well as exacerbate the disadvantages faced by children born to young parents relative to children born to other young parents.

I explicitly address the possibility that incarceration is associated with three family transitions—union entry, union stability, and childbearing—through unobserved heterogeneity. That is, rather than a causal relationship, incarceration may be linked to family transitions through unobserved factors such as a latent tendency to take risks, a tendency to make poor decisions, or judicial processes that are associated with both incarceration and family transitions. Using both a random intercepts approach and a sample selection strategy, I find no evidence that the associations between incarceration and family transitions are explained by unobserved heterogeneity.

CHAPTER 1: INTRODUCTION

Incarceration rates in the United States have grown so dramatically over recent decades that some researchers and policy makers are calling the current situation a regime of *mass incarceration* (Clear and Rose 2003). The numbers of men and women moving through local, state, and federal correctional institutions in the United States have risen to unprecedented levels. While researchers have begun to examine the consequences of incarceration for marriage, family stability, and family well-being, scholars still know very little about the influence of incarceration on the experience of family transitions among members of recent cohorts.

The current study uses new data from a recent cohort of young adults in the United States to examine the influence of incarceration experiences on the timing of entrance into a romantic partnership (i.e., marriage or cohabitation), the stability of these romantic partnerships, and fertility transitions. In this chapter, I provide a description of the expansion of the corrections system in the United States, and show that because of this expansion, incarceration has become a life course event for members of certain minority and low-income populations. I then provide an overview of the study's contributions to the scholarly knowledge of the effects of incarceration on family life.

MASS INCARCERATION IN THE UNITED STATES

Over the past 30 years, incarceration has increased to levels never before seen in U.S. history. In 2009, a total of 1,524,513 individuals were housed in a state or federal correctional facility, compared to just 319,598 in 1980 (Glaze, Minton, and West 2010), an increase that far exceeded population growth. Over that same time period, the annual imprisonment rate increased more than three-fold,

from 139 to 502 per 100,000 (Sabol and West 2009). Figure 1.1 shows that the rate of adult imprisonment roughly parallels the growth of the overall corrections population in the United States, which includes all individuals under the control of local/county jails, federal and state prisons, and community corrections (i.e., parole and probation). The growth in the adult imprisonment rate over time indicates that the growth in the prison population cannot be attributed solely to general population growth.

[FIGURE 1.1 ABOUT HERE]

The number of individuals in prisons, however, does not demonstrate the true extent of the expansion of the correctional system in the United States over this period. The number of individuals currently in prison is quite small compared to the total number of adults convicted of a crime and under the supervision of the correctional system (defined as prison, jail, parole, and probation), which grew by a factor of 3.9 from 1980 to 2009 (Glaze, Minton, and West 2010). The long-term trend over the past three decades indicates the rapid growth of the corrections population in the United States. While the sharp growth in the imprisonment rate slowed around the year 2000, rates have continued to grow at a slightly slower pace since that time.

MASS INCARCERATION AND THE LIFE COURSE

The U.S. corrections system has become a much larger part of the life course experience of Americans over the past few decades, but this phenomenon has been concentrated among specific segments of the population (Goffman 2009; Pettit and Western 2004). A closer look at patterns of incarceration shows that minority men with low levels of education and income have been disproportionately represented in U.S. prisons. For example, between 1981 and 1998 the average incarceration rate grew for both black and white men, but black male incarceration rates were

consistently 6.7 to 7.7 times higher than white male incarceration rates (Glaze, Minton, and West 2010). Using retrospective data from 1999, Pettit and Western (2004) found that 22 percent of surviving black men born between 1965 and 1969 had ever been incarcerated, compared to just 3 percent of non-Hispanic white men. The authors also found that incarceration has become more prevalent among men with lower educational attainment, indicating a growing class inequality in the likelihood of incarceration over time. From the 1980s through the 1990s, the lifetime chances of incarceration doubled for all men, but most of this increase was concentrated among men without a college education.

Incarceration spells remain rare events for women, but the incarceration rate of women in the United States has grown over the last several decades: the rate more than doubled from 3 percent in 1975 to 7 percent in 2008 (Harmon and O'Brien 2011). Similarly, the percentage of those incarcerated who are female has grown from 14 percent in 1990 to 18 percent in 2009 (Glaze 2010). This growth in female incarceration is due primarily to growing arrest rates for drug crimes (Harmon and O'Brien 2011).

Incarceration is a particularly salient issue as young people transition into adulthood, because of the average timing of first incarcerations, cohabiting and marital partnerships, and childbearing. In 1991, the vast majority of first-time state and federal prison admissions in the United States affected individuals between the ages of 18 and 34 (Bonczar and Beck 1997). The majority of these first-time prisoners had previously been incarcerated in a local county jail.¹ Recent data show that young adults compose a substantial proportion of the prison population. In 2009, one third of the adult male prison population and one quarter of the adult female prison population in the United States were under the

¹ Local jails are defined here as facilities in which offenders can be held while awaiting adjudication, or facilities in which offenders may stay for short sentences (less than one year) for relatively minor crimes. State and federal prisons house convicted felons who are expected to serve longer sentences (usually one year or longer). Jail and prison statistics are usually reported separately.

age of 30 (West, Sabol, and Greenman 2010). For men born between 1965 and 1969, age-specific first-time incarceration rates peaked when these men were in their late 20s (Pettit and Western 2004). The rate of first incarcerations also differs by race, with minorities incarcerated at a higher rate than non-Hispanic white men. About 1 in 6 black men and 1 in 11 Hispanic men had been in prison by the age of 25, compared to 1 in 60 white men (Bonczar and Beck 1997). Unfortunately life-table estimates of incarcerations for more recent cohorts are not available.

FUNDAMENTAL CONTRIBUTIONS OF THE CURRENT STUDY

Criminal justice policies use incarceration to punish individuals, but this form of punishment has repercussions beyond the individual—reaching families, partners, and communities (Clear and Rose 2003). The growth of the correctional system and the prevalence of incarceration within poor and minority communities has prompted a growing body of research that examines the consequences of incarceration for these families. The current study focuses on the consequences of incarceration for family transitions that are prominent events in the transition to adulthood: entry into cohabiting and marital relationships, exit from these relationships, and childbearing. This dissertation makes three fundamental contributions to this growing body of family demographic research.

First, I revisit questions asked in previous research on the influence of incarceration on the formation of marital and cohabiting relationships and relationship stability; however, I use monthly event-history data that is better suited to the measurement of incarceration and family transitions than the data used in previous research. My research accounts for multiple aspects of incarceration over the life course of young adult. Given the emergent corrections regime in the United States, this approach is more important than ever before. Much of the existing research that links incarceration and family outcomes at the national level uses data that are limited in their measurement of the incarceration

experience over the life course (e.g., data from the National Longitudinal Survey of Youth 1979 cohort, which only measures incarceration at the time of interview). In addition to these measurement limitations, the most recent research on incarceration and family transitions relies on data from the Fragile Families and Child Wellbeing Study, a sample that is limited to couples with children.

I improve upon past studies of incarceration and family transitions by taking advantage of the cohabitation, marriage, childbearing, and incarceration histories collected in the National Longitudinal Survey of Youth 1997 cohort (NLSY97). Unlike the Fragile Families and Child Wellbeing Study (Geller et al. 2009; Geller, Garfinkel, and Western 2011; Wildeman 2009), the NLSY79 (Lopoo and Western 2005), and the National Health and Social Life Survey (London and Parker 2009), the NLSY97 study contains self-reported complete event histories of arrests and any resulting convictions and incarcerations over the respondents' lifetimes. The NLSY97 also contains complete event histories for family transitions (i.e., cohabitation, marriage, divorce, and childbearing) and socioeconomic histories (i.e., employment and education). Using this information, I am able to establish the temporal order of incarcerations and family transitions for the first time. Short of randomly assigning subjects to serve time in prison, researchers cannot definitively establish a causal relationship between incarceration and family transitions using quantitative research methods. By using monthly event history information, however, I am able to virtually eliminate reverse causality as an explanation of the association between incarceration and family transitions.

My study reinforces previous findings that incarcerated individuals are more likely to be single and more likely to divorce than individuals who have never been incarcerated. The month-to-month calendar data used in my analysis ensures that the findings account for all incarceration experiences prior to relationship transitions, and thus cannot be attributed to reverse causality. I find that young

adults with a history of incarceration tend to delay marital and cohabiting relationships relative to those without a history of incarceration. I also find that cohabiters who are incarcerated during a cohabiting partnership are less likely to later transition to a marriage with their current partner than cohabiters who did not experience an incarceration; further, cohabiters who experienced more incarcerations are less likely to transition into marriage than those who experienced fewer incarcerations. In addition, I find that marital and cohabiting relationships that are interrupted by an incarceration are more likely to dissolve than relationships in which an incarceration did not occur. These findings suggest that among young people in the United States, incarceration is associated with the delay, avoidance, or forfeiture of normative adult transitions into more stable romantic relationships.

The second contribution of the current study is the examination of the relationship between incarceration and the timing of childbearing. Individuals with a history of incarceration may have difficulty providing an economically stable environment within which a family can flourish. The growing corrections regime in the United States has contributed to an environment in which poor minorities are both over-represented in the incarcerated population and have poor employment and earnings prospects (Apel and Sweeten 2010; Geller, Garfinkel, and Western 2006; Geller, Garfinkel, and Western 2011; Pager 2003; Pager, Western, and Sugie 2009; Pettit and Western 2004; Sabol and Lynch 2003; Schwartz-Soicher, Geller, and Garfinkel 2011; Western, Kling, and Weiman 2001). Due to the lower opportunity costs of childbearing among this population, members of these same groups have a tendency to begin childbearing earlier than those in other groups (Carlson and McLanahan 2010). Using incarceration and fertility histories from the NLSY97, I conduct the first prospective study of the consequences of incarceration for childbearing behavior among adolescents and young adults. I find that incarcerated men are more likely to begin childbearing early compared to men who have never been incarcerated; further, men who had experienced more incarcerations were more likely to begin

childbearing early compared to men who had experienced fewer incarcerations. In addition, I find that men with a history of incarceration tend to delay higher-order births. I did not find evidence of an association between the timing of childbearing and women's incarceration. These findings suggest that incarceration may contribute to the growth and persistence of child poverty by increasing the likelihood of early childbearing among those who can least afford to provide for their children.

The third contribution of the study is the use of new and theoretically relevant measures of incarceration. Because the incarcerated population in the United States has grown, it is important to recognize that there may be heterogeneity within this population in terms of both the characteristics of incarcerated individuals and the characteristics of incarceration experiences (e.g., length of incarceration, frequency of incarcerations). The correctional system casts a wider net than in decades past, and researchers can no longer assume that the incarcerated population consists of only hardened criminals who contribute little to family life (Wildeman and Western 2010). A growing proportion of incarcerations occur due to non-violent crimes such as drug crimes (Harmon and O'Brien 2011), while sentence length is growing for all crimes (Pew Center on the States 2012). At the same time, specific characteristics of incarceration may have different consequences for relationships outside prison. For example, compared to a single short-term incarceration, persistent contact with the corrections system resulting in multiple incarcerations or a single long-term incarceration for a serious crime may have worse consequences for an individual's attractiveness as a stable romantic partner. Researchers focusing on employment and earnings outcomes have found little evidence that an increase in the length of an incarceration is associated with the severity of consequences after release (Kling 2006; Lyons and Pettit 2011). These studies, however, did not focus on family transitions; in addition, they used state and federal prison records, and therefore only sampled individuals who had been convicted of serious felonies and who may have already been approaching the nadir of their earnings capacity.

Further, these researchers did not have access to complete information on incarceration history over the lifetime of the individuals, and thus were unable to account for multiple incarcerations or incarcerations occurring in different jurisdictions.

My research incorporates several measures of the dynamics of incarceration: timing of incarcerations relative to family transitions (before, during, after), length of time incarcerated, and the number of incarcerations experienced by respondents. I find that experiencing multiple periods of incarceration has greater consequences for family transitions. For example, an individual who cycles in and out of prison is more likely to delay entry into a marital or cohabiting union, less likely to transition from a cohabiting union to a marriage, and more likely to begin childbearing early compared to an individual who experienced a single incarceration. Overall, I find that the amount of time an individual is incarcerated does not have an independent association with family transitions, with one exception: an increase in the amount of time spent in prison is associated with delayed entry into a first marriage (however, this association was weak). This pattern implies that family transitions are not associated with incarceration through either physical incapacitation or time away from the community.

In addition to making these fundamental contributions, the study accounts for the possibility that relationships between family transitions and incarceration may be driven by unobserved heterogeneity. As mentioned above, methods used in the current study cannot definitively establish causality between incarceration and family transitions. The results of the current study establish associations rather than causal linkages between incarceration and these family processes. Individuals may have characteristics that are either excluded from the model or are not observable via self-reported survey data that affect their chances of experiencing a family transition. Rather than a “treatment effect” of incarceration, I may be observing a process in which members of a group that already has a lower chance of marriage, for example, self-selects into the incarcerated group. Similarly, those who are

prone to crime and contact with the criminal justice system may have unobserved characteristics that also lead them to self-select into unstable relationships and early childbearing. I use two strategies to account for unobserved heterogeneity: sample selection based on criminal conviction (Apel and Sweeten 2010), and longitudinal methods that adjust for unobserved within-person characteristics over time (Steele 2008).

The subsequent chapters in this study examine the association between incarceration experiences and 1) entry into marital and cohabiting relationships and transitions from cohabitation to marriage, 2) exits from marital and cohabiting relationships, and 3) the timing of childbearing. I establish the significance of incarceration for each type of family transition by reviewing the relevant research and then estimating the associations using longitudinal data from NLSY97. Finally, I discuss the implications of the findings for family and life course transitions and criminal justice policy in the United States.

CHAPTER 2: DATA

I use panel data from the 1997 cohort of the National Longitudinal Survey of Youth ($n=8,984$). The cohort consists of a nationally representative panel of men and women born between 1980 and 1984, who were 12-18 years old at the baseline interview in 1997. The NLSY97 over-sampled black and Hispanic individuals. Using computer-assisted personal interview (CAPI) and computer-assisted telephone interview (CATI) methods, the NLSY97 study collected a unique combination of complete month-to-month event histories of marriages, cohabitations, births, and incarcerations over the life course of a nationally representative sample of young adults.

I use 13 waves of yearly interview data ending in 2009 when respondents were 24-30 years old. Yearly follow-up response rates range from 81.7 percent in 2005 to 93.3 percent in 1998. Nearly 90 percent of baseline sample members completed a follow-up interview 10 or more years after the baseline interview, and nearly 60 percent of baseline sample members completed all 13 interviews. The number of interviews completed by male respondents is significantly lower than the number of interviews completed by female respondents, and black respondents completed significantly more interviews than white respondents ($p < 0.05$). I find no statistically significant association between having been incarcerated by the 2009 interview and the total number of interviews completed. I also find no statistically significant association between incarceration prior to the baseline interview and the total number of interviews completed.

The NLSY97 collected event histories for life events, including cohabitations, marriages, births and incarcerations. These self-report event histories were collected annually; however, respondents reported events that had occurred “since the last interview,” at each wave of data collection, so that non-respondents who were lost to follow-up and then interviewed in a subsequent wave completed an

event history that covered all years of NLSY97 data collection. This method of data collection reduces non-response bias. This rich combination of family and incarceration event-history data that is both calendar based and prospective has never been used to estimate the relationship between incarceration and family transitions.

INCARCERATIONS

Using the NLSY97, I am able to construct a nearly complete event history of incarcerations over the life course. Respondents reported the month and year in which they began serving a sentence in a correctional facility, as well as the month and year they stopped serving that sentence. The sample includes a total of 1,272 incarcerations experienced by 800 respondents (9 percent of the baseline sample). Between 1997 and 2009, 637 men and 163 women in the NLSY97 spent time in a correctional facility (juvenile facility, jail, or prison). As of the 2009 interview, 12.5 percent of black respondents, 6.8 percent of non-Hispanic white respondents, and 9.5 percent of Hispanic respondents had reported ever spending time in a correctional facility. Black and Hispanic respondents were significantly more likely than non-Hispanic white respondents to report ever being incarcerated, and black respondents were significantly more likely to report ever being incarcerated than Hispanic respondents.

The richness of the event history information in the NLSY97 allows me to measure multiple aspects of a respondent's incarcerations including the timing of incarcerations relative to family transitions (before, during, after or after a union), the length of time incarcerated, and the number of incarcerations experienced. The median length of incarceration was two months, and about one in three incarcerated respondents reported two or more incarcerations.

The sample of NLSY97 respondents who have ever been incarcerated may be somewhat biased compared to the population of all adults in the United States who have ever been incarcerated, because

the sample may include a higher proportion of those who tend to take greater risks and partake in serious criminal activity at younger ages. According to Pettit and Western (2004), incarceration peaks in the late 20s for men in the United States. The median age at the time of the 2009 interview was 27.3, suggesting that about half of the men in the NLSY97 had not yet approached the age of peak incarceration.

MARRIAGE AND COHABITATION

The NLSY97 collected a complete monthly event history of marriage/cohabitation status from 1994 (prior to the baseline interview) through 2009. In addition, the study uniquely identified partners of NLSY97 respondents. While partners were never directly observed in the study, the respondents' relationships to these partners can be tracked over time, which is especially important because the measurement of cohabiting relationship status can be confounded by the removal of an individual from the current household to a correctional facility. As of the 2009 interview, 4,789 respondents in the full NLSY97 cohort had cohabited at least once and 2,897 had married at least once. In comparison with the general population, the NLSY97 sample is biased towards younger marriages. Using data through the 2009 interview, the median age at first marriage was 22.5 years for men and 21.2 years for women. According to the U.S. Census Bureau (2011), the median age at first marriage from 1994-2008 ranged from 26.7-27.6 for men and 24.5-25.9 for women.

Of the 3,199 marriages observed through 2009, half began as cohabitations. More than one in five marriages (22.4 percent) ended with divorce, legal separation, or cohabitation with a new partner prior to the 2009 interview. Of the cohabitations observed through the 2009 interview, 4,843 had not transitioned to marriage; of these, two-thirds of the couples stopped living together permanently or began a cohabiting relationship with a new partner. More than one quarter (28.4 percent) of cohabiting

unions were higher-order cohabitations, while only 7.2 percent of marriages were higher-order marriages. Chapter 3 and Chapter 4 include further details on the measurement of marriages/cohabitations and union dissolutions, respectively.

CHILDBEARING

The NLSY97 collected a complete fertility history (month and year of all births) for all respondents. As of the 2009 interview, 4,074 biological children had been reported by NLSY97 respondents. Over one third of men and half of women had a biological child by the 2009 interview. The NLSY97 used yearly interviews to collect information on the births of children, which potentially reduced error in data about non-residential children and their birthdays among male respondents. Chapter 5 includes further details on the measurement and timing of births.

CHAPTER 3: INCARCERATION AND UNION FORMATION

INTRODUCTION

In recent decades, the United States has experienced an unprecedented expansion of its correctional system, and Americans are now incarcerated at a higher rate than at any other time in history (Glaze 2010). A close examination of this trend has shown that incarceration rates among the poor and minority groups account for the majority of the increase (Pettit and Western 2004). Over the same period, the United States experienced dramatic changes in the family as an institution, in particular, the development of cohabitation as a normative family structure and the increasing concentration of marriage among higher socio-economic classes. The greater likelihood of incarceration as a life course event for disadvantaged individuals and families in the United States calls for an examination of the relevance of incarceration to family life. Researchers have only recently begun to examine possible linkages between the expansion of the correction system in the United States and changing patterns in couple and family relationships.

In this chapter, I address the consequences of incarceration for couple relationships using data from the National Longitudinal Survey of Youth 1997 (NLSY97), a recent cohort of young adults in the United States. First I examine whether a history of incarceration reduces the likelihood of entry into marriage. Next, I investigate whether a past incarceration also reduces the likelihood of entry into *any* long-term or stable union by focusing on entrance into cohabitation. Finally, I examine whether a history of incarceration makes couples less likely to transition from cohabitation to marriage. Past studies of incarceration and couple relationships rely on limited measures of incarceration and/or marriage and cohabitation histories that do not allow researchers to establish temporal ordering between specific

periods of incarceration and relationship transitions. In this study, I take advantage of event history data collected in the NLSY97 to establish the temporal ordering between incarceration spells and union transitions.

This study is the first to account for variation in the experience of incarceration (i.e., frequency of incarceration, length of sentence, and timing of incarcerations) under the recent expansion of the prison system in the United States, as well as how differences in incarceration experiences are associated with post-incarceration transitions to cohabitation and marriage. In addition, the study will be the first to address these associations using a sample that includes cohabiters both with and without children. A number of recent studies that include cohabiting couples use data collected by the Fragile Families and Child Wellbeing study, a sample limited to couples with children (Geller et al. 2012; Geller et al. 2009; Geller, Garfinkel, and Western 2011; Western 2006). To form a complete picture of the consequences of incarceration for young adults, it is important to study young adults who have not yet begun childbearing, as well as parents.²

Existing research provides mixed evidence that the experience of incarceration is detrimental to an individual's future chances of entering into marriage. Some researchers have found evidence that individuals who have been incarcerated are less likely to marry later (London and Parker 2009; Lopoo and Western 2005), while other researchers have found little evidence of a detrimental effect of incarceration on getting married (Apel et al. 2010). Still other researchers have found evidence that the relationship between incarceration and later entry into marriage is not necessarily causal, but rather is at least partially explained by other factors such as low socio-economic status that make individuals *both* more likely to be incarcerated *and* remain unmarried (Western 2006).

² While a large proportion of the incarcerated population, both men and women, are parents, only 44 percent of jail and prison inmates younger than 25 years old have minor children, and 64 percent of jail and prison inmates 25-34 years old have minor children (Glaze and Maruschak 2008).

Over the past few decades, cohabitation has become the modal first union in the United States, and is especially common for disadvantaged couples and racial minorities (Bumpass and Lu 2000; Meier and Allen 2008). In other words, researchers must consider cohabitation as an important and normative relationship state for the population most likely to come in contact with the corrections system. With some notable exceptions (Geller et al. 2009; London and Parker 2009), few nationally representative studies have addressed how incarcerations influence the formation of cohabiting relationships. A longitudinal study of adults in the United States showed that, compared to individuals who had never experienced an incarceration, those with a history of incarceration were more likely to cohabit with a partner or live alone and less likely to live with a spouse (London and Parker 2009). Research on families in the Fragile Families and Child Wellbeing Study found that mothers and fathers who had been incarcerated in the past were less likely to live in the same household as their child by the child's third birthday compared to parents who had never been incarcerated (Geller et al. 2009; Geller, Garfinkel, and Western 2011). The Fragile Families study sampled parent couples and followed them over time, but did not examine the formation of cohabiting unions or marriages prospectively. In addition, the studies described above lack complete information on incarceration and cohabiting relationship experiences over the life course due to data limitations. Establishing a plausible causal relationship between incarceration and cohabitation requires establishing a temporal relationship between the two states; using data from the NLSY97 will allow me to establish temporal ordering between incarcerations and cohabitations.

Using the wealth of information on incarceration and relationships available in the NLSY97, I am able to make three fundamental contributions to the literature on the consequences of the expanding prison system in the United States for the formation of couple relationships. First, I have nearly complete event history information on both incarceration and union transitions for a nationally

representative sample of young people from adolescence into young adulthood. These data allow me to establish temporal ordering between periods of incarceration and transitions into marriages and cohabiting relationships. Second, I construct new measures that capture heterogeneity in the experience of incarceration over the life course of incarcerated young adults. These measures allow me to test whether differences in incarceration experiences in adolescence and young adulthood are associated with transitions into marriage and cohabitation. Third, using a sample selection strategy, I address whether associations between incarceration and union stability are driven by unobserved heterogeneity.

BACKGROUND AND SIGNIFICANCE

While a large body of research has addressed the ways in which participation in marriage and family life can contribute to the desistence of criminal behavior over the life course (Laub, Nagin, and Sampson 1998; Laub and Sampson 1993; Sampson, Laub, and Wimer 2006; Warr 1998), fewer researchers have addressed the consequences of incarceration for the formation of romantic partnerships. The extant research has focused on four main issues: the causal mechanisms by which incarceration may create barriers to union formation,³ evidence that incarceration serves as a barrier to marriage, the association between cohabitation and marriage, and unobserved heterogeneity or selection into marriages and cohabiting partnerships.

³ In this chapter, I use the term “union formation” to describe entry into a romantic partnership, specifically a cohabiting partnership or a marriage, both of which are generally considered to be more stable, long-term, or committed than a girlfriend/boyfriend or “visiting” relationship.

Causal Mechanisms

Incarceration has the potential to disrupt the normative transition to adulthood by creating barriers or disincentives to the formation of stable romantic relationships. Marriage has persisted as a common part of the life course in the United States over a period marked by the rise in cohabiting partnerships and non-marital childbearing. Despite the rising age at marriage since the post-World War II period, the proportion of Americans who remain unmarried throughout the life course is still relatively small (Goldstein and Kenney 2001; Zeng et al. 2012). Union formation is particularly salient for young adults, with marriage often perceived as the “capstone” of adulthood (Cherlin 2004), and cohabitation often viewed as a “placeholder” by young adults who are not yet ready to marry, in large part because they have not reached a financial threshold suitable for marriage (Clarkberg 1999; Kefalas et al. 2011; Smock and Manning 1997; Smock, Manning, and Porter 2005). In previous research, several causal mechanisms that explain how incarceration may create a barrier to union formation and, ultimately, the transition to adulthood, have emerged: incapacitation, economic instability, stigma, and criminal embeddedness.

Incarceration may inhibit the chances of entering into a marriage or cohabiting union through *incapacitation* or removal from the marriage market (Apel et al. 2010; Clear and Rose 2003; Western 2006). Incarcerated individuals are physically removed from their communities and placed in a correctional facility, leaving fewer opportunities to find or engage with potential partners.⁴ Evidence from the Netherlands suggests that incarceration imposes more of a delay than a lasting barrier to union formation, with only a short-lived incapacitation effect on the probability of marriage after release from incarceration (Apel et al. 2010). In addition, individuals cannot be incarcerated while simultaneously

⁴ While there are some women who seek out men who are incarcerated for long periods of time as partners (Comfort 2008), the opportunities to form romantic partnerships inside prison are few compared to those in the broader community outside prison walls.

cohabiting with a partner.⁵ I address the effect of incapacitation on the likelihood of entering a union by including a variable measuring the average duration of time that respondents served in a correctional facility. That is, I estimate the association between the amount of time a respondent spent away from the community while incarcerated, on average, with the likelihood of entering a marriage or cohabitation in a given month.

An incarceration during young adulthood, and even adolescence, might also delay or undermine the formation of stable couple relationships by undermining economic stability. Low socio-economic status is associated with a higher likelihood of incarceration (Pettit and Western 2004) and a lower likelihood of entry into marriage (Carlson, McLanahan, and England 2004; Huebner 2005; Oppenheimer 1988; Schneider 2011; Xie et al. 2003). Socio-economic status, however, has not been shown to be associated with entry into cohabitation (Xie et al. 2003). Incarceration is detrimental to the employment and earnings capacity of individuals (Apel and Sweeten 2010; Geller, Garfinkel, and Western 2006; Geller, Garfinkel, and Western 2011; Huebner 2005; Pager 2003; Pager, Western, and Sugie 2009; Sabol and Lynch 2003). Men with a criminal record are more likely to experience difficulty finding employment (Pager 2003; Pager, Western, and Sugie 2009) and are more likely to remove themselves from the labor force (Apel and Sweeten 2010; Goffman 2009). Historical increases in the incarcerated population in the United States have been largely concentrated among men who were high school dropouts or who lack a college education (Pettit and Western 2004). Weak ties to the work force, low educational attainment, and involvement in the corrections system may form a feedback loop, worsening an individual's socio-economic status while increasing the individual's risk for entry and re-entry into the corrections system over time. These poor economic prospects may make an individual an

⁵ It is possible for incarcerated individuals to form same-sex partnerships while in jail or prison; however, I limit the current analysis to heterosexual partnerships.

unattractive candidate for a long-term stable relationship. In addition, individuals may avoid both stable residential arrangements (e.g., with a cohabiting partner) and employment situations in order to avoid a perceived threat of pursuit by law enforcement (Goffman 2009). While the current analysis does not model these socio-economic/incarceration feedback loops, I estimate an independent affect of incarceration by controlling for associations between socio-economic status and union formation. I include time-varying measures of socio-economic status in the analysis. That is, I measure the employment history, educational attainment, and school enrollment of NLSY97 respondents throughout young adulthood, both before and after incarceration.

Incarceration may influence the romantic partnering prospects of young adults through other mechanisms, such as stigma and involvement in criminal social networks. Individuals with a history of incarceration may be considered “unmarriageable” or an undesirable partner because of the negative stereotypes associated with incarceration and criminal behavior (Edin and Kefalas 2005; Massoglia, Remster, and King 2011; Sabol and Lynch 2003). At the same time, those involved in crime may find themselves with limited social networks populated by others who engage in criminal behavior and few potential stable partners, a phenomenon known as criminal embeddedness, (Apel et al. 2010; Hagan 1993). I am unable to test for these mechanisms directly in the current study.

Incarceration and Marriage

Several studies have addressed the association between incarceration and the likelihood of subsequent marriage. Using a sample from NLSY79, researchers found evidence that incarceration may have served as a barrier to marriage for men who were young adults in the 1980s and early 1990s in the United States. Lopoo and Western (2005) found that an incarceration and a marriage were unlikely to occur in the same year, and that individuals with an incarceration in their past were less likely to get

married. Huebner (2007) found that black, white, and Hispanic men who had been incarcerated in the past were less likely to marry, but incarceration was more harmful to the marriage prospects of white and Hispanic men than black men (who had the lowest marriage rates of these racial/ethnic groups, even among those who were not incarcerated). Closer examination of these findings from the NLSY79 shows that a history of unemployment, at least in part, explains the association between incarceration and marriage (Huebner 2005; Lopoo and Western 2005; Western 2006).

Studies of incarceration and marriage using the NLSY79 data suggest that incarceration may create a barrier to marriage, which is at least partially explained by economic mechanisms.

Unfortunately, the NLSY79 has incomplete measures of incarceration history. Specifically, the NLSY79 only provides information on whether a respondent was incarcerated at the time of their annual or biannual interview. In addition, these studies focused on marriage but not cohabitation, because detailed cohabitation histories are not available in the NLSY79. The current study uses the NLSY97, which includes detailed calendar information on all incarcerations, marriages, and cohabitations experienced by respondents.

Incarceration and Cohabitation

While much research has addressed the transition from cohabitation to marriage, there is little existing research on non-cohabiting couples' transitions into cohabiting relationships. On the whole, cohabitation in the United States does not require the same level of commitment, stability, or economic resources as marriage (Clarkberg 1999; Kefalas et al. 2011; Smock and Manning 1997; Smock, Manning, and Porter 2005; Xie et al. 2003). Existing research does not clearly conclude whether an incarceration would increase or decrease the chances that an individual might enter into a cohabiting partnership. While researchers have found that delinquent adolescents are more likely to cohabit and cohabit at

earlier ages than non-delinquents (Lonardo et al. 2010), criminal behavior rather than incarceration was used to measure delinquency. Compared to individuals who had never experienced an incarceration, individuals who had spent time in a correctional facility were more likely to cohabit with a partner, live alone, or live with extended family and less likely to live with a spouse (London and Parker 2009). On one hand, economic instability and stigma could make a formerly incarcerated individual unattractive as *either* a marriage partner or a cohabiting partner. Individuals who have frequent contact with law enforcement may actively avoid a stable living arrangement with anyone, even a girlfriend or boyfriend, in an effort to avoid further contact with police (Goffman 2009). On the other hand, cohabitation may be more probable for an individual with a history of incarceration. Cohabitation might be seen as a beneficial arrangement for an individual caught in the loop of incarceration and economic instability who cannot afford to live independently. In some cases, an inmate may be required to live in a “stable” situation (such as with a partner) as part of the terms of their parole (Goffman 2009), thus increasing the probability of cohabitation for previously incarcerated individuals. My study is the first to prospectively address this heretofore untested relationship between incarceration and entry into cohabitation using complete event histories on incarceration experiences.

Incarceration and Transition from Cohabitation to Marriage

While a large body of research has addressed the conditions under which couples transition from cohabitation to marriage, no studies have successfully incorporated incarceration as a possible explanatory factor. Research using the data from the Fragile Families and Child Wellbeing Study has shown that cohabiting parents are unlikely to stay together if one or both parents has a history of incarceration (Geller et al. 2009; Geller, Garfinkel, and Western 2011). The association between the transition from cohabitation to marriage and incarceration is inherently difficult to measure. Because

incarcerations involve removal from a residence, an incarcerated person cannot concurrently cohabit with a partner. While a marriage is a legal contract that exists apart from whether or not a couple lives together, cohabiting unions do not have a legal status outside co-residence. Without detailed prospective data on the timing of incarcerations, cohabiting partners, and co-residencies with those partners before and after incarcerations, it would be impossible to establish whether a relationship spanned across an incarceration or dissolved at the time of incarceration. If a cohabiting union was defined strictly by co-residence, every cohabiting individual sent to jail/prison would experience a union dissolution. For the purposes of the current study, I define a cohabiting relationship as a relationship based on both co-residence and an informal (that is, non-legal) romantic relationship that can span temporary disruptions such as an incarceration or military deployment.

Fortunately, NLSY97 contains detailed event histories for all incarcerations as well as all romantic cohabiting unions experienced over time; the study also links cohabiting partners across time so it is possible to measure whether incarcerations during cohabitation lead to the *dissolution* of a continuing cohabitation or simply a *temporary disruption*. No other nationally representative study contains this type of information in conjunction with detailed incarceration histories. Using the NLSY97, I am able to identify the relationship between incarceration disruption during a relationship and subsequent relationship dissolution.

Unobserved Heterogeneity

The relationship between incarceration and union formation may not be causal, but rather driven by an unobserved selection process that draws individuals both into prison and away from stable couple relationships. This selection process may be due to unobserved individual-level factors, structural and environmental factors, or both. In this section, I discuss three individual-level factors that

may be related to both a higher likelihood of incarceration and a lower likelihood of union formation: self-control, criminal propensity, and a low desire to marry. Next, I discuss whether the use of incarceration as a measure to predict union formation actually measures the association between criminal behavior and union formation. Finally, I discuss whether the association between incarceration and union formation may reflect structural trends in the stratification of marriage on socio-economic status.

Individual-level unobserved factors may explain the relationship between incarceration and failure to enter stable couple relationships because an individual who is inclined to engage in criminal activity that lands him or her in jail or prison may also tend to have trouble maintaining a romantic partnership (Western 2006). Researchers have asserted that criminal behavior and marriage are linked, not by a causal connection, but rather through a selection process that draws individuals out of "conventional" societal institutions and into crime and deviance (King and South 2011); additional studies have focused on other personal attributes that could lead to the same selection process, such as self-control or criminal propensity (Apel et al. 2010). King and South (2011) found that criminal behavior was associated with delayed marriage for men who reached young adulthood in the 1980s, but the association was, in part, explained by a self-reported desire to marry. That is, men who chose to engage in criminal activity also tended to choose not to engage in marriage. This study focused on criminal behavior itself (not incarceration), and used an older sample who of men had become young adults before the rate of incarceration reached the high levels currently experienced in the United States. Apel and colleagues' study (2010) of Dutch former prison inmates in the 1980s found no evidence that incarceration and being single selected on criminal propensity, but it is unclear whether their findings can be generalized to the United States. To address concerns about unobserved heterogeneity, I use a sample selection strategy that limits the analysis to those convicted of a crime. I base this strategy on

the assumption that the exclusion of never-convicted individuals should eliminate some unobserved variation in individual and environmental attributes when comparing individuals who have been incarcerated and those who have never been incarcerated.

As the response to crime in the United States has increasingly favored incarceration, it is important to establish whether incarceration has consequences for family life course transitions that are independent of criminal behavior itself. Incarceration may serve as a proxy measurement for delinquent or criminal behavior. While there is not a one-to-one correlation between criminal behavior and incarceration—that is, not all criminals are incarcerated and not all incarcerated persons are guilty of criminal behavior—the two phenomena are strongly intertwined. Crime and delinquent behavior were associated with delayed or forgone marriage in the late twentieth century in the United States. Criminal behavior was associated with delayed marriage for males who reached young adulthood in the 1980s, but this association was not found for women (King and South 2011). Delinquent youth from a cohort of children from the South Side of Chicago were less likely to marry by the age of 42 than their non-delinquent peers (Doherty, Green, and Ensminger 2012). I address criminal behavior as a confounding factor by controlling for self-reported criminal behavior among formerly incarcerated and never-incarcerated individuals in order to test for an independent relationship between incarceration and entry into marriage and cohabitation. I also use a sample selection strategy that compares the likelihood of union formation between those who were incarcerated and those who were convicted of a crime but not incarcerated, so that incarceration is assumed to capture differences in the experience of incarceration rather than differences in criminal behavior.

The characteristics of individuals who marry in the United States are changing. Marriage increasingly selects on positive socio-economic attributes, and at the same time, incarceration has become a more common life course experience for the poor. While the vast majority of individuals in

the United States will marry in their lifetime, marriage increasingly selects on demographic characteristics such as age, educational attainment, and race, with older, better-educated whites becoming increasingly more likely to marry over the past few decades (Goldstein and Kenney 2001). Members of these groups are the *least* likely to experience incarceration in their lifetime, suggesting that as incarceration becomes a more common life course experience in low-income, minority groups in the United States (Pettit and Western 2004), marriage is becoming an increasingly rare life course experience for members of this same group. The relationship between incarceration and the lower probability of marriage may be spurious. That is, individuals with low socio-economic status have both a higher probability of incarceration and a lower probability of marriage, as discussed above, but marriage may select on higher socio-economic status, better neighborhoods, and higher social capital rather than a clean criminal record. To address selection on socio-economic status, I use dynamic time-varying indicators that measure economic well-being both before and after incarcerations occur.

CURRENT STUDY

I improve upon past studies of incarceration and union formation by taking advantage of the detailed cohabitation, marriage, and incarceration histories collected in the National Longitudinal Survey of Youth 1997 cohort (NLSY97). The current study addresses three main research questions:

1. Is incarceration associated with the timing of first cohabiting and first marital unions?
 - a. How are the dynamics of incarceration (timing, frequency, length) associated with the transition to a first union?
 - b. Does the association between the risk of entering a union and incarceration change with age?
2. Is incarceration associated with the transition from a cohabiting union to a marital union?

- a. Is an incarceration during the course of a cohabiting union associated with transition to marriage? Does this association change depending on the length of the union?
 - b. Are the dynamics of an incarceration (timing, frequency, length) prior to the cohabiting union associated with transition to marriage?
3. Are formerly incarcerated individuals selected to avoid unions through unobserved factors or is there evidence of an independent association between union entry and incarceration?

In Part I of the analysis, I estimate four multivariate models. I first estimate whether there is a relationship between incarceration and subsequent entry into a first cohabitation. Second, I estimate whether there is a relationship between incarceration and subsequent entry into a first marriage. I then re-estimate the first cohabitation and first marriage models using a sample selection strategy designed to reduce selection bias.

To analyze the relationship between incarceration and union formation, I estimate a hazard model predicting whether cohabitation is the first union entered, with marriage as a competing risk. Next, I estimate a hazard model predicting whether marriage is the first union entered, using cohabitation as a competing risk. I use two measures of incarceration: the number of incarcerations experienced and the length of incarcerations experienced. All models control for the type of criminal behavior reported by respondents in order to test for an association between incarceration and union formation independent of criminal behavior. Because low-skilled minority men have a greater risk of incarceration (Pettit and Western 2004), all models also control for socio-economic status, gender, and race/ethnicity. Proportionality assumptions are relaxed by controlling for changes in the association between incarceration and union formation over time.

Next, I strategically account for selection bias due to unobserved heterogeneity. Specifically, I restrict the sample to the convicted population (individuals convicted of a crime and sentenced to

probation, community service, etc. rather than time in jail or prison), which serves as a comparison group for the incarcerated population (those convicted and sentenced to incarceration), as described by Apel and Sweeten (2010). The reason for using the convicted/not incarcerated population as a comparison group is that this population is more likely than the general (i.e., never convicted) population to have unobserved characteristics similar to those of the convicted/incarcerated population. In addition, using the convicted/not incarcerated comparison group provides more conservative estimates of an independent association between incarceration and union formation because the association cannot be attributed to any other aspect of criminal justice processing that leads to conviction (Apel and Sweeten 2010). This strategy, however, cannot account for all unobserved differences between individuals convicted of a crime. The strategy requires making the assumption that all individuals who are convicted of a crime have a high risk of future incarceration. Systematic differences in sentencing by seriousness or type of crime, prior record, race, and socioeconomic status violate this assumption. I mitigate these violations by controlling for all of these factors (type of criminal behavior, previous incarceration, race/ethnicity, educational attainment, and employment) in the analysis.

In Part II of the analysis, I estimate a hazard model predicting the transition to marriage among cohabiting couples using multiple measures of incarceration: the number of incarcerations experienced prior to the union, the length of incarcerations experienced prior to the union, and (when appropriate) incarceration that occurred during a union. As I did in Part I, I reduce selection bias by re-estimating the model with a sample that includes only individuals who have been convicted of a crime.

PART I: TRANSITION TO FIRST UNION

SAMPLE

I analyzed a sample of 8,960 respondents from the 1997 cohort of the National Longitudinal Survey of Youth (n=8,984) who had been interviewed at age 14 or older. The NLSY97 interview collected a prospective month-to-month marital and cohabiting relationship history beginning when the respondent turned 14 and ending with the respondent's most recent interview. Respondents who were older than age 14 at baseline gave a retrospective relationship history beginning at age 14. I excluded respondents who were not yet 14 years old at their most recent interview from the current analysis.⁶

MEASURES

Dependent Variable: Entry into First Union

Table 3.1 presents descriptive statistics for all respondents in the NLSY97 cohort from the 1997-2009 interviews. Table 3.2 presents descriptive statistics for respondents who ever reported an incarceration. Table 3.3 presents descriptive statistics for the general never incarcerated sample, or all respondents who were convicted of a crime. Table 3.4 presents descriptive statistics for the convicted/never incarcerated sample, or all respondents who were convicted of a crime and were not incarcerated. I define entry into a first union as a transition from a never-married/never cohabited state into a first marriage or cohabitation.

[TABLE 3.1 ABOUT HERE]

[TABLE 3.2 ABOUT HERE]

[TABLE 3.3 ABOUT HERE]

⁶ There were 78 respondents who cohabited before the age of 16, and 6 respondents reported getting married before the age of 16. A sensitivity analysis (not presented) that limited the sample to those over 16 years old had results that were virtually the same as the results presented here.

[TABLE 3.4 ABOUT HERE]

To estimate the probability of entering into a first cohabiting union, I use a categorical dependent variable: never married/never cohabited (single), first union=cohabitation, or first union=marriage. Of 8,960 young adults interviewed past age 14 in the NLSY97 from 1997-2009, over half (53 percent) entered into a cohabitation as a first union, and 13 percent had a marital first union that did not follow a cohabitation. About one third (35 percent) of respondents were censored without an observed marriage or cohabitation. Because of the age of the NLSY97 respondents at their most recent possible interview (the median age at 2009 interview was 27 years old), marriages observed in this cohort are biased toward early marriages (the median age at first marriage in 1997-2009 was 23.5 years old).⁷

To estimate the probability of entering a first marriage, I include all first marriages, including those preceded by a cohabiting union with the same partner or a different partner. One third of NLSY97 respondents had gotten married by the 2009 interview. Respondents could have been censored due to interview non-participation (refusal, withdrawal, loss to follow-up, death) or because they reported never marrying or cohabiting at the 2009 interview.

The median observation time to entry into a first union/censorship of all respondents was 8.83 years at median age 22 (min=14; max=30). Among respondents with a history of incarceration, 62 percent entered into a cohabitation compared to 52 percent of respondents who were never incarcerated. Among respondents who were convicted of a crime but never incarcerated, 71 percent entered into a first cohabitation. The median observation time for respondents in the convicted but not incarcerated sample was 7.1 years.

⁷ In 2009, the median ages at first marriage for females and males in the United States were, respectively, 26 and 28 years old (U.S. Census Bureau 2011).

The median observation time to first marriage (starting at age 14) was 9 years (age 23). Among respondents with a history of incarceration, 20 percent entered into a marriage compared to 34 percent of respondents who were never incarcerated. Among respondents who were convicted of a crime but never incarcerated, 32 percent entered into a first marriage. The median observation time for respondents in the convicted but not incarcerated sample was 9 years.

Independent Variables

Incarceration. Of the 8,960 respondents interviewed after age 14 in the NLSY97, 5.4 percent had been incarcerated prior to entering into a first union. Respondents who had been incarcerated spent an average of 6.2 months in a correctional facility per incarceration sentence prior to a first union.

Criminal behavior. Prior research suggests that partnerships often become strained or dissolve because of criminal behavior itself, not specifically because of a partner's incarceration (Edin and Kefalas 2005). Most individuals who engage in criminal behavior are never incarcerated. Of the NLSY97 cohort who reported engaging in criminal behavior, only 13 percent had ever been incarcerated prior to the 2009 interview.

Individuals who commit violent crimes may be qualitatively different than those who commit non-violent crimes (e.g., destruction of property or drug dealing, both of which could potentially contribute to family income). I include lifetime measures of engagement ("have you ever?"/"have you engaged in crime since the last interview?") in three types of self-reported criminal behavior that occurred at any time prior to the union in the analysis. First, I include binary (yes/no) measures of drug dealing with a criminal conviction or guilty plea, drug dealing without a conviction (the respondent was not convicted or arrested), and drug possession with a conviction/guilty plea. Second, I include a binary measure of non-violent criminal activity that asks where the respondent has ever had a conviction/guilty

plea for burglary, theft, property crimes, major traffic offenses (e.g., drunk driving), public order crimes (e.g., disorderly conduct, sexual offenses), and/or other crimes. This measure also includes reports of theft and property crimes for which the respondent was never caught or convicted. Third, I include a binary measure of violent criminal behavior, including any type of assault or robbery, committed by respondents who were convicted or pled guilty, or who reported committing these crimes without a conviction.

Within the incarcerated sample⁸, 61 percent of respondents reported drug-related criminal behavior, 9 out of 10 respondents reported committing a non-violent crime, and 3 out of 4 reported engaging in violent criminal behavior. Only about 1 in 5 (19 percent) respondents in the general never-incarcerated sample committed drug-related crimes, 55 percent committed non-violent crimes, and 31 percent committed violent crimes. The prevalence of each type of criminal history is lower for respondents in the convicted/never incarcerated sample than in the incarcerated sample.

Childbearing. I include a time-varying measure of the number of children a respondent reported giving birth to or fathering prior to the first union. Because they occur prior to the first union, these births occur outside of the context of a cohabitation or marriage. Previous studies have found that individuals who experience a family transition such as non-marital childbearing are also more likely to enter a cohabitation or marriage (Brien, Lillard, and Waite 1999; Guzzo 2006). In addition, women who experience a non-marital birth are more likely to enter into a cohabiting union than a marriage (Qian, Lichter, and Mellott 2005). Among the ever-incarcerated group, 30 percent of respondents experienced a first birth prior to their first cohabitation or marriage, while in the general never-incarcerated group only 16 percent entered a first union with at least one child.

⁸ In the current study, “incarcerated sample” refers to NLYS97 respondents who reported ever being incarcerated.

Socio-economic status. Widely used indicators of socio-economic status such as individuals' income, educational attainment, and occupation are not as highly correlated with socio-economic status in young adulthood as they are at older ages because young adults may still be in school and fully or partially dependent on their parents for financial support. At the same time, it is important to adjust for socio-economic factors when estimating an independent relationship between incarceration and union entry. I include three measures of young adult socio-economic status in the analysis.

First, I create a time-varying employment variable for the total number of hours the respondent worked in the previous year based on NLSY97 summary variables for the total number of hours worked per month from 1980 until the respondent's most recent interview. I limit the maximum mean number of hours worked per week to 80, though some respondents reported working more hours. Respondents worked an average of 1,164 hours, or 3.2 (eight-hour) days per week, in the final 12 months of observation. Respondents in the incarcerated sample worked, on average, fewer hours (870 total hours; 2.39 days per week) than respondents in either the convicted/never incarcerated sample (1092 total hours; 3 days per week) or the never-incarcerated general sample (1,183 total hours; 3.25 days per week). Second, I include a time-varying binary indicator of whether the respondent attended college as a full-time student in the past year. Compared to the general never incarcerated group (12 percent), a smaller proportion of young adults in the incarcerated (4 percent) and the convicted but not incarcerated (6 percent) groups were enrolled in college full time in the year previous to their first union or most recent interview. Third, I include a binary indicator of whether the respondent failed to complete high school by the most recent interview. Nearly one quarter (23 percent) of all respondents had dropped out of high school. The majority (61 percent) of the incarcerated sample had dropped out of high school, compared to only 40 percent of respondents in the convicted but not incarcerated sample, and 20 percent in the general never incarcerated sample.

Demographic characteristics. While nearly half (49 percent) of the NLSY97 respondents are females, both the incarcerated sample and the convicted/never incarcerated sample are more heavily dominated by males (82 percent and 71 percent respectively). Females comprise half of the never incarcerated general sample of respondents in marital and cohabiting relationships.

Over half of the respondents in the analytical sample are non-Hispanic white (52 percent), 26 percent are black, and 21 percent are Hispanic. Within the incarcerated sample, 39 percent of respondents are white, 37 percent are black, and 23 percent are Hispanic.⁹ Compared to the ever incarcerated sample, a smaller proportion of the convicted/never incarcerated sample is made up of racial/ethnic minorities.

METHODS

Discrete-Time Event History Model

I use a discrete-time event history analysis approach to estimate the relationship between incarceration and the hazard $h(t)$ of entry into a first union (*failure*) in month t (Allison 1982). The NLSY97 begins the collection of event histories for cohabitations and marriages at age 14. In the model, youth from the NLSY97 enter into the risk pool for entry into a first union at age 14.

Data structure. The NLSY97 collected monthly calendar-based event history information on union formation and incarceration. I expand the data to include one observation per person, per month from age 14 (t_0) to the final month observed (t). For example, a respondent who was observed from age

⁹ Data from the National Prisoner Statistics Program show that on December 31, 2010, the state and federal prison population ages 18-29 was 31 percent white, 39 percent black, and 23 percent Hispanic (Guerino, Harrison, and Sabol 2012). These estimates exclude prisoners with sentences of one year or less and also exclude jail inmates; therefore, these estimates are not directly comparable to the NLSY 1997 estimates, which include sentences of any length in jail or prison.

14 and who entered a first cohabitation on their 24th birthday would have been observed for 120 months from entry to exit and would have 120 observations (one per month). A categorical variable for *failure* is coded as 0 for each observation until the month t , and coded as 1 in the month t when the first cohabitation occurs, or 2 in the month t when the first marriage occurs, conditional on no other marriage or cohabitation occurring previously. For censored respondents, the failure variable is coded as 0 for all monthly observations. In the model predicting first marriage, I include a binary outcome for failure, which is coded as 0 for each observation until the month t , and coded as 1 in the month t when the first marriage occurs, ignoring any cohabitating partnerships that occurred prior to t .

Covariates can be either time-varying or time-invariant. Time-invariant characteristics are coded with the same value for all observations within each respondent. Time-invariant variables include gender and race/ethnicity.

Time-varying covariates can change across the monthly observations within a respondent. Time-varying covariates include the number of incarcerations, the average duration of all incarcerations, ever engaging in criminal behavior, number of children, total hours worked in the past 12 months, full-time college enrollment during the past year, highest grade completed, and age.

Logit estimates. I use multinomial logistic regression to estimate the relationship between incarceration and entry into first unions observed in the NLSY97 from 1997 to 2009. First, I estimate the relationship between incarceration and entry into a first *cohabitation*, with marriage treated as a competing risk.

Equation 3.1:

$$\text{LOGIT}[p_t^{\text{coh}}] = \ln \left[\frac{p_t(\text{cohabitation})}{p_t(\text{single})} \right] = \alpha Z_t + \beta_1 X + \beta_2 W_t$$

Equation 3.2:

$$\text{LOGIT}[p_t^{mar}] = \ln \left[\frac{p_t(\text{marriage})}{p_t(\text{single})} \right] = \alpha Z_t + \beta_1 X + \beta_2 W_t$$

Respondents can experience three union-entry outcomes: no event (censored or *single*), a transition to a cohabiting union (failure=*cohabitation*), or a transition to a marital union (failure=*marriage*). I

estimate a logistic regression model (Equation 3.1)¹⁰ estimating the probability p_t^{coh} of entering into a first cohabitation with entry into marriage as a competing risk, or the probability that a cohabitation will occur in the time interval t (month), given that a cohabitation or marriage did not occur previously, where α is the baseline probability of union entry, Z_t is a quadratic term for age,¹¹ X is a vector of time-invariant covariates, and W_t is a vector of time-varying covariates.

Next, I estimate the relationship between incarceration and entry into a first *marriage*. In this analysis, I ignore cohabitation rather than treating it as a competing risk. I estimate the probability p_t^{mar} of entering into a first marriage (Equation 3.2), or the probability that a marriage will occur in the time interval t (month), given that a marriage did not occur in a previous month.

RESULTS

Transition to First Cohabitation and First Marriage

Table 3.5 presents odds ratios and 95 percent confidence intervals for the discrete-time event history analysis estimating the probability of entry into a first cohabitation versus remaining single (never marrying and never cohabiting) during the NLSY97 (1997-2009). Table 3.6 presents odds ratios

¹⁰ Linked logit estimates of the probability of entry into a first marriage (the competing event) versus remaining in a never-union (single) state are not presented.

¹¹ An analysis (not presented) using a likelihood ratio test showed that including a quadratic term for age improved the fit of the model (compared to assuming a linear relationship between age and the probability of cohabitation).

and 95 percent confidence intervals for the the discrete-time event history analysis estimating the probability of entry into a first marriage versus never marrying.

[TABLE 3.5 ABOUT HERE]

[TABLE 3.6 ABOUT HERE]

Logit Model

Incarceration. Young adults who experience an incarceration are less likely to enter a cohabiting or marital union when other factors—self-reported criminal behavior, fertility, socio-economic status, gender, and race/ethnicity—are held constant. With each incarceration, an individual's odds of remaining single in a given month increase by 51 percent ($1/0.66=1.51$) relative to the odds of entry into a cohabitation, but this association is not statistically significant. The likelihood of marriage decreases by 22 percent upon incarceration, a statistically significant change. I find little evidence that the average length of prison or jail time served is associated with the likelihood of entry into a first cohabitation in a meaningful way, although there is a weak negative association.

Other covariates. All types of criminal behavior are significantly associated with a greater likelihood of entering into a cohabiting relationship than remaining single in a given month, even when holding incarceration constant. These findings are consistent with recent research that found delinquent adolescents were more likely to cohabit and cohabit earlier than non-delinquents (Lonardo et al. 2010). In the current analysis, respondents who had ever committed, or were convicted of, drug-related crimes were 23 percent more likely enter into a cohabiting relationship (relative to remaining single) compared to those who never reported drug-related criminal behavior. Those who had ever committed, or were convicted of, a non-violent crime had 30 percent greater odds of entry into a cohabitating union than those who did not report non-violent criminal behavior. Similarly, respondents

who reported violent criminal behavior or conviction for a violent crime had 42 percent greater odds of cohabitation compared to those who had not reported this type of criminal behavior.

Young adults who reported committing drug crimes were significantly less likely to enter a marriage (compared to remaining single) than those who did not report drug dealing or possession. I estimate that the odds of remaining never-married rather than entering a marriage are 22 percent higher for those who reported drug-related criminal activity compared to those who never engaged in drug-related criminal activity. Other violent and non-violent criminal behaviors are positively and significantly associated with marriage. These findings are inconsistent with the research of Laub and Sampson (1993) who found that individuals who engaged in crime and other risky behaviors are less likely to marry; however, the Laub and Sampson study involved a much older cohort.

Greater levels of educational attainment and employment significantly predict a higher likelihood of entry into cohabitation; all of the socio-economic indicators have a positive and significant association with the likelihood of entry into marriage. Consistent with previous research (Thornton, Axinn, and Teachman 1995), full-time college students are significantly less likely to enter into a cohabitation; however, the finding that school enrollment predicts marriage is inconsistent with previous research. Childbearing is significantly associated with a higher probability of entering into a first union. Compared to whites and Hispanics, blacks were significantly more likely to remain single in any given month (relative to entering into a first marriage or cohabitation). There was no significant difference in the rate of cohabitation for Hispanics and whites; however, Hispanics were significantly less likely than whites to marry.

Convicted comparison sample estimates. Convicted sample estimates of odds ratios and 95 percent confidence intervals for entry into first cohabitation are presented in Table 3.5. Convicted

sample estimates of odds ratios and 95 percent confidence intervals for entry into first marriage are presented in Table 3.6. The results indicate that, in general, the relationship between incarceration history and entry into a first cohabitation or a first marriage cannot be attributed to unobserved factors in the adjudication process leading to conviction. Logit models using a non-incarcerated comparison group convicted of crimes yielded similar estimates to the full-sample models. Among young adults who had been convicted of a crime but never incarcerated, the odds of cohabitation decrease by 48 percent ($1 - 0.51 = 0.48$) after each incarceration; this association is stronger than the full-sample estimates and is statistically significant. The association between incarceration and marriage is slightly weaker for the convicted sample than for the full-sample estimates, but remains significant. As with previous estimates that use the full sample, the average duration of incarceration is weakly associated with the risk of entering a first union.

PART II: TRANSITION FROM COHABITATION TO MARRIAGE

SAMPLE

I analyzed a sample all 6,455 cohabitations observed in the NLSY97 cohort ($n=8,984$) through the 2009 wave. Respondents reported start and end dates (month and year) of cohabitations from 1994 (prior to the baseline interview) through 2009 (the most recent available interview). Respondents reported a maximum of seven cohabiting partnerships, and multiple cohabitations reported by a single respondent are included in the sample. Over half of the total sample (4,733 respondents) reported at least one cohabitation.

[TABLE 3.7 ABOUT HERE]

[TABLE 3.8 ABOUT HERE]

[TABLE 3.9 ABOUT HERE]

[TABLE 3.10 ABOUT HERE]

MEASURES

Dependent Variable: Transition to Marriage

Table 3.7 presents descriptive statistics for all cohabitations observed in the NLSY from the 1997-2009 interviews. Table 3.8 presents descriptive statistics for cohabitations in the ever incarcerated sample. Table 3.9 presents descriptive statistics for cohabitations in the general never incarcerated sample. Table 3.10 presents descriptive statistics for cohabitations in the convicted/never incarcerated sample.

I use a categorical dependent variable with three categories: non-marital cohabiting partnership (censored), event=marriage, or event=dissolution. One quarter of the cohabiting partnerships observed in the NLSY97 from 1997-2009 transitioned to marriage, and half of all cohabiting partnerships were dissolved. The mean observation time to failure/censorship (duration) of all cohabitations was nearly two years.

Among cohabiters who were ever incarcerated or convicted of a crime, 16 percent later married compared to 26 percent from the never-incarcerated group. The mean observation time for cohabitations and marriages in the convicted but not incarcerated sample was 21 months.

Independent Variables

Incarceration. Of 6,455 total cohabitations observed in the NLSY97, 172 (3 percent) involved a respondent who was incarcerated *during* the cohabitation and 560 (9 percent, not shown in table) involved a respondent who was incarcerated *prior to* the cohabitation. Within the incarcerated sample, one quarter of cohabitations had a respondent incarceration occur during the cohabitation; this group had an average of one incarceration prior to the beginning of the union. In addition, within the

incarcerated sample, respondents spent an average of 5.4 months in a correctional facility per incarceration sentence prior to the union.

Criminal behavior. Within the incarcerated sample, nearly two thirds of cohabiting unions involved a respondent with a drug-related criminal history, 9 out of 10 unions involved a respondent who had committed a non-violent crime, and 3 out of 4 reported violent criminal behavior. Only about 1 in 4 (26 percent) unions in the general never incarcerated sample involved a respondent who committed drug-related crimes, 61 percent involved a respondent who committed non-violent crimes, and 39 percent of unions involved a respondent who committed violent crimes. The prevalence of each type of criminal history is slightly lower for unions in the convicted/never incarcerated sample than unions in the incarcerated sample.

Union characteristics. The number of cohabitations per respondent ranged from 1 to 7 (median=1). Nearly three quarters of all cohabiting unions (73 percent) were first cohabitations. A larger proportion of cohabiting unions were higher-order cohabitations in the ever-incarcerated sample (44 percent) than in either the convicted/never incarcerated sample (35 percent) or the general never incarcerated sample (25 percent).

The mean age at the beginning of all cohabitations is about 22 years old (the median age at cohabitation was 21 years and 8 months) and is similar across the incarcerated, never incarcerated, and convicted/never incarcerated groups. About 1 in 5 (21 percent) cohabiting couples had at least one child during the cohabitation, with a higher proportion of unions with children (28 percent) in the ever-incarcerated sub-sample. In about three quarters of cohabitations, the respondent had no children upon entering into the cohabiting relationship. The ever-incarcerated sub-sample had a greater average number of children prior to the cohabiting partnership (mean number of children=0.68) than either the general or the convicted sub-samples.

Socio-economic status. Cohabiting couples with greater socio-economic resources are more likely to marry (Manning and Smock 1995; Smock and Manning 1997; Smock, Manning, and Porter 2005). Respondents worked an average of 1,421 hours (about 27 hours per week) in the 12 months prior to a marriage or their most recent interview. Respondents worked fewer hours in the incarcerated sample (1,164 hours) compared to the convicted/never incarcerated sample (1,341 hours) and the never incarcerated general sample (1,451 hours). On average, respondents in cohabiting unions had completed more than 12 years of school, while in the incarcerated and convicted sample, respondents in cohabiting unions had less than a high school education on average.

Demographic characteristics. Over half (55 percent) of the cohabitations in the NLSY97 were reported by females; however, cohabitations in the incarcerated sample and convicted/never incarcerated sample are more heavily dominated by males (79 percent and 63 percent respectively). Among all respondents in cohabiting unions, over half are non-Hispanic white, 25 percent are black, and 21 percent are Hispanic. Within the incarcerated sample, 45 percent of cohabiting respondents are white, 34 percent are black, and 20 percent are Hispanic. There are relatively fewer racial/ethnic minority group members in the convicted but not incarcerated sample than in the ever incarcerated sample.

METHODS

Multilevel Discrete-Time Event History Model for Repeated Events

I use a discrete-time event history analysis approach to estimate the relationship between incarceration and the hazard $h(t)$ of marriage among cohabiting couples (Allison 1982). I model the duration of each cohabitation within each individual as the period of time during which a cohabitation is

at risk of transition to marriage (Steele 2008). If an individual experiences multiple cohabitations, the duration clock is reset to zero at the beginning of each new cohabitating union.

Data structure. Because monthly calendar-based event history information on union formation, dissolution, and incarceration was collected in the NLSY97, I expand the data to include one observation per person, per month from the beginning of a union (t_0) until the final month of observation (t). For example, a cohabiting union lasting 12 months from entry to exit would have 12 observations (one per month).

For the purposes of the current study, I define a cohabiting relationship as a relationship based on both co-residence and an informal (that is, non-legal) romantic relationship that can span temporary disruptions such as an incarceration. Because incarcerations involve removal from a residence, an incarcerated person cannot concurrently cohabit with a partner. Fortunately, the NLSY97 uniquely identifies cohabiting partners, so I am able to determine if a romantic cohabiting relationship spans the period before and after an incarceration. If an incarceration occurs during a cohabiting union, I consider the incarceration intake month as the exit from a cohabitation only if the respondent never again reports living with the same romantic partner.¹² If the respondent reports living with the same partner after an incarceration, I treat the partnership as if the cohabitation continuously spanned the incarceration.

A categorical variable for *failure* is coded as 0 for each observation until the month t , and coded as 1 in the month t when the marriage occurs, conditional on an observed marriage. I treat cohabitation dissolution as a competing risk; therefore, couples who stop living together permanently are coded as 0 for each observation until the month t , and coded as 2 in the month t when the break-up occurs. After

¹² Cohabiting respondents who transitioned into an incarceration are coded as breaking up if they are incarcerated at the time of the final interview ($n=3$).

time t , the couple is no longer at risk for marriage. For censored unions, the failure variable is coded as 0 for each monthly observation. For unions beginning and ending in the same month, I assume that the union lasted 0.5 months (approximately two weeks).

Time-invariant covariates include number of incarcerations prior to union, average duration of incarcerations prior to union, criminal behavior (ever engaged in criminal behavior by t_0), number of previous unions, age at union, the number of children the respondent had prior to the union, gender, race/ethnicity, and high school dropout status. Time-varying covariates include incarceration during union¹³, union duration, having a child with the current partner, total hours worked in the past year, and full-time college enrollment in the past year.

Logit estimates. The first stage of the analysis uses multilevel logistic regression to estimate the relationship between incarceration and marriage for *all* cohabiting partnerships observed in the NLSY97 from 1997 to 2009.

Equation 3.3:

$$\text{LOGIT}[p_t^{\text{mar}}] = \ln \left[\frac{p_t(\text{marriage})}{p_t(\text{cohabitation})} \right] = \alpha Z_t + \beta_1 X + \beta_2 W_t$$

I estimate a logistic regression model (Equation 3.3)¹⁴ estimating the probability p_t^{mar} of marriage (failure), or the probability that a failure will occur in the time interval t (month), given that it did not occur previously, where α is the baseline probability of transition to marriage, Z_t is a quadratic term for

¹³ I do not account for the month of release from incarceration within a union, nor do I account for second or higher-order incarcerations within unions because I assume that the length and frequency of incarceration during a union may be endogenous to the duration of that union. For example, a respondent in a longer, more stable union would have a greater period of exposure to the risk of being incarcerated multiple times and for longer periods *during* a union than a respondent in a more unstable union.

¹⁴ Linked logit estimates of the probability of cohabitation dissolution (the competing event) versus remaining in a non-marital cohabiting partnership were conducted but are not presented.

the duration of the union in months,¹⁵ X is a vector of time-invariant covariates, and W_t is a vector time-varying covariates.

Convicted comparison sample. As with the analysis in Part I, I estimate logit models on two samples: (1) all unions, and (2) unions reported only by NLSY97 respondents who were ever convicted of a crime in order to reduce selection bias due to unobserved heterogeneity (Apel and Sweeten 2010).

RESULTS

Table 3.11 presents odds ratios and 95 percent confidence intervals for the discrete-time event history analysis estimating the hazard of transition from cohabitation to marriage in the NLSY97 (1997-2009).

[TABLE 3.11 ABOUT HERE]

Logit Model

Incarceration. The results of the analysis suggest both *direct* and *indirect* associations between incarceration and the likelihood of transitioning to marriage for cohabiting partners. Incarceration during a cohabitation is strongly associated with a lower probability of marriage when other factors—prior incarceration, self-reported criminal behavior, union characteristics, socio-economic status, gender, and race/ethnicity—are held constant: The odds of marriage for cohabiting couples decreased 53 percent upon a partner incarceration. This estimate was statistically significant (95 percent CI: 0.41-0.55).

¹⁵ Likelihood ratio tests indicate that adding a quadratic term for time improves the fit of the model compared to a linear term. I assume, therefore, that the probability of transition to marriage is non-linear over the duration of a cohabitation.

I find a statistically significant association between the frequency of incarceration prior to cohabitation and the likelihood of marriage, *net of current incarceration*. Each additional incarceration prior to a union is associated with a 19 percent decrease in the odds of marriage in any given month compared to the odds of remaining in a non-marital cohabiting relationship.¹⁶ I estimate almost no relationship between the average duration of time in corrections prior to a cohabiting partnership and the subsequent likelihood of marriage.

Other covariates. Drug-related criminal behavior and violent criminal behavior prior to cohabitation are significantly associated with a decreased likelihood of marriage even while incarceration is controlled. Those who had ever committed, or were convicted of, drug-related crimes were 5 percent less likely to marry their partner compared to those who never reported drug-related criminal behavior. Conversely, those who had ever committed or were convicted of a violent crime had 13 percent *greater* odds of marrying their partner than those who had not reported non-violent criminal behavior. Respondents who reported non-violent criminal behavior other than drug-related crime had 29 percent greater odds of marriage compared to those who had not reported this type of criminal behavior.

For all indicators, higher socio-economic status significantly predicts a higher likelihood of transition to marriage. Childbearing with the current partner is significantly associated with a higher probability of a transition to marriage, but those who had children prior to the cohabitation were less likely to transition to marriage. Compared to whites and Hispanics, blacks were significantly more likely

¹⁶ A supplemental analysis (not shown) provides some evidence that the association between the number of incarcerations prior to a cohabiting union and the probability of transition to marriage weakens after two incarcerations. Allowing for a non-linear association does not substantively change the results. For the sake of parsimony, I assume a linear relationship between the number of incarcerations and the probability of transition to marriage. I hope to explore the possible non-linearity of this relationship in future versions of this paper.

to remain in a cohabiting relationship in any given month (compared to transitioning to marriage), and Hispanic cohabiters were significantly more likely than black cohabiters to marry.

Convicted comparison sample estimates. A logit model using a non-incarcerated but convicted comparison group yielded estimates similar to those from the full sample model. In sum, the relationship between incarceration history and marriage among cohabiting partners cannot be attributed to unobserved factors in the adjudication process leading to conviction. Upon incarceration, convicted cohabiters are 51 percent less likely to marry in a given month. This association is slightly weaker than the association for the less-conservative full-sample estimates, but remains statistically significant. The convicted sample estimates show that incarceration prior to the cohabitation decreases the odds of marriage in a given month by 14 percent, and this association is statistically significant.

DISCUSSION

The current study adds to the growing body of research that suggests incarceration may create barriers to the formation of lasting partnerships among young adults. The relationship between incarceration and couple relationships exists independently of criminal activity itself. This result suggests that the expansion of the corrections system in the United States may have detrimental consequences for the life course transitions of young adults.

In addition, the findings suggest that the effects of incarceration may extend beyond the individual who was incarcerated to partners, families, and communities. Incarceration may create barriers to marriage for cohabiting couples, and may also contribute to the persistence of crime in communities at the aggregate level. Past research has shown that forming stable romantic partnerships and engaging in family life contributes to the desistence of crime and delinquent behavior (Laub, Nagin,

and Sampson 1998; Laub and Sampson 1993; Sampson, Laub, and Wimer 2006; Warr 1998). Barriers to or delays in union formation may halt or slow the criminal desistence process. These consequences of incarceration must be weighed against any benefits that the expansion of incarceration may yield as a response to criminal and social problems in the United States.

My use of complete incarceration histories to measure the association between incarceration and union formation has confirmed what researchers have previously found using more limited data sources. Unlike previous studies, I am able to establish the temporal ordering of incarcerations and union transitions. In addition, the NLSY97 identifies and tracks respondents' cohabiting and marriage partners across time. I use this information to determine whether or not cohabiting couples continued their partnerships after an incarceration and subsequently transitioned to marriage, regardless of the fact that they were unable to live together during the incarceration. This study is the first to examine the relationship between incarceration and the transition to marriage for non-parent cohabiting couples.

Individuals who experience an incarceration are less likely to subsequently enter into a cohabitation or marriage in young adulthood. In addition, the findings demonstrate that individuals who cycle in and out of the corrections system have a lower probability of entering into a marriage or cohabitation than individuals who have been incarcerated a single time. Incarceration may create a barrier to the formation of stable or long-term partnerships through physical incapacitation, social stigma, exacerbation of economic instability, or embeddedness in criminal social networks. The presence of this barrier to marriage is consistent with previous research that found a start-up cost to marriage in terms of economic and relationship stability, which is especially salient for the economically disadvantaged (Clarkberg 1999; Kefalas et al. 2011; Smock and Manning 1997; Smock, Manning, and Porter 2005; Xie et al. 2003). I find modest evidence that physical incapacitation through removal from

the community (and therefore, the marriage market) may be a mechanism by which incarceration inhibits marriage among young adults. Those with higher socio-economic status were more likely to enter into a first marriage during young adulthood. In light of Apel and Sweeten's (2010) research using the NLSY97, which found that incarcerated individuals tended to remove themselves from the labor market, my findings are consistent with the theory that incarceration may exacerbate poor economic circumstances, thereby reducing the likelihood of marriage.

The findings suggest that incarceration may help establish a barrier that is too high even for the formation of cohabiting relationships, despite previous findings that the start-up costs of cohabitation partnerships are not as high as the start-up costs of marriage (Xie et al. 2003). My findings add a new dimension to conclusions from recent research that found delinquent adolescents were more likely to cohabit and cohabit earlier than non-delinquents (Lonardo et al. 2010), and that individuals with a history of incarceration were more likely to reside in a household with a cohabiting partner than to reside with a spouse (London and Parker 2009). In the current analyses, independent of both criminal behavior itself and conviction of a crime, individuals who experienced an incarceration were *less* likely to enter into a first cohabiting partnership in young adulthood. Conditions of stigma, limited social networks, and economic instability unique to those who have been incarcerated may make it more difficult and/or less desirable for individuals who have been incarcerated to enter into a longer-term cohabiting partnership. Incapacitation, as measured by the average time served in prison, did not explain the mechanism behind the higher likelihood of remaining single for incarcerated individuals.

Given the lower likelihood of entering into a cohabiting partnership among men and women who have been incarcerated, those who do enter these types of relationship may be a highly select group. I examined the transition to marriage for first and higher-order cohabiting relationships. Cohabiting young adults are less likely to marry when a partner has been incarcerated, whether that

incarceration occurs prior to or during the cohabitation. Although the cumulative disadvantage, economic incapacitation, and instability due to incarceration are not enough to prevent a select group of formerly incarcerated individuals from pursuing a cohabiting relationship, incarceration may still create a barrier to marriage by causing financial hardship during the cohabitation, relationship stress due to social stigma, or simply disruption and relationship strain due to living apart. The transition from cohabitation to marriage is not related to the *degree* of incapacitation experienced by former prisoners. This finding suggests that the amount of time an individual was removed from the community—and the weakening of social and economic ties caused by that time away from the community—has little bearing on the transition from cohabitation to marriage.

The current research suggests that the association between incarceration and union formation cannot be attributed solely to unobserved factors. I used a sample selection approach to estimate the degree to which unobserved heterogeneity plays a role in the association between incarceration and union dissolution. I find that the lower probability of union formation cannot be explained by unobserved factors associated with being convicted of a crime. Unobserved person-level characteristics that lead to both incarceration and avoidance of or difficulty establishing more stable partnerships may be expected to lead to an over-estimate of the independent association between incarceration and union formation; however, this overestimation appeared to be minimal for entry into marriage. Unobserved factors associated with criminal conviction may be associated with a higher likelihood of entry into a cohabiting partnership, which is somewhat consistent with previous research showing that delinquency was associated with cohabitation (Lonardo et al. 2010).

While the NLSY97 contains substantial information on cohabitations and marriages, I am unable to observe how long a couple dated prior to a cohabitation or marriage or whether an incarceration took place during that dating period. Dating couples who broke up after an incarceration are excluded

from the study; conversely, a more stable group of dating couples who proceeded with a relationship after an incarceration are selected into the sample if they cohabit or marry. If dating couples are more likely to break up if a partner is incarcerated, the results of the current study are a conservative estimate of the negative association between incarceration and union formation. Further research involving the collection of information on couple dyads and dating couples would contribute to the scholarly understanding of the ways in which incarceration influences decisions about union formation.

Although the NLSY97 contains a wealth of information on the incarceration experiences of individual respondents, I am unable to determine whether their partners were ever incarcerated, with the exception of current partners in the 2002, 2007, and 2009 waves. This data limitation could lead to a Type II error such that a respondent's cohabiting partner was incarcerated, but the incarceration was not observed. A Type II error would be more likely to occur among female respondents because male incarceration rates are higher than female incarceration rates in the United States. Supplemental analyses excluding female respondents (not shown) yielded findings that were substantively similar to the results of the analyses presented here.

The current analysis showed that respondents who reported non-drug-related criminal behavior were more likely to enter into a marriage or cohabitation than those who reported never engaging in this type of criminal behavior. Those who reported drug dealing and possession, however, were less likely to enter into a first marriage or cohabitation than those who never reported drug dealing or possession. Involvement in drugs or drug dealing may serve as a proxy for a persistent lifestyle marked by criminal behavior, while violent and other non-violent crime may have been isolated incidents. Individuals involved in drug crimes may be more highly stigmatized by their partners than those who committed other types of crime. Drug laws are heavily enforced and draw harsher prison sentences in comparison to other criminal behavior—even violent crimes such as robbery (Blumstein 1993). This

harsh enforcement of drug laws may indicate an especially risky lifestyle for drug offenders in terms of contact with law enforcement and the corrections system, making these individuals less desirable marriage partners. Further exploration of criminal behavior reported in the NLSY97 is warranted to tease out these associations.

Despite these limitations, the current study establishes a link between incarceration and the delay of or failure to engage in more stable or long-lasting romantic partnerships among young adults in the United States. The expansion of the U.S. corrections system has turned incarceration into a common life course event for individuals who are already facing economic hardship. This nation-wide response to crime may exacerbate the instability and uncertainty facing these young adults, thereby delaying their transitions into more stable adult roles and leading to the persistence of criminal behavior.

CHAPTER 4: INCARCERATION AND UNION INSTABILITY

INTRODUCTION

The expansion of the prison system in the United States over the last three decades has drawn the attention of politicians, community activists, and scholars alike. While this expansion may have initially emerged as a way to preserve “law and order” and benefit communities, a confluence of historical circumstances including the erosion of the welfare state, the rise of community activism, and the development of the criminal justice system have brought about largely unanticipated consequences for individuals and communities (Gottschalk 2006). For example, past research has shown that incarceration has consequences for a broad range of social institutions, from employment and the labor market (Apel and Sweeten 2010; Pager 2003) to voting behavior and democratic elections (Uggen and Manza 2002).

Previous studies investigating the consequences of incarceration for couple relationships in the United States have suggested that incarceration is associated with relationship instability (Geller et al. 2009; Lopoo and Western 2005; Western 2006). In addition, incarceration is associated with other negative outcomes that can threaten the stability of families, such as unemployment, financial hardship, and residential instability (Apel and Sweeten 2010; Geller et al. 2009).

Despite the valuable contributions of these studies, there is currently a dearth of knowledge about the influence of incarceration on union dissolution among recent cohorts of young adults. Much of the existing research that links incarceration and family outcomes at the national level uses data that are limited in their measurement of the incarceration experience over the life course (e.g., the National Longitudinal Survey of Youth 1979 cohort and the Fragile Families and Child Wellbeing Study).

In this chapter, I use a sample of married and cohabiting unions from the National Longitudinal Survey of Youth 1997 cohort to estimate the association between incarceration history and couple relationship transitions, specifically, the dissolution of cohabiting relationships and the dissolution of marriages through divorce or legal separation. Using detailed life history information, I make three fundamental contributions to this body of research. First, I use complete information on the history of incarceration over the life course in conjunction with complete cohabitation and marriage histories to establish the temporal ordering of these events and estimate the association between incarceration and union dissolution. Second, I construct new measures that capture heterogeneity in the experience of incarceration; these measures allow me to test whether differing incarceration experiences have different associations with relationship stability. Third, using appropriate statistical modeling and sample selection strategies, I address whether associations between incarceration and union stability are driven by unobserved heterogeneity.

BACKGROUND AND SIGNIFICANCE

Emerging research on the expansion of incarceration in the United States highlights the consequences of this expansion for both communities and individuals. However, only a few researchers have addressed whether the expansion of the corrections system has played a role in destabilizing marriages and cohabiting relationships. These initial studies have focused on three main issues: the pathways from incarceration to relationship instability, incarceration's association with the stability of couple relationships, and selection bias due to unobserved factors that lead to both incarceration and unstable relationships.

Pathways from Incarceration to Relationship Instability

Relatively little attention has been paid to the potential weakening of social ties in the community that comes with removing people from their communities through incarceration (Clear and Rose 2003). This study focuses on a specific observable aspect of this weakening of social ties due to incarceration: the diminishment of the bonds between individuals in married and cohabiting couples.

Incarceration is an institutional intervention in the lives of men and women that has the potential to alter the life trajectory of the prisoner's romantic partner, as well as that of the prisoner, in both direct and indirect ways. Directly, incarceration can negatively affect the lives of spouses and cohabiting partners through residential instability (removal of one partner from the home), household disruption, and stigma-induced relationship stress (Braman 2002; Clear and Rose 2003; Massoglia, Remster, and King 2011; Western 2006). The corrections system that seeks to prevent individuals from engaging in further criminal behavior also prevents them from engaging in their partner/family relationships or paid employment that can support their families.

Indirectly, incarceration could harm the stability of the marriage or cohabiting union through the diminished employment and earnings capacity of partners who have been previously incarcerated (Apel and Sweeten 2010; Geller, Garfinkel, and Western 2006; Geller, Garfinkel, and Western 2011; Pager 2003; Pager, Western, and Sugie 2009; Sabol and Lynch 2003; Western 2006; Western, Kleykamp, and Rosenfeld 2006). Individuals with a criminal record are more likely to experience difficulty finding employment (Pager 2003; Pager, Western, and Sugie 2009) and are more likely to remove themselves from the labor force (Apel and Sweeten 2010; Goffman 2009). Historical increases in the incarcerated population in the United States have been largely concentrated among men who were high school dropouts or who lack a college education (Pettit and Western 2004). Ties to the corrections system may

form a feedback loop with weak ties to the work force and low educational attainment, worsening an individual's socio-economic status while at the same time increasing the individual's risk for entry and re-entry into the corrections system over time. The combination of residential instability due to time spent in corrections, and financial instability due to low levels of educational attainment and employment among those with an incarceration history may add strain to romantic partnerships, making them more unstable. While socio-economic risk factors for diminished union stability are observable, other possible indirect consequences of incarceration such as reduced attachment to family, relationships, and the larger community are more difficult to measure (Clear and Rose 2003; Goffman 2009).

The current study examines both incarcerations that occurred within a union (direct or concurrent influence of incarceration on union stability) and those that occurred prior to a union (indirect or delayed influences of incarceration on union stability). While previous longitudinal studies (NLSY79 and Fragile Families) have included data on both the timing of an incarceration and the timing of a union dissolution (before or after a specific point in time, i.e., an interview), researchers cannot always determine from the available information when an incarceration and a union dissolution happened in relation to one another. This study uses detailed calendar information in the NLSY97 for all incarcerations, unions, and union dissolutions experienced by individuals. This information allows me to establish the temporal order of these events and determine the direct and indirect associations between incarceration and union dissolution.

Incarceration and Union Dissolution

Previous research suggests that incarcerated men are more likely to divorce than non-

incarcerated men. Lopoo and Western (2005) used the National Longitudinal Study of Youth 1979 cohort to study the relationship between incarceration, marriage, and divorce. The authors found that divorce is associated with an incarceration in the same year. A history of incarceration, however, was not significantly associated with divorce for men in the NLSY79 cohort. (Western 2006) found that incarcerated men in the NLSY79 cohort were more likely to have ever divorced. Unfortunately, the NLSY79 did not collect sufficiently detailed incarceration histories; the study only collected information on whether respondents had been incarcerated prior to 1980 (when the respondents were between the ages of 15 and 22) and whether respondents were interviewed in a correctional facility. Therefore, the NLSY79 data are more likely to capture juvenile offenses and longer incarcerations spells for more serious crimes, while the shorter incarcerations that are experienced by a substantial proportion of the incarcerated population (Glaze, Minton, and West 2010; U.S. Department of Justice 2011) are more likely to remain unobserved.¹⁷ In addition, the authors did not establish the temporal order of incarceration and marriage or divorce in the same year. That is, the NLSY79 did not collect information on whether the divorce or the observed “current” incarceration came first.

Few nationally representative studies have addressed how incarcerations might influence cohabiting couple relationships. Over the past few decades, cohabitation has become the modal first union in the United States, and is especially common among disadvantaged couples and racial minorities (Bumpass and Lu 2000). It is important to consider cohabitation as an important and normative relationship state for the population most likely to come in contact with the corrections system. Lopoo and Western (2005) did not consider the relationship between incarceration and transitions out of (or into) cohabiting unions, possibly due to the data limitations of the NLSY79.

¹⁷ From 1980 to 2000 the proportion of incarcerated adults who were serving time in local jails—facilities that typically house inmates for sentences of less than one year—ranged from about 31 percent to 36 percent, suggesting that a substantial proportion of individuals in corrections on any given day are incarcerated for a few months at a time.

Ethnographic studies of marital and non-marital co-parenting relationships in low-income populations have shown that the incarceration of partners creates relationship and mental stress, as well as a heavy financial burden, for the families they leave behind (Braman and Wood 2003; Comfort 2008; Edin and Kefalas 2005; Goffman 2009; Travis and Waul 2003). In their qualitative study of low-income incarcerated fathers, Edin and colleagues (2004) found couple relationships rarely withstood the test of an incarceration spell.

A nationwide study of urban parents suggested that the incarceration of one of the partners may make it difficult for a couple to maintain lasting partnerships. Geller and colleagues (2009) followed parent dyads (married, cohabiting, and visiting) in the Fragile Families and Child Wellbeing Study. The authors observed a reduction in the proportion of parents who were cohabiting three years after their child's birth, and this proportion was slightly—but significantly—lower among dyads in which a parent was incarcerated. Over the same period, the proportion of married parents grew within the incarcerated groups. It is unclear how much of the decline in the proportion of cohabiting parents in the incarcerated group can be attributed to dissolutions and how much of the decline can be attributed to transitions from cohabitation to marriage. Like the NLSY79, the Fragile Families study did not provide complete information on incarceration history. The child-based Fragile Families sample is limited to individuals who are parents, and the study did not collect retrospective histories of incarceration prior to parenthood. While the timing of incarcerations relative to the timing of interviews can be established, the Fragile Families study did not collect the information needed for researchers to establish when incarcerations and union dissolutions occurred in relation to each other in all cases.

The association between cohabitation dissolution and incarceration is inherently difficult to measure. Because incarcerations involve removal from a residence, an incarcerated person cannot

concurrently cohabit with a partner. A marriage is a legal contract that exists apart from whether or not a couple lives together, but cohabiting unions do not have a separate legal status outside of co-residence. Without detailed prospective data on the timing of incarcerations, cohabiting partners, and co-residencies with those partners before and after incarcerations, it would be impossible to establish whether a relationship spanned an incarceration or dissolved at the time of incarceration. If a cohabiting union was defined strictly by co-residence, all cohabiting individuals sent to jail/prison would experience a union dissolution. For the purposes of the current study, I define a cohabiting relationship as a relationship based on both co-residence and an informal (that is, non-legal) romantic relationship that can span temporary disruptions such as an incarceration or military deployment.

Fortunately, the National Longitudinal Study of Youth 1997 contains detailed event histories for all incarcerations and all romantic cohabiting unions experienced over time while linking cohabiting partners across time so that it is possible to know whether incarcerations during cohabitation lead to a dissolution or simply a temporary disruption of the cohabitation. No other nationally representative study contains this type of information in conjunction with detailed incarceration histories. Using the NLSY97, I am able to identify the association between incarceration during a relationship and subsequent relationship dissolution.

Selection Bias

Past research suggests that there may be a complex relationship between incarceration and relationship dissolution. In attempting to identify the consequences of incarceration for individuals, partners, and families, researchers have also recognized that a selection process may occur because individuals at risk for incarceration also tend to struggle in other areas of their lives, including family

relationships (Apel and Sweeten 2010; Geller, Garfinkel, and Western 2011; Goffman 2009; Western 2006). Short of randomly assigning a partner to incarceration, researchers cannot definitively establish causation between incarceration and the dissolution of marriages and cohabitations (Apel and Sweeten 2010).

Qualitative research has provided some valuable insight into how an individual may be at risk for both incarceration and unstable partnerships due to observable factors, such as criminal behavior and socioeconomic status, and factors that are more difficult to quantify and define. An ethnographic study involving interviews with low-income mothers found that incarcerated fathers' engagement in criminal activity tended to alienate the mothers of their children prior to their actual incarcerations (Edin and Kefalas 2005). While incarceration may have had a direct effect on relationship dissolution, it may also have served as the final provocation in a string of relationship transgressions that began with participation in criminal behavior (Edin, Nelson, and Paranal 2004). Goffman's (2009) research showed that young black men in a heavily policed neighborhood actively chose to avoid legitimate employment and stable romantic partnerships as part of a strategy to avoid law enforcement. A young man who maintains a steady job or steady residence with his girlfriend might be easier for the police to locate in the event that he is suspected of a crime. The ubiquitous presence of law enforcement in the lives of these poor, low-skilled black men creates both a real and a perceived risk of incarceration, and reinforces the choices and behaviors that lead to a lifestyle characterized by unsteady employment and unstable relationships.

While this ethnographic research provides important information about how an individual may be selected into both incarceration and unstable relationships, the research does not answer the question of whether there is an independent relationship between incarceration and union stability.

The current study takes three steps to directly address selection bias in the measurement of the association between incarceration and union stability. First, the analysis controls for observable factors, including criminal behavior and low socio-economic status, which may place an individual at higher risk for incarceration and relationship instability. Second, I use a statistical modeling approach to measure unexplained within-person variance (i.e., a random intercepts approach). Last, I use a sample selection strategy to reduce unobserved heterogeneity by creating a comparison group consisting of individuals who were convicted of a crime but never incarcerated; this group is more similar to the incarcerated group than the general population.

CURRENT STUDY

I improve upon past studies of incarceration and union transitions by taking advantage of the detailed cohabitation, marriage, and incarceration histories collected in the National Longitudinal Survey of Youth 1997 cohort (NLSY97). The current study addresses two main research questions:

1. Is incarceration either directly or indirectly associated with the dissolution of cohabiting and/or marital unions?
 - a. Is an incarceration during the course of a cohabiting or marital union associated with union dissolution (direct effect)?
 - b. Are differing dynamics of incarceration, including the frequency or length of incarceration, prior to the cohabiting or marital union associated with union dissolution (indirect effects)?

I estimate four multivariate models. I first estimate whether there is a relationship between incarceration and union dissolution; the three subsequent models use different methods to account for potential selection bias and unobserved heterogeneity.

To determine the relationship between incarceration and union dissolution, I estimate a hazard model predicting a union dissolution using multiple measures of incarceration: the number of incarcerations experienced prior to the union, the length of incarcerations experienced prior to the union, and (when appropriate) incarceration during a union. All models control for the type of criminal behavior reported by respondents in order to test for an association between incarceration and union dissolution independent of criminal behavior, which can add strain to a relationship (Edin and Kefalas 2005). Low-skilled minority men have a greater risk of incarceration (Pettit and Western 2004); therefore, all models also control for socio-economic status, gender, and race/ethnicity. Finally, all models also control for relationship characteristics. Proportionality assumptions are relaxed by controlling for changes in the association between incarceration and union dissolution over the duration of the union.

Next, I use two strategies to reduce selection bias due to unobserved heterogeneity. The first strategy uses discrete-time multilevel event history analysis for repeated events, which takes advantage of multiple unions experienced by individuals in order to estimate within-person variance attributed to unobserved factors (Allison 1982; Steele 2008). Individuals who have a high risk of union dissolution while in a cohabitation or marriage may also have a high risk of dissolution while in a subsequent union. By allowing for residual correlation between union transitions within an individual, I am able to estimate whether unobserved person-specific characteristics are associated with the risk of union dissolution.

Second, I use a sample selection strategy to produce conservative estimates of the association between incarceration and family transitions. Specifically, I restrict the sample to the convicted population as described by Apel and Sweeten (2010); individuals who have been convicted of a crime but were sentenced to probation, community service, or other consequences rather than time in jail or prison serve as a comparison group for the incarcerated population (those who were convicted and

sentenced to incarceration). The reason for using the convicted/not-incarcerated population as a comparison group is that this population is more likely than the general (i.e., never convicted) population to have unobserved characteristics similar to those of the convicted/incarcerated population. In addition, using the convicted/not-incarcerated comparison group provides more conservative estimates of an independent association between incarceration and union dissolution because the association cannot be attributed to any other aspect of criminal justice processing that leads to conviction (Apel and Sweeten 2010).

SAMPLE

I analyzed a sample of 8,042 unions (marriages and cohabitations) from the 1997 cohort of the National Longitudinal Survey of Youth (n=8,984). Respondents reported the start and end dates of marriages and cohabitations from 1994 (prior to the baseline interview) through 2009 (the most recent available interview). I define unions based on partnership rather than marital status. A respondent can report multiple cohabitations, multiple marriages, or a combination of the two types of unions; however, if a respondent's cohabitation transitions into a marriage, I define that partnership as a single union.

MEASURES

Dependent Variable: Union Dissolution

Table 4.1 presents descriptive statistics for all cohabitations and marriages reported by the NLSY97 Cohort from 1997-2009. Table 4.2 presents descriptive statistics for cohabitations and marriages reported in the ever incarcerated sample. Table 4.3 presents descriptive statistics for cohabitations and marriage reported in the general never incarcerated sample. Table 4.4 presents

descriptive statistics for cohabitations and marriage reported in the convicted/never incarcerated sample.

Of 8,042 unions reported in the NLSY97 from 1997-2009, nearly half were dissolved (49 percent). The mean observation time to failure/censorship of all unions was 3 years. Marriages were observed for an average of 4.5 years, while cohabitations were observed for an average of 2 years. Two thirds of all cohabitations ended when a couple stopped living together permanently. Marriages were more stable than cohabitations, with only 22 percent dissolving with an observed legal separation, divorce, or cohabitation with a new partner.

Among unions in which a respondent was ever incarcerated prior to or during the union, 57 percent were dissolved, compared to 48 percent of unions in which respondents were never incarcerated. Unions reported by respondents who were convicted of a crime but never incarcerated had a higher percentage of dissolution (67 percent) compared to both the incarcerated sample and the never incarcerated general sample. The mean observation time for cohabitations and marriages in the convicted but not incarcerated sample was 2.3 years.

[TABLE 4.1 ABOUT HERE]

[TABLE 4.2 ABOUT HERE]

[TABLE 4.3 ABOUT HERE]

[TABLE 4.4 ABOUT HERE]

Independent Variables

Incarceration. Of the 8,042 total unions observed in the NLSY97, 206 (3 percent) had a respondent incarceration during the union and 634 (8 percent, not shown in table) had a respondent incarceration prior to the union. Within the incarcerated sample, approximately one quarter (27 percent) of marriages and cohabitations had a respondent incarceration during the union. Respondents

in this sample experienced an average of one incarceration prior to the beginning of the union and spent an average of 5.5 months in a correctional facility per incarceration sentence prior to the union.

Criminal behavior. Prior research suggests that partnerships often become strained or dissolve because of criminal behavior itself, rather than a partner's incarceration (Edin and Kefalas 2005). Most individuals who engage in criminal behavior are not incarcerated for this behavior. Of the NLSY97 cohort who reported criminal behavior, only 13 percent were ever incarcerated prior to the 2009 interview.

Individuals who commit violent crimes may be qualitatively different than those who commit non-violent crimes such as destruction of property, or crimes such as drug dealing, which can potentially contribute to family income. In the analysis, I include engagement in three types of self-reported criminal behavior that occurred during or prior to the union. First, I use a single binary measure that includes reports of any drug dealing with a criminal conviction or guilty plea, drug dealing without a conviction (that is, the respondent was not convicted or "caught"), or drug possession with a conviction/guilty plea. Second, I use a single binary measure that includes any other non-violent criminal activity—burglary, theft, property crimes, major traffic offenses (e.g., drunk driving), public order crimes (e.g., disorderly conduct, sexual offenses), and other crimes—followed by a conviction/guilty plea, as well as a measure of reports of theft and property crimes for which the respondent was never caught or convicted. Third, I use a single binary measure of any violent criminal behavior that includes reports from respondents who were convicted, pled guilty, or who reported committing these crimes without a conviction. The three binary measures of criminal behavior are not mutually exclusive.

Within the incarcerated sample, nearly two thirds of romantic unions involved a respondent with a drug-related criminal history, 9 out of 10 unions involved a respondent who had committed a

non-violent crime, and 3 out of 4 unions included a respondent who had reported violent criminal behavior. Only about 1 in 4 (24 percent) unions in the general non-incarcerated sample involved a respondent who committed drug-related crimes, while 58 percent involved a respondent who committed non-violent crimes, and 36 percent of unions involved a respondent who committed violent crimes. The prevalence of each type of criminal history is slightly lower for unions in the convicted but never incarcerated sample than in the incarcerated sample.

Union characteristics. About three-fourths of all unions (5,851 unions) in the sample were first unions. As of the 2009 interview, 4,789 respondents in the NLSY97 cohort had cohabited at least once and 2,897 had married at least once. The majority (60 percent) of couple unions observed were cohabiting unions, and 40 percent were marriages. About half of these marriages were immediately preceded by a cohabitation with the same partner. The incarcerated sample and the convicted but not incarcerated sample are more heavily weighted toward cohabiting unions with about three fourths of the unions being cohabitations compared to the 59 percent in the general non-incarcerated sample. Respondents reported a maximum of seven unions. Nearly three quarters of these unions (73 percent) were first unions. Only 7.2 percent of marriages were second or higher-order marriages, but over one quarter (28.4 percent) of cohabiting unions were second or higher-order cohabitations. At 46 percent, the incarcerated sample had a larger proportion of higher-order unions than either the convicted/never incarcerated sample (32 percent) or the general never incarcerated sample (25 percent).

The mean age at the beginning of all marriages and cohabitations is 22 years old, and is similar across all sub-samples. About one in five (21 percent) unions resulted in at least one child, with a similar proportion of unions resulting in children in all sub-samples. A slightly higher proportion of marriages, 22 percent, resulted in children compared to 20 percent of cohabitations.

Socio-economic status. Socio-economic status is associated with both incarceration (Pettit and Western 2004; Western, Kleykamp, and Rosenfeld 2006) and union stability (Martin 2006; Raley and Bumpass 2003). Widely used indicators of socio-economic status such as an individual's income, education, and occupation are not as highly correlated with socio-economic status during young adulthood as they are at other ages because young adults may still be in school and fully or partially dependent on their parents for financial support. At the same time, a married or cohabiting couple that is financially independent will experience less relationship stress than a couple that is not financially independent, and it is important to adjust for this factor when estimating an independent relationship between incarceration and union stability.

I include two measures of socio-economic status in the analysis. First I create an employment variable for the average number of hours the respondent worked per week during the course of a union based on NLSY97 summary variables for the total number of hours worked in every calendar year from 1980 until the respondent's most recent interview. I limited the maximum mean number of hours worked per week to 80. Respondents worked an average of 26.8 hours per week during all unions. Respondents worked fewer mean hours per week (22.4 hours) in the incarcerated sample than in the convicted/never incarcerated sample (25.5 hours) and the never incarcerated general sample (27.3 hours).

I also include a binary indicator of whether the respondent failed to complete high school by the most recent interview. One quarter of respondents in marriages or cohabiting unions dropped out of high school. High school dropouts were more prevalent among respondents in cohabitations (33 percent) than among respondents in marriages (21 percent). The majority (63 percent) of the incarcerated sample dropped out of high school compared to only one third of respondents in the convicted but not incarcerated sample, and 20 percent in the never incarcerated general sample.

Demographic characteristics. Both gender and race/ethnicity are associated with incarceration. Men and racial/ethnic minority group members are more likely to be incarcerated (Pettit and Western 2004; West, Sabol, and Greenman 2010). Over half (53 percent) of the unions in the NLSY97 were reported by females; however, the unions in the incarcerated sample and convicted/never incarcerated sample were more likely to be reported by males (78 percent and 64 percent, respectively). Females comprised 57 percent of the never incarcerated general sample of respondents who reported being in marital and cohabiting relationships.

Among all respondents in cohabiting or marital unions, over half are non-Hispanic white, 23 percent are black, and 23 percent are Hispanic. Within the incarcerated sample, 43 percent of respondents in unions are white, 33 percent are black, and 23 percent are Hispanic.¹⁸ There are fewer racial/ethnic minorities in unions in the convicted but not incarcerated sample than in the ever incarcerated sample.

METHODS

Multilevel Discrete-Time Event History Model for Repeated Events

I use a discrete-time event history analysis approach to estimate the relationship between incarceration and the hazard $h(t)$ of union dissolution (*failure*) in month t (Allison 1982). I model the duration of each union within each individual as the period of time during which a union is at risk of dissolution (Steele 2008). If an individual experiences multiple unions, the duration clock is reset to zero at the beginning of each new union.

¹⁸ Data from the National Prisoner Statistics Program show that on December 31, 2010, the state and federal prison populations ages 18-29 were 31 percent white, 39 percent black, and 23 percent Hispanic (Guerino, Harrison, and Sabol 2012). These estimates exclude prisoners with sentences of one year or less and also exclude jail inmates; therefore, these estimates are not directly comparable to the NLSY 1997 estimates, which include sentences of any length in jail or prison.

Data structure. I use a two-level hierarchical data structure: (1) the episode level includes all cohabiting and marital unions i observed in the NLSY97 from 1997-2009, and (2) the panel (or group) level includes all persons j in the NLSY97 who reported entering into a cohabitation or marriage. Multiple unions i can be observed within person j .

Because monthly calendar-based event history information on union formation, dissolution, and incarceration was collected in the NLSY97, I expand the data to include one observation per month from the beginning of a union (t_0) the final month observed (t) whether due to union dissolution ($failure=1$) or censoring ($failure=0$). For example, a cohabiting union lasting 12 months from entry to exit would have 12 observations (one per month). A binary variable for *failure* is coded as 0 for each observation until the month t , and coded as 1 in the month t when the union dissolution occurs, conditional on an observed union dissolution. For censored unions, the binary failure variable is coded as 0 for each monthly observation. I assume that unions beginning and ending in the same month lasted a full 0.5 months (approximately two weeks).

Person-level variables are coded with the same value for all observations within person j . Person-level variables include gender, race/ethnicity, and high school dropout. Union-level variables can be either time-varying or time-invariant. Time-invariant union-level variables include number of incarcerations prior to union, average duration of incarcerations prior to union, criminal behavior, number of previous unions, age at union, having a child with the current partner, and average number of hours worked per week during the union.

Time-varying union-level variables are coded differently for each monthly observation during the union. Time-varying union-level variables include incarceration during union¹⁹, union duration, and marriage. For the time-varying union-level variable *marriage*, I code marriages immediately preceded by cohabitation with the same partner as 0 for each monthly observation until the month when the marriage is reported. Observations in the reported month of marriage are coded as 1, as are all subsequent observations during the union. For marriages that were not immediately preceded by cohabitation with the same partner, the binary *marriage* variable is coded as 1 for all monthly observations during the union.

Logit estimates. The first stage of the analysis uses multiple logistic regression to estimate the relationship between incarceration and union stability for all marital and cohabiting unions observed in the NLSY97 from 1997 to 2009.

Equation 4.1:

$$\text{LOGIT}[p_{ijt}] = \ln\left(\frac{p_{ijt}}{1-p_{ijt}}\right) = \alpha Z_t + \beta_1 X_j + \beta_2 R_{ij} + \beta_3 W_{ijt} + \beta_4 V_{ijt} + \beta_5 V_{ijt} * Z_t$$

I estimate a logistic regression model (Equation 4.1), estimating the probability p_{ijt} of union dissolution (failure), or the probability that a failure will occur in the time interval t (month) during union i of individual j , given that it did not occur previously, where α is the baseline probability of union dissolution, Z_t is a quadratic term for the duration of the union in months, X_j is a vector of person-level

¹⁹ I do not account for the month of release from incarceration within a union, nor do I account for second or higher-order incarcerations within unions because I assume that the length and frequency of incarceration during a union may be endogenous to the duration of that union. For example, respondents in longer, more stable unions would have a greater period of exposure to the risk of being incarcerated multiple times and for longer periods during a union than respondents in more unstable unions.

time-invariant covariates, R_{ijt} is a vector of union-level time-invariant covariates, W_{ijt} is a vector of union-level time-varying covariates, and V_{ijt} is a vector of union-level duration-dependent covariates.

Random intercepts estimates. The second stage of the analysis estimates unobserved heterogeneity or the unobserved within-person propensity for incarceration and involvement in unstable unions. I assume that variation in union stability has two main components: union-specific variation and person-specific variation.

Equation 4.2:

$$\text{LOGIT}[p_{ijt}] = \ln\left(\frac{p_{ijt}}{1-p_{ijt}}\right) = \alpha Z_t + \beta_1 X_j + \beta_2 R_{ij} + \beta_3 W_{ijt} + \beta_4 V_{ijt} + \beta_5 V_{ijt} * Z_t + u_j$$

The random intercepts model (Equation 4.2) includes a parameter u_j representing unobserved person-level characteristics across all observations within individual j , and where $u_j \sim N(0, \sigma_u^2)$. The random intercepts model allows me to estimate the amount of unexplained variation in union stability due to unobserved person-level characteristics that are stable over time, after controlling for observed explanatory variables (i.e., incarceration). The model assumes that allowing for correlation between the residual terms of repeated marital or cohabiting unions will account for all person-level unobserved characteristics that are constant across unions within each person (Pillinger 2011). The model does not account for changes over time in unobservable characteristics that influence both incarceration and union stability. Because exploratory analysis suggested duration dependence between covariates and the hazard of union dissolution, interaction terms for covariates (i.e., marriage and union duration) were used when appropriate to relax proportionality assumptions.

Convicted comparison sample. I estimate logit models and random intercepts models on two samples: (1) all unions, and (2) only those unions reported by respondents who had ever been convicted of a crime. In the first sample, the general population serves as a comparison group for respondents who experienced an incarceration, while in the second sample, respondents who were convicted of a crime but never incarcerated serve as the comparison group. This sample selection strategy is designed to reduce selection bias due to unobserved heterogeneity (Apel and Sweeten 2010).

RESULTS

Table 4.5 presents odds ratios and 95 percent confidence intervals for the discrete-time event history analysis estimating the hazard of dissolution for cohabiting and marital unions in the NLSY97 (1997-2009).

[TABLE 4.5 ABOUT HERE]

Logit Model

Incarceration during a union is associated with a subsequent marital dissolution holding other factors (prior incarceration, self-reported criminal behavior, union characteristics, socio-economic status, gender, and race/ethnicity) constant. The odds of union dissolution for married and cohabiting couples increased 24 percent when a partner was incarcerated. This estimate, however, was not statistically significant.

I find weak and inconsistent evidence of an association between either the frequency or the duration of incarceration prior to a marriage or cohabitation and the subsequent dissolution of that union, net of current incarceration. Each additional incarceration prior to a union is associated with a 5

percent decrease in the odds of union dissolution in any given month. An additional month of incarceration (on average) prior to a union is associated with a 1 percent increase in the odds of union dissolution. These estimates were not statistically significant.

All types of criminal behavior are significantly associated with a greater likelihood of union dissolution even when incarceration is controlled. Those who had ever committed, or were convicted of, drug-related crimes were 11 percent more likely to experience the break-up of a marital or cohabiting union compared to those who never reported drug-related criminal behavior; however, the estimated confidence interval (95 percent CI: 1.01-1.22) suggests that this association should be interpreted with caution. Respondents who had ever committed or were convicted of a non-violent crime had 32 percent greater odds of subsequent union dissolution than those who had not reported non-violent criminal behavior. Similarly, those who reported violent criminal behavior or conviction for a violent crime had 32 percent greater odds of union dissolution compared to those who did not report this type of criminal behavior.

Marriages are significantly less likely to dissolve than cohabitations. Additional analysis (not shown) found no significant interactions between incarceration prior to the union and marriage dissolution or incarceration during the union and marriage dissolution. The difference in the association between union dissolution and incarceration between marriages and cohabitations is not significantly different from zero. Higher-order unions are significantly more likely to break up in a given month compared to first unions. The odds of union dissolution increase 2.32 times with each additional failed previous marriage or cohabitation.

[TABLE 4.6 ABOUT HERE]

Convicted comparison sample estimates. Table 4.6 presents odds ratios and 95 percent confidence intervals for the discrete-time event history analysis estimating the hazard of dissolution for cohabiting and marital unions in the NLSY97 (1997-2009). A logit model using a comparison group of respondents who had been convicted of crimes yet never incarcerated yielded estimates similar to those for the full sample model. Overall, the relationship between incarceration history and union stability cannot be attributed to unobserved factors in the adjudication process leading to conviction. Unions that experience a partner incarceration are 16 percent more likely to dissolve in a given month compared to unions in which a partner had experienced a conviction but was never incarcerated. This association is weaker than the less conservative full-sample estimates, and is not statistically significant. Convicted sample estimates show a stronger negative association between the number of incarcerations experienced prior to the union and union dissolution. Each additional incarceration prior to the union decreases the odds of dissolution in a given month by 13 percent ($p < 0.05$).

Random Intercepts Models

Full sample. Random intercepts estimates in Table 4.5 show that 34 percent of the total variance in the hazard of union dissolution is attributable to person-level variance. Failure to account for unobserved heterogeneity underestimates the association between incarceration during a union and the subsequent dissolution of that union. Upon incarceration, an individual experiences a 53 percent increase in the odds of union dissolution. This association is statistically significant. Re-estimation of the model (not shown) using group-centering transformation (Paccagnella 2006) shows that the between-person association between incarceration and union dissolution is negative and statistically significant (OR: 0.17; 95 percent CI: 0.09-0.33), and the person-level association between incarceration and dissolution is strongly positive and statistically significant (OR: 9.03; 95 percent CI: 5.28-15.46). This result means that the single-level logit estimate of the association between incarceration and union

dissolution is tempered by a failure to jointly model both between- and within-person variance; therefore, the multilevel random intercepts model estimates a stronger positive association.

Convicted comparison sample estimates. Limiting the sample to convicted persons reduced the between-person variance in the hazard of union dissolution (Table 4.6). Upon incarceration, an individual experiences a 41 percent increase in the odds of union dissolution (95 percent CI: 0.96-2.06). As with the full-sample random intercepts estimates, the decomposition of between-person and within-person estimates elucidates a negative and statistically significant between-person association between incarceration and union dissolution (OR: 0.13; 95 percent CI: 0.06-0.29) and a positive and statistically significant association for within-person association between incarceration and union dissolution (OR: 7.96; 95 percent CI: 4.6-13.7).

DISCUSSION

The current study adds to the growing body of research that suggests incarceration may be detrimental for partnerships and families. The incapacitation of an individual for the purposes of punishment and the prevention of future criminal activity may also result in the incapacitation of partnerships and families. Undoubtedly, some families benefit from the incarceration of an abusive or violent partner; I found that NLSY97 respondents reporting violent criminal behavior were more likely to dissolve their partnerships than non-violent individuals. However, the relationship between incarceration and union instability exists independently from criminal activity itself, which suggests that the expansion of the corrections system in the United States may have detrimental consequences for families; these consequences must be weighed against the extent to which the justice system uses

incarceration as a punishment for relatively minor crimes and non-violent crimes, or as a substitute for mental health and substance abuse treatment.

My use of the complete incarceration histories in the NLSY97 to measure the association between incarceration and dissolution confirms what researchers found previously using more limited data sources. Unlike previous studies, I am able to establish the temporal ordering of incarcerations and union transitions in relation to each other. In addition, the NLSY97 identifies and tracks respondents' cohabiting and marriage partners across time. I use this information to determine whether both married and cohabiting couples continued their partnerships after an incarceration, regardless of the fact that these couples cannot live together during the incarceration. This study is the first to examine the relationship between incarceration and the stability of non-parent cohabiting couples.

Cohabiting and married young adults are more likely to break up when a partner is incarcerated; however, the relationship between union stability and incarceration is manifested mostly directly through the concurrent incarceration of a partner during the union. An incarceration might precipitate a break-up by causing additional financial hardship, stress due to social stigma, or simply disruption and strain due to living apart. This finding is consistent with past research suggesting that incarceration is associated with divorce regardless of incarceration history prior to marriage or employment (Lopoo and Western 2005; Massoglia, Remster, and King 2011; Western 2006). Unlike Western's (2006) study, I did not find evidence that the association between incarceration and union dissolution differed significantly by race/ethnicity.

The results of my analyses suggest that the direct association between incarceration and union dissolution cannot be attributed solely to unobserved factors. I used both a statistical approach and a sample selection approach to estimate the degree to which unobserved heterogeneity contributes to the association between incarceration and union dissolution. By jointly modeling both between-person

and within-person variance, I am able to establish that a single-level logit approach underestimates the likelihood that a couple will break up when a partner is incarcerated. I also find that this association cannot be explained by unobserved factors associated with being convicted of a crime. While unobserved person-level characteristics that lead to both incarceration and union instability may be expected to lead to an over-estimate of the independent association between incarceration and union dissolution, analysis from the previous chapter on entry into marital and cohabiting unions showed that individuals with a history of incarceration have a lower than average tendency to enter into these partnerships compared to individuals without an incarceration history. While a selection effect on unstable unions does exist, it may actually occur when individuals knowingly and willingly enter into a marriage or cohabitation with someone who either engages in risky behavior or criminal activity, and/or lives in a community in which individuals have frequent contact with police and/or the corrections system.

I find little evidence that incarceration is associated with union instability through more indirect pathways. Though previous studies have shown that incarceration is associated with non-participation in the labor force and reduced earnings potential (Apel and Sweeten 2010; Pager 2003), the current findings suggest that there is no relationship between incarceration history prior to a union and union stability independent of the relationship between union stability and economic stability. These results are consistent with previous findings that men who were incarcerated before they married were not more likely to divorce (Lopoo and Western 2005; Western 2006). This pattern may be due to the fact that only a select group of incarcerated individuals eventually choose to become involved in cohabiting or marital relationships that require a basic level of intention for stability (see previous chapter). The lack of an indirect association between incarceration history and union dissolution may also indicate that partners of formerly incarcerated individuals are a highly selected group who may be

knowledgeable about the individual's incarceration history and still willing to proceed with a cohabiting or marital relationship. In addition, the analysis produced conservative estimates of the indirect association between incarceration and union stability by controlling for socio-economic factors.

Relationship stability is not tied to the degree of incapacitation (physical, social, and economic) experienced by former prisoners. The length of time spent incarcerated (by former prisoners) was very weakly associated with relationship instability. This finding suggests that the amount of time an individual was removed from the community—and the weakening of social and economic ties that may have resulted from that time away—has little bearing on the stability of future relationships. I found weak evidence that individuals with multiple past incarcerations have *more* stable future relationships. Again, this association may be due to the fact that only a highly selected group of individuals who cycle in and out of prison subsequently enter into serious partnerships. This result is consistent with findings from the previous chapter that show that the more time incarcerated young adults spend in the correctional system, the less likely they are to enter a marital or cohabiting union. In addition, it is possible that only a highly selected group of individuals consider former prisoners to be favorable romantic partners. These findings regarding multiple dimensions of incarceration and union stability have never before been documented in research on the consequences of the prison expansion for family life.

Although the NLSY97 contains a wealth of information on the incarceration experiences of individual respondents, I am unable to determine whether respondents' partners were ever incarcerated. In addition, while there is substantial data on cohabitations and marriages, I am unable to observe how long a couple dated prior to a cohabitation or marriage, or whether an incarceration took place during that dating period. Dating couples who may have broken up after an incarceration are

excluded from the study, while a more stable group of dating couples who proceeded with their relationship after an incarceration are selected *into* the sample if they cohabited or married.

The current analysis takes gender and race/ethnicity into account, and I find no evidence that the association between incarceration and union dissolution differs significantly by these characteristics. In the interest of preserving statistical power in the analysis, I did not analyze these groups separately. A larger sample including more incarcerated individuals within these subgroups may have yielded different associations. The disproportionate incarceration of minority and low-skilled men means that individuals in these groups are incarcerated under a different set of circumstances than other individuals. Because women, whites, and higher status groups are less likely to ever be incarcerated, even after accounting for participation in actual criminal activity, the corrections system may be selecting only “the worst of the worst” of these groups. That is, women, whites, and higher status individuals who are incarcerated may have more serious unobserved problems than incarcerated individuals from groups who are disproportionately incarcerated. This pattern means that incarceration most likely has different implications for couple stability across different racial/ethnic, gender, and status groups.

The current analysis combines marriages and cohabitations. While marriages are substantially more stable, on average, than cohabiting relationships, the increase in dissolutions due to incarceration is the same for both types of unions. However, the NLSY97 contains relatively few married individuals who were also incarcerated; a larger sample containing more incarcerated marriage partners may have revealed differences in this association by marital status.

Despite these limitations, this study establishes a link between incarceration and the instability of marriages and cohabitations among young adults in the United States. Even in the midst of the expansion of the U.S. corrections system—even as incarceration may now be a common life course

event for individuals who are already facing economic hardship, the disruption of an incarceration may place young couples at greater risk for a permanent separation.

CHAPTER 5: INCARCERATION AND CHILDBEARING

INTRODUCTION

In this chapter, I analyze the first prospective study of incarceration and fertility in the United States among a nationally representative cohort of young adults, both men and women, from the National Longitudinal Survey of Youth 1997 (NLSY97). I examine whether having a history of incarceration is associated with the timing of childbearing among adolescent and young adult men and women. Individuals who have been incarcerated are more likely to delay entry into serious romantic partnerships (as shown in the previous chapter), which may lead to later childbearing. However, groups who are over-represented in the incarcerated population (i.e., the poor and racial/ethnic minorities) also tend to start childbearing earlier. Due the lack of research on the relationship between incarceration and childbearing, little is known about the possible influence of incarceration on the timing of childbearing.

Using the wealth of information on incarceration and fertility available in the NLSY97, I make three fundamental contributions to the study of the consequences of the expanding prison system in the United States for childbearing behavior. First, I have nearly complete event history information on both incarceration and fertility for a nationally representative sample of young people from adolescence into young adulthood, which allows me to establish the temporal order of periods of incarceration and fertility transitions. Second, I construct new measures that capture heterogeneity in the experience of incarceration over the life course of young adults. These measures allow me to explore whether differences in the frequency and duration of incarcerations influence childbearing behavior. Third, using statistical modeling and sample selection strategies, I address whether associations between

incarceration and childbearing are explained by unobserved heterogeneity. My findings suggest that men with a history of incarceration are at risk for early childbearing, but may delay higher-order childbearing or have fewer children in young adulthood compared to those who have not been incarcerated. I find little evidence that women's incarceration is associated with the timing of childbearing.

BACKGROUND AND SIGNIFICANCE

Emerging research on incarceration and families has focused on the influences of incarceration on marriage and divorce, and the consequences of parental incarceration for children. Thus far, researchers have neglected the possible consequences that the U.S. incarceration boom may have for childbearing behavior. Existing research on fertility and reproductive behavior does not provide a clear hypothesis about the influence of incarceration on the childbearing behavior of young adult men and women. As my research suggests, incarceration may delay and destabilize cohabiting and marital relationships; therefore, it may also delay childbearing within these relationships. These conclusions do not have any bearing on childbearing outside marital and cohabiting relationships, which accounts for a significant portion of births in the United States; about 16 percent of mothers from 1990 to 2001 were in neither a marital nor cohabiting relationship when they gave birth (Cherlin 2010). In this section, I discuss research on the significance of parental incarceration for children, and I review common correlates of incarceration and early childbearing for mothers and fathers in the United States since the expansion of the U.S. corrections system. I also review possible explanatory factors for the relationship between incarceration and childbearing, including physical incapacitation, marital status, economic instability, and unobserved characteristics such as risk taking.

Consequences of Incarceration for Children

My study examines the relationship between incarceration and the timing of childbearing, which may have serious implications for the magnitude and persistence of socio-economic disadvantage and crime in the United States. If incarceration itself is associated with early childbearing, this pattern might lead to increases in child poverty, the need for government services, juvenile and adult delinquency, and persistent economic disadvantage among children of incarcerated parents. In recent years, a growing body of research has examined the relationship between parental incarceration and child well-being. This research has focused on the consequences of incarceration for child poverty, child residence, childhood educational attainment, and childhood delinquent behavior. While this research does not directly address the timing of childbearing in the incarcerated population, it demonstrates that parental involvement in the corrections system has potentially negative consequences for the well-being of the focal parents' children.

The U.S. corrections system has become a much larger part of the life course experience of Americans over the past few decades, but this phenomenon has been concentrated among specific segments of the population (Goffman 2009; Pettit and Western 2004). Low-skilled minority men are at the greatest risk of incarceration in the United States (Pettit and Western 2004). In addition, incarceration may lead to diminished employment and earnings capacity in adulthood (Apel and Sweeten 2010; Geller, Garfinkel, and Western 2006; Geller, Garfinkel, and Western 2011; Pager 2003; Pager, Western, and Sugie 2009; Sabol and Lynch 2003; Schwartz-Soicher, Geller, and Garfinkel 2011; Western, Kling, and Weiman 2001).

The explosive growth in national incarceration rates has meant that an increasing number of children have incarcerated parents, especially children born to minority men with low levels of educational attainment. In 1990, about 50 percent of children with a black father who dropped out of

high school had experienced a paternal incarceration by the age of 14, exacerbating the disadvantages already faced by poor children (Wildeman 2009). Previous research suggests that parents who have been involved in the corrections system are likely to face difficulties in providing for their children. For example, research using the Fragile Families and Child Wellbeing study has shown that children received less financial support from parents with a history of incarceration (Geller, Garfinkel, and Western 2011). These children are also more likely to receive government aid through food stamps, Medicaid, and the State Children's Health Insurance Program (SCHIP; Sugie 2012). Many children of incarcerated parents live apart from the parent with a history of incarceration (Chung 2011; Geller et al. 2009; Geller, Garfinkel, and Western 2011), and this group includes an increasing number of children in the foster-care system who have a mother in prison (Swann and Sylvester 2006). Children of incarcerated parents have lower levels of educational attainment, even into adulthood (Hagan and Foster 2012a; Hagan and Foster 2012b; Murray, Loeber, and Pardini 2012), making upward social mobility difficult. Children of incarcerated parents also exhibit more delinquent and aggressive behaviors and increased involvement in the criminal justice system (Hannon and DeFina 2012; Huebner and Gustafson 2007; Murray, Loeber, and Pardini 2012; Roettger and Swisher 2011; Wildeman 2010).

Fathers

Research on both incarcerated men and young fathers (typically 25 years old or younger) has shown that these two groups are likely to intersect. Racial/ethnic minority group members tend to experience fatherhood earlier than white males, and research on characteristics of fathers from the Fragile Families and Child Wellbeing Study demonstrated that young fathers are more likely to experience an incarceration compared to older fathers (Carlson and McLanahan 2010). In addition, Carlson and McLanahan (2010) found that young fathers tend to have low levels of educational

attainment, and are more likely to be black or Hispanic—characteristics associated with a higher risk of incarceration. The Fragile Families study, however, exclusively samples parents, and therefore reverse causality and spuriousness cannot be ruled out as explanations for the association between incarceration and early fatherhood using these data.

No previous research has examined the association between incarceration and early fatherhood using prospective data. I use fertility information collected in the NLSY97 to examine the association between incarceration and the timing of childbearing among male respondents. Researchers often avoid using fertility data that rely solely on fathers' self reports because men tend to under-report childbearing (Cherlin, Griffith, and McCarthy 1983; Joyner et al. 2012), especially non-marital births that are more likely to occur at young ages (Rendall 1999). Joyner and colleagues (2012) compared fertility rates from young fathers in the NLSY97 to rates from U.S. vital statistics found that 9 out of 10 births were reported in the NLSY97; however, non-marital births were disproportionately underreported.²⁰ While the yearly follow-up sample design of the NLSY97 yielded the highest quality data for non-marital births among the national surveys included in the study, the authors predicted that the coefficients for variables that may be correlated with underreporting (e.g., incarceration) could be attenuated in models of early childbearing due to the reduced number of births reported. Given this possibility, I consider the current analysis to be a first step in the examination of the timing of childbearing and incarceration in young adulthood using the best quality data currently available from a major U.S. survey.

Mothers

²⁰ The authors suspected that relatively high non-response rates among men in their 20s led to the underreporting of fertility in the NLSY97; they cited higher incidences of incarceration in this age group as one possible mechanism for non-participation and/or greater recall time when reporting children, with the implication that incarcerated individuals would be less likely to participate in the study. The authors, however, did not provide any empirical support for this hypothesis.

Incarceration may have differing consequences for the fertility of men and women. Within recent cohorts, women are more likely to give birth as teenagers than men (Hynes et al. 2008). Overall, contemporaneous trends in teen childbearing and incarceration rates suggest that the expansion of incarceration in the United States is associated with delays in childbearing. Teen birth rates have decreased dramatically since the early 1990s and births to women in their early 20s have remained steady (Hamilton and Cosgrove 2010), but female incarceration rates have grown over this period (Harmon and O'Brien 2011). As with men, incarceration disproportionately affects women of low socioeconomic status who also tend to start childbearing early (Berger and Langton 2011): from ages 15-30, black and Hispanic women have higher birth rates and incarceration rates than white women (Glaze 2010).

Mechanisms

There are several possible mechanisms by which incarceration could affect the timing of childbearing among young adults. I discuss both mechanisms by which incarceration may contribute to delays in childbearing as well as mechanisms that could lead to early childbearing. I then discuss the possibility that incarceration is spuriously associated with the timing of childbearing because of the influence of unobserved factors.

Mechanisms for delayed childbearing. Physical incapacitation and removal from the community can prevent pregnancy for prisoners and their partners in the community and, therefore, delay childbearing.²¹ Childbearing may also be delayed due to the delay in other adult family transitions such

²¹ Only six states (California, Connecticut, Mississippi, New Mexico, New York, and Washington) explicitly offer overnight or “family” visits (traditionally known as “conjugal visits”) in their state prison systems. These visits tend to happen in a limited number/type of correctional facilities and under limited circumstances (Boudin, Stutz, and Littman 2012). While conjugal visits would make conception during incarceration possible for male and female prisoners, these events are likely to be very rare.

as entry into cohabitation or marriage. My research, as well as past research (Lopoo and Western 2005), has shown that incarceration is associated with the delay of entry into serious romantic relationships, and the majority of births in the United States occur within a marital or cohabiting union (Cherlin 2010). The timing of pregnancies among “visiting” couples (that is, couples who do not live together) should not be affected by delayed entry into more stable couple relationships.

Incarceration may be associated with lower fertility through its negative effects on relationship stability. As I found in the previous chapter, an incarceration is associated with relationship instability for marital and cohabiting couples. Higher quality relationships and positive partner expectations tend to encourage fertility and fertility desires among married and cohabiting couples (Myers 1997; Rijken and Thomson 2011; Wilson and Koo 2006). If a current or potential partner views an incarceration as a sign of the unreliability of a mate or potential co-parent, the likelihood of childbearing for the formerly incarcerated individual may decrease.

Mechanisms for early childbearing. Incarceration could lead to early childbearing via economic pathways. Incarceration is associated with lower socio-economic status (Pettit and Western 2004) and few employment prospects (Pager 2003). Under an economic model, the relatively low cost of fertility in terms of forgone income opportunities would lead to earlier childbearing for a low-income individual (Edin and Kefalas 2005; Schmidt 2008).

Unobserved heterogeneity. Incarceration may not be linked to childbearing through a causal mechanism, but rather through unobserved heterogeneity, or unobserved factors that are associated with both incarceration and early childbearing. Incarcerated individuals are likely to engage in many types of risky behavior. Specifically, poor contraceptive practices may be part of an overall “risky” lifestyle. A study of delinquent girls in a juvenile detention facility found that nearly all of the girls in the sample were sexually active, yet over half did not use contraception (Kelly et al. 2003). Schmidt’s (2008)

study of risk-tolerance and childbearing among women suggests that women who report a greater willingness to take risks are more likely to have a birth at an early age, which is consistent with findings regarding poor contraceptive practices. Schmidt's study design, however, measured risk-taking in terms of economic opportunities, which may be qualitatively different from risks taken by individuals who have a history of incarceration. Research using the NLSY79 Child-Young Adult cohort suggested that youth who reported feelings of low self-control were more likely to be sexually active, and for girls, less likely to contracept and more likely to become mothers (Kowaleski-Jones and Mott 1998). The current study specifically addresses the possibility of a spurious association between incarceration and fertility timing.

CURRENT STUDY

I conduct the first prospective study of incarceration and childbearing by taking advantage of the detailed fertility and incarceration histories collected in the NLSY97 cohort study. The current study addresses two main research questions:

1. Is incarceration associated with the timing of first and higher-order births among adolescents and young adults?
 - a. How are differing dynamics of incarceration (timing, frequency, length) associated with fertility timing?
2. Are unobserved factors driving the relationship between incarceration and fertility timing?

I estimate four multivariate models. I first provide a baseline estimate of the relationship between incarceration and childbearing by estimating a hazard model predicting time until a birth using two time-varying measures of incarceration: the number of past incarcerations and the length of past

incarcerations. I then report the results of three subsequent models that assess the robustness of the baseline measures by using different methods to account for unobserved heterogeneity. All models control for the type of criminal behavior, socio-economic status, race/ethnicity, and marital status. I conduct the analyses separately by gender for three reasons: 1) potentially different mechanisms lead to the association between incarceration and childbearing; 2) there are disparate rates of incarceration for men and women; and 3) recall bias is a problem unique to fathers.

To reduce bias due to unobserved heterogeneity, I use three strategies. First, I control for the engagement in different types of criminal behavior over the life course. I assume that these covariates serve as a proxy for the tendency to engage in risky behavior.

Second, I use discrete-time multilevel event history analysis for repeated events, which takes advantage of multiple births experienced by individuals in order to estimate within-person variance attributed to unobserved factors (Allison 1982; Steele 2008). Individuals who have a high risk of early childbearing may also have a high risk of having another child. By allowing for residual correlation between births within an individual, I am able to estimate whether unobserved person-specific characteristics that are unrelated to observed factors in my model are associated with the risk of a birth.

Third, I use a sample selection strategy. Specifically, I restrict the sample such that the convicted population (i.e., individuals convicted of a crime but sentenced to probation, community service, etc. rather than time in jail or prison) serves as the comparison group to the incarcerated population (those convicted and sentenced to incarceration), as described by Apel and Sweeten (2010). The convicted/not-incarcerated population is a useful comparison group because this population is more likely than the general (i.e., never convicted) population to have unobserved characteristics (such as a latent tendency for risk-taking) that are similar to those of the convicted/incarcerated population. In addition, using the convicted/not-incarcerated comparison group provides a more conservative

estimate of an independent association between incarceration and childbearing because the association cannot be attributed to any other aspect of criminal justice processing that leads to conviction (Apel and Sweeten 2010).

SAMPLE

I analyzed a sample of 4,385 women and 4,599 men from the 1997 cohort of the National Longitudinal Survey of Youth (n=8,984). Respondents reported all live births to themselves or to a partner (for males) prior to the baseline interview in 1997 until their most recent interview in 2009. Respondents reported up to eight children. Men reported 1,775 first births and 1,256 higher-order births. Women reported 2,291 first births and 2,165 higher-order births. Respondents who did not report a first birth (61 percent of men and 48 percent of women) were censored at their most recent interview.

MEASURES

Dependent Variable: Birth

Information on live births was collected using the “Biological/Adopted Child Roster” from the NLSY97 interview. Respondents reported the month and year of each child’s birth at each interview. The NLSY97 assigned a unique identification number to each child reported by the respondent. Non-resident children are included in the analysis, but adopted children and step children are excluded.²² I consider men and women to be at risk of having a first birth starting at age 11.²³

²² I consider twins (n=90 sets) to be a single birth event in the analysis; however, twins are counted as two children when measuring the number of children previously born to the respondent.

²³ I dropped 49 births reported to occur prior to age 11 due to likely error. Twenty-one of these births were included in the 2009 birth history created by the NLSY97. I used first reports of each child’s birthday with the exception of births that were missing information such as a birthday month or year, or the timing of which was implausible (less

Table 5.1 presents descriptive statistics for men in the NLSY97. Table 5.2 presents descriptive statistics for men in the NLSY97 who ever reported an incarceration. Table 5.3 presents descriptive statistics for men in the general never incarcerated sample. Table 5.4 presents descriptive statistics for men who were convicted of a crime but never incarcerated.

Among men, the mean observation time to first birth/censorship was 161 months. The mean age at first birth for men was 22.1 years old. Male respondents reported a maximum of eight births. Men with a history of incarceration had more children, on average, than men who had never been incarcerated.

[TABLE 5.1 ABOUT HERE]

[TABLE 5.2 ABOUT HERE]

[TABLE 5.3 ABOUT HERE]

[TABLE 5.4 ABOUT HERE]

Table 5.5 presents descriptive statistics for women in the NLSY97. Table 5.6 presents descriptive statistics for women in the NLSY97 who ever reported an incarceration. Table 5.7 presents descriptive statistics for women in the general never incarcerated sample. Table 5.8 presents descriptive statistics for women who were convicted of a crime but never incarcerated.

Among women, the mean observation time to first birth/censorship was 148 months. The mean age at first birth for women was 21, indicating that births in the NLSY97 sample over-represent births to

than six months between births for women). I dropped 21 children missing month and year of their birthday from the analysis. I imputed July birthdays for five children who had a birth year but were missing a birth month.

young mothers.²⁴ This is likely due to the youth of the NLSY97 cohort, which has not yet completed childbearing. Female respondents reported a maximum of seven births. Women with a history of incarceration had more children, on average, than women who had never been incarcerated.

Independent Variables

Incarceration. Of the 4,599 men observed in the NLSY97, 460 (10 percent) had a history of incarceration prior to having a child (Table 5.1). An additional 93 men were incarcerated after they had a first child and prior to a higher-order birth. Out of 4,385 women, 96 (2 percent) were incarcerated before having a child (Table 5.2). An additional 29 women were incarcerated after their first birth and prior to a subsequent birth.

Criminal behavior. Prior research suggests that delinquent and high-risk youth have poor contraception practices, therefore making early childbearing more likely (Kowaleski-Jones and Mott 1998; Schmidt 2008). I include engagement in criminal behavior (independent of incarceration) in the analysis to account for possible spuriousness in the relationship between early fertility and incarceration driven by a latent tendency to engage in risky behavior.

Individuals who commit violent crimes may be qualitatively different than those who commit non-violent crimes such as destruction of property, or crimes such as drug dealing, which could potentially contribute to family income. In the analysis, I include engagement in three types of self-reported criminal behavior that occurred prior to each live birth. First, I include binary variables for drug dealing with a criminal conviction or guilty plea, drug dealing without a conviction (that is, the respondent was not convicted or “caught”), and drug possession with a conviction/guilty plea. Second, I include a binary measure of non-violent criminal activity that includes a conviction/guilty plea for any of

²⁴ U.S. vital statistics show that mean age at first birth for mothers increased from 24.5 to 25.2 from 1995 to 2009 (Martin et al. 2011). The mean age of fathers was not available from vital statistics.

the following: burglary, theft, property crimes, major traffic offenses (e.g., drunk driving), public order crimes (e.g., disorderly conduct, sexual offenses), and other crimes. This measure also includes reports of theft and property crimes for which the respondent was never caught or convicted. Third, I include a binary measure of violent criminal behavior including any type of assault and robbery; the measure incorporates reports from respondents who were convicted of, pled guilty to, or reported committing (without a conviction) these crimes.

Among incarcerated men, about 60 percent had a drug-related criminal history prior to the birth of a first child, 86 percent had committed a non-violent crime, and 3 out of 4 reported violent criminal behavior (Table 5.1). Only about 1 in 4 men (23 percent) in the general non-incarcerated sample had committed drug-related crimes, while 60 percent had committed non-violent crimes, and 36 percent had committed violent crimes. The prevalence of each type of criminal history is lower for men in the convicted/non-incarcerated sample than in the incarcerated sample.

[TABLE 5.5 ABOUT HERE]

[TABLE 5.6 ABOUT HERE]

[TABLE 5.7 ABOUT HERE]

[TABLE 5.8 ABOUT HERE]

Among incarcerated women, about half had a drug-related criminal history prior to the birth of a first child, 85 percent had committed a non-violent crime, and 2 out of 3 reported violent criminal behavior. Only about 13 percent of women in the general non-incarcerated sample had committed drug-related crimes, while 44 percent had committed non-violent crimes, and 23 percent had

committed violent crimes. The prevalence of each type of criminal history is lower for women in the convicted/non-incarcerated sample than in the incarcerated sample.

Current marital status. I include a categorical measure of whether respondents were single, married, or cohabiting at the time of the birth of their child. Among single men and women, a higher proportion of first births occur to single males and females in the incarcerated group compared to those who have never experienced an incarceration. In addition, a higher proportion of births occur to cohabiting males and females in the incarcerated sample than cohabiting males and females who had never been incarcerated.

Socio-economic status. I include three measures of socio-economic status in the analysis. First, I create an employment variable for the average number of days the respondent worked per week during the 12 months prior to a given month based on NLSY97 summary variables for the total number of hours worked in every calendar year from 1980 until the most recent interview. I limited the maximum mean number of hours worked per week to 80. I scale the employment variable from mean hours worked per week to mean days worked per week for ease of interpretation. Men in the incarcerated sub-sample worked an average of about one fewer day per week at the month of birth/censorship than men in the never-incarcerated sub-sample. Both incarcerated and never incarcerated women worked an average of two days a week in the year prior to childbirth/censorship. It should be noted that employment hours might be closely tied to pregnancy and childbearing for women. That is, women may purposefully remove themselves from the workforce prior to the birth of a child.

I include a binary indicator of whether the respondent was enrolled in college as a full time student in a given month. Very few men and women with a history of incarceration were enrolled as a

full-time student at the birth of their first child/month of censorship; however, school enrollment was also low for the never-incarcerated subsample.

I also include a continuous variable for highest grade completed in a given month. Overall, the never-incarcerated subsample had higher levels of educational attainment at the birth of a first child/month of censorship than the incarcerated subsample.

Demographic characteristics. Among men, the incarcerated subsample includes a larger proportion of non-white respondents than the never-incarcerated subsample. Among women, however, there is little difference in the racial/ethnic distribution of the incarcerated and never-incarcerated subsamples.

METHODS

Multilevel Discrete-Time Event History Model for Repeated Events

I use a discrete-time event history analysis approach to estimate the relationship between incarceration and the hazard $h(t)$ of live birth (*failure*) in month t (Allison 1982). I model the time to childbirth within each individual as a separate episode in which each person is at risk of childbirth (Steele 2008). The clock is reset to t_0 in the month after each birth for males or six months after each birth for females.

Data structure. I use a two-level hierarchical data structure: 1) the episode level includes the period from age 11 to the month of a first birth (or the most recent interview month for nulliparous respondents) plus all subsequent periods i leading to higher-order births, and 2) the panel (or group) level includes all persons j in the NLSY97. Multiple episodes (births) i can be observed within person j .

Because the NLSY97 collected monthly event history information on child birthdays and incarceration, I expand the data to include one observation per month from the beginning of an episode (t_0) to the final month observed (t), whether due to a birth (*failure*=1) or censoring (*failure*=0). For example, a respondent who entered the risk pool for first births at age 11 and exited the risk pool with a first birth 10 years later at age 21 would have 120 observations, or one per month. A binary variable for *failure* is coded as 0 for each observation until the month t , and coded as 1 in the month t when the birth occurs, conditional on an observed birth. For censored episodes, the binary failure variable is coded as 0 for each monthly observation.

Person-level variables are coded with the same value for all observations within person j . Person-level variables include binary (dummy) variables for race/ethnicity. Episode-level variables can be either time-varying or time-invariant. Time-invariant episode-level variables are coded the same way for all observations of episode i within person j . Whether the respondent had a *previous birth* is a time-invariant measure. Time-varying episode-level variables can be coded differently for each monthly observation within the birth episode. These variables are based on monthly calendar-based information or cumulative lifetime information (e.g., ever engaged in a behavior, engaged in behavior since last interview) in the NLSY97. Time-varying episode-level variables include the number of incarcerations prior to birth, the average duration of incarceration spells prior to birth, criminal behavior, marital status, average days worked per week for the past year, full-time school enrollment, and highest grade completed.

Logit estimates. The first stage of the analysis uses multiple logistic regression to estimate the relationship between incarceration and childbearing for *all* births observed in the NLSY97 from 1997 to 2009.

Equation 5.1:

$$\text{LOGIT}[p_{ijt}] = \ln\left(\frac{p_{ijt}}{1-p_{ijt}}\right) = \alpha Z_t + \beta_1 X_j + \beta_2 R_{ij} + \beta_3 W_{ijt} + \beta_4 V_{ijt} + \beta_5 V_{ijt} * Z_t$$

I estimate a logistic regression model (Equation 5.1), estimating the probability p_{ijt} of a live birth (failure), or the probability that a failure will occur in the time interval t (month) during episode i of individual j , given that it did not occur previously, where α is the baseline probability of a birth, Z_t is a quadratic term for the duration of the episode in months, X_j is a vector of person-level time-invariant covariates, R_{ijt} is an episode-level time-invariant covariate, W_{ijt} is a vector of episode-level time-varying covariates, V_{ijt} is a vector of episode-level duration-dependent covariates, and $\beta_1, \dots, \beta_6$ are variable coefficients.

Random intercepts estimates. The second stage of the analysis estimates unobserved heterogeneity or the unobserved within-person propensity for incarceration and early childbearing. I assume that variation in childbearing in a given month has two main components: episode-specific variation and person-specific variation.

Equation 5.2:

$$\text{LOGIT}[p_{ijt}] = \ln\left(\frac{p_{ijt}}{1-p_{ijt}}\right) = \alpha Z_t + \beta_1 X_j + \beta_2 R_{ij} + \beta_3 W_{ijt} + \beta_4 V_{ijt} + \beta_5 V_{ijt} * Z_t + u_j$$

The random intercepts model (Equation 5.2) includes a parameter u_j representing unobserved person-level characteristics across all observations within individual j , where $u_j \sim N(0, \sigma_u^2)$. The random intercepts model allows me to estimate the amount of unexplained variation in the risk of childbirth (after controlling for observed explanatory variables, e.g., incarceration) due to unobserved person-level

characteristics that are stable over time. The model assumes that allowing for correlation between the residual terms of repeated birth episodes will account for all person-level unobserved characteristics that are both constant across birth episodes within each person and unrelated to the factors in the model (Pillinger 2011). The model does not account for changes over time in unobservable characteristics that influence both incarceration and childbearing.

Convicted comparison sample estimates. I estimate logit models and random intercepts models on two samples: 1) all respondents, and 2) respondents who were ever convicted of a crime. In the first sample, the general population serves as the comparison group for those who experienced an incarceration. In the second sample, respondents who had been convicted of a crime but never incarcerated are the comparison group. This sample selection strategy is designed to reduce bias due to unobserved heterogeneity because I assume that the unobserved characteristics of individuals who have been incarcerated are more similar to the unobserved characteristics of individuals who have been convicted of a crime but never sentenced to incarceration than to the unobserved characteristics of the general population (Apel and Sweeten 2010).

[TABLE 5.9 ABOUT HERE]

[TABLE 5.10 ABOUT HERE]

RESULTS

Males

Table 5.9 presents odds ratios and 95 percent confidence intervals for the log-odds of births to males in the NLSY97. Table 5.10 presents odds ratios and 95 percent confidence intervals for the log-odds of births to males who were convicted of a crime. Men who have a history of incarceration are at

risk of early childbearing, but tend delay or widely space higher-order childbearing. Using a random intercepts approach and a sample selection strategy, I find no evidence that the association between incarceration and fathering a first child can be attributed to unobserved heterogeneity—the magnitude of the association remains virtually unchanged across models. In addition, the association between incarceration and childbearing cannot be solely attributed to criminal behavior, marital status, socioeconomic status, or race/ethnicity.

The main effect term for the number of incarcerations represents the log-odds of the event of a *first birth* to a non-cohabiting, non-married father with each incarceration experienced. With each incarceration, the likelihood of a first birth in a given month increases by 14 percent.²⁵ This association is statistically significant (95 percent CI: 1.05-1.24). The term for the interaction between the number of incarcerations and whether the respondent had a previous child represents the log-odds of the event of a *higher-order birth* with each incarceration experienced. With each incarceration, the odds of a higher-order birth are significantly reduced by 20 percent. I found no evidence that the amount of time spent in jail or prison was independently associated with the timing of childbearing among men.

Random intercepts estimates in Table 5.9 and Table 5.10 show that only 1-2 percent of the total variance in the hazard of childbearing is attributable to person-level variance. Both random intercepts estimates and convicted sample estimates suggest that there is little difference in unobserved characteristics related to childbearing between the general population and the convicted population.

[TABLE 5.11 ABOUT HERE]

[TABLE 5.12 ABOUT HERE]

²⁵ A supplemental analysis suggests a non-linear relationship between the number of incarcerations and childbearing. The association between incarceration and childbearing weakens after two incarcerations. The interpretation of the association between incarceration and childbearing is not substantially different using a non-linear term for incarceration. In the interest of parsimony, I present incarceration as a single-count variable.

Females

Table 5.11 presents odds ratios and 95 percent confidence intervals for the log-odds of births to females in the NLSY97. Table 5.12 presents odds ratios and 95 percent confidence intervals for the log-odds of births to females who were convicted of a crime. I find weak evidence that women with a history of incarceration are at risk for early childbearing, but I find slightly stronger evidence that women who have been incarcerated tend to have fewer children overall as they become young adults. Associations between incarceration and childbearing were not significant, possibly due to the relative rarity of incarceration among women in the sample. With each incarceration, the likelihood of a first birth in a given month increases by 7 percent, but this association was not statistically significant. With each incarceration, the odds of a higher-order birth are reduced by 15 percent. Again, this association was not significant. I found no evidence that the amount of time spent in jail or prison was independently associated with the timing of childbearing among women. Random intercepts models suggest that no more than 1 percent of the total variance in the hazard of childbearing is attributable to person-level variance.

Sensitivity Analysis

I conducted supplemental analyses that took into account duration-dependence of the associations of covariates with the likelihood of childbearing over time. Interaction terms for covariates and Z_t were used when appropriate to relax the proportionality assumptions of the four main discrete-time hazard models. For the male sub-sample, duration-dependent covariates included current marital status and highest grade completed. For the female sub-sample, duration-dependent covariates included current marital status, average days worked per week in the past year, and race/ethnicity. I found no evidence that the association between incarceration history variables and childbearing

violated proportionality assumptions. In addition, results from the four main proportional models were robust across the four models with duration-dependent terms added (not shown). The duration-dependent models demonstrate that each additional past incarceration increases the likelihood of a first birth in a given month between 16 percent and 23 percent, and decreases the likelihood of a higher-order birth in a given month between 16 percent and 41 percent.

I also conducted supplemental analyses to examine differences in the relationship between incarceration and the timing of childbearing by race and marital status. I analyzed the four main models separately by race and marital status. The relationships between childbearing and incarceration terms were robust across all sub-analyses.

DISCUSSION

This study adds to the growing body of research on the consequences of incarceration for family transitions in the United States. I conducted the first prospective study of the relationship between incarceration and subsequent childbearing in a cohort of young adults from the NLSY97. The results suggest that incarceration increases the likelihood of early fatherhood and delays or reduces higher-order childbearing among men. Because an incarceration could have negative consequences for future financial prospects, early fertility may not be viewed as having a high cost for men with histories of incarceration. Conversely, higher-order births may be delayed because more incarcerations tend to occur as individuals age and commit repeated offenses. There may be a threshold effect in which potential partners see the combination of incarceration history and previous children as the mark of a problematic partner. More analysis is needed to tease out these associations. Regardless of these potential qualifications, the relationship between incarceration and fatherhood exists independently

from criminal activity itself, which suggests that the expansion of the corrections system in the United States may contribute to rates of early childbearing, especially among low-income and minority populations.

The current study gives special consideration to the possibility that unobserved factors, such as a latent tendency to engage in risky behavior, may be related to both incarceration and early childbearing. To address this issue, I used a sample selection strategy designed to reduce heterogeneity in unobserved factors between the incarcerated and never-incarcerated subsamples. I also used a random-intercept approach that adjusted for within-person factors that are stable over time. The findings suggest that the association between early fatherhood and incarceration cannot be explained solely by unobserved heterogeneity.

I found that incarceration is associated with early entry into motherhood and delayed or reduced higher-order fertility among mothers. While my findings for women are similar to my findings for men, they were not statistically significant. In addition, I found that the amount of time spent in prison was not associated with the timing of childbearing for either men or women.

The study has several limitations. First, I must rely on men's self reports of childbearing and children's birthdays. Previous research estimated that fathers in the NLSY97 underreport childbearing by 10 percent (Joyner et al. 2012). Because fathers in the incarcerated sub-sample have higher levels of fertility, on average, than fathers in the never-incarcerated subsample, the estimates presented in the current analyses are likely to be conservative estimates the relationship between childbearing and incarceration. Second, the sub-sample of incarcerated females in the NLSY97 may be too small to estimate statistically significant differences in childbearing between incarcerated and never-incarcerated women. Future analyses using a sample that targets delinquent women may yield clearer

results. Third, despite the wealth of information on the incarceration experiences of individual respondents in the NLSY97, I am unable to determine whether respondents' partners were ever incarcerated with the exception of current partners in the 2002, 2007, and 2009 waves. This omission could lead to a Type II error in which a respondent's partner was incarcerated, but the incarceration was not observed. A Type II error would be more likely to occur among female respondents because male incarceration rates in the United States are higher than female incarceration rates. Fourth, I take marital status into account only as a control variable in the current analysis. Processes that lead delayed marital and cohabiting relationships and the dissolution of these relationships may be correlated with the childbearing process (Steele et al. 2005). In future versions of this analysis, I plan to use a multistate approach that jointly models relationship and fertility transitions.

The current study is a first step in the study of the consequences of incarceration for subsequent childbearing. Incarceration has become a common life course event in many low-income communities in the United States. Parents in these communities have few economic resources. This study suggests that the growth of incarceration may exacerbate the disadvantages experienced by families and communities in which it has become common by increasing the likelihood of early childbearing. In addition, an increase in early childbearing among incarcerated men may lead to the growth and persistence of poverty and crime in the United States by increasing the number of individuals exposed to this unique disadvantage.

CHAPTER 6: CONCLUSION

My study provides a vital and timely overview of the consequences of the U.S. prison expansion for family transitions in young adulthood. Incarceration has become a prominent part of the lives of many families and communities for several reasons, including the increase in rates of incarceration over the past three decades, the high likelihood of incarceration over the life course for poor and minority men, the geographically clustered nature of economically depressed minority populations, and the targeted nature of law enforcement in these neighborhoods (Goffman 2009; Pettit and Western 2004; Sabol and Lynch 2003; Wildeman 2009). In this chapter, I provide a summary of my research findings, discuss the limitations of the current study, and outline the implications of this research for public policy.

SUMMARY

Entry into Marriage and Cohabitation

The findings suggest that incarceration may have negative consequences for the normative transition to adulthood through the delay, avoidance, or forfeiture of cohabiting and married relationships. For young adults, each additional spell spent in corrections reduces the likelihood of entering into a first cohabiting partnership or first marital partnership, or transitioning from a cohabiting relationship to marriage. At the same time, time spent incarcerated and away from family and community has little association with engagement in these partnerships in young adulthood. This pattern suggests that of those individuals who have a history of incarceration or are prone to incarceration and criminal activity, the ones who engage in marital and cohabiting partnerships are a highly selected group. That is, this group is likely to be different (with regard to factors other than

criminal activity, socio-demographic characteristics, and socio-economic status) than both the general population and others in the incarcerated population (who have a low risk of entering into a romantic union) with regard to characteristics not observed in the current study. These individuals may attract partners who also engage in risky behavior, may have personal characteristics that lead them into serious romantic partnerships, or may live in communities in which a history of incarceration is common.

Stability of Marriage and Cohabiting Partnerships

I find that a marriage or cohabiting partnership is more likely to dissolve after the partnership is interrupted by an incarceration and a partner is removed from the household. For partnerships among the select group of men and women with a history of incarceration, or those who are prone to incarceration, the consequences of incarceration are more immediate than far-reaching. Incarcerations that occurred prior to the relationship seem to have little influence on the stability of marital and cohabiting unions. An incarceration that removes a partner from the home may result in too much relationship stress and financial hardship to bear. Considering that incarceration is more prevalent among economically disadvantaged populations, high incarceration rates may be contributing to the vulnerability of couple relationships.

Childbearing

This study suggests incarceration is associated with early fatherhood. Each additional incarceration increases the likelihood of early fatherhood, but also delays higher-order childbearing among men. Higher incarceration rates may lead to higher rates of child poverty and a greater need for government services due to the increase in the likelihood of early childbearing for incarcerated men.

LIMITATIONS

The study has several limitations. First, the units of analysis are individuals rather than couples and I do not account for potentially important partner characteristics such as a partner incarceration. Partner incarceration would be especially important for male partners of women in the NLSY97 because men have higher rates of incarceration. I am unable to determine whether respondents' partners were ever incarcerated with the exception of current partners in the 2002, 2007, and 2009 waves. Using the information from these three waves, I plan to conduct supplemental analyses of partner incarceration to assess the level of bias introduced by this exclusion in future versions of this study.

Second, survey non-response is disproportionately high for men and women who are likely to be incarcerated (Joyner et al. 2012). While the yearly follow-up design of the NLSY97 has led to high response rates, young unmarried, uneducated men are less likely to participate in yearly interviews. Of the NLSY97 sample, 90 percent participated in a follow-up interview at least 10 years after their baseline interview, but respondents who participated in fewer interviews are likely to be affected by recall bias. Men and women with a history of incarceration who participated in the NLSY97 and its follow-up interviews are likely to be systematically different from men and women who are incarcerated who did not participate in follow-up interviews.

Third, the study cannot establish causal linkages between incarceration and family transitions. I attempt to account for endogeneity (the correlation of model parameters with unobserved characteristics) by using a sample selection strategy and a random intercepts approach, and including appropriate controls in my statistical models. Unfortunately, these strategies do not completely rule out endogeneity as a factor in the results. These strategies for taking *unobservable* factors into account are still based on *observable* information, and suffer the same biases as my baseline models.

POLICY IMPLICATIONS

The current research suggests that incarceration has yielded unintended consequences that affect individuals in addition to the incarcerated individual. A large body of research demonstrates that transitions into family life may be turning points that lead to the desistence of criminal activity. This research suggests that incarceration may, ironically, contribute to increases in crime and future incarceration by preventing these transitions into more stable cohabiting and marital partnerships. In a generation in which marriage is considered the “capstone” of the transition to adulthood across all socio-economic strata (Cherlin 2004), incarceration may create a roadblock to adulthood that leaves poor and minority men and women feeling “left out” of normative life course transitions—cut off from full participation in community and family life. This scenario may lead to the further isolation of these communities from greater society and greater tension between these communities and law enforcement. In addition, incarceration may increase rates of child poverty in the United States by increasing the likelihood of early childbearing for men who are incarcerated, which in turn reduces the economic opportunities available to these children. Public service interventions may be needed to counteract the impact of the negative economic and social circumstances into which these children are born.

This study reinforces previous research and provides new evidence that incarceration reaches beyond punishment of the individual—reaching partners and families both during incarceration and after the incarceration has ended. Policy makers too often ignore this phenomenon, and now must weigh the consequences of incarceration against any potential benefits of incarceration for the larger community. Specifically, law makers must review current policies that increase the likelihood of incarceration for non-violent criminals.

While there is little public disagreement about the fact that violent offenders should be incarcerated, alternatives to incarceration for non-violent criminals may allow these individuals to continue or enhance their engagement in their families and the greater community without disruption to their families or to normative life course transitions. This opportunity could allow offenders to maintain social ties and thus reduce recidivism.

The U.S. corrections system currently casts a wider net than it ever has before, and this research highlights the consequences for the partners and children caught up in this net. The recent spate of evidence regarding the negative consequences of mass incarceration is becoming more difficult for the public to ignore. The recent efforts of several states to decriminalize the sale and use of marijuana may be the first sign of the public's greater recognition of the limitations of incarceration as a response to crime. Recognition of the true scope of the corrections system is a first step in bringing the consequences of incarceration into public debate.

TABLES AND FIGURES

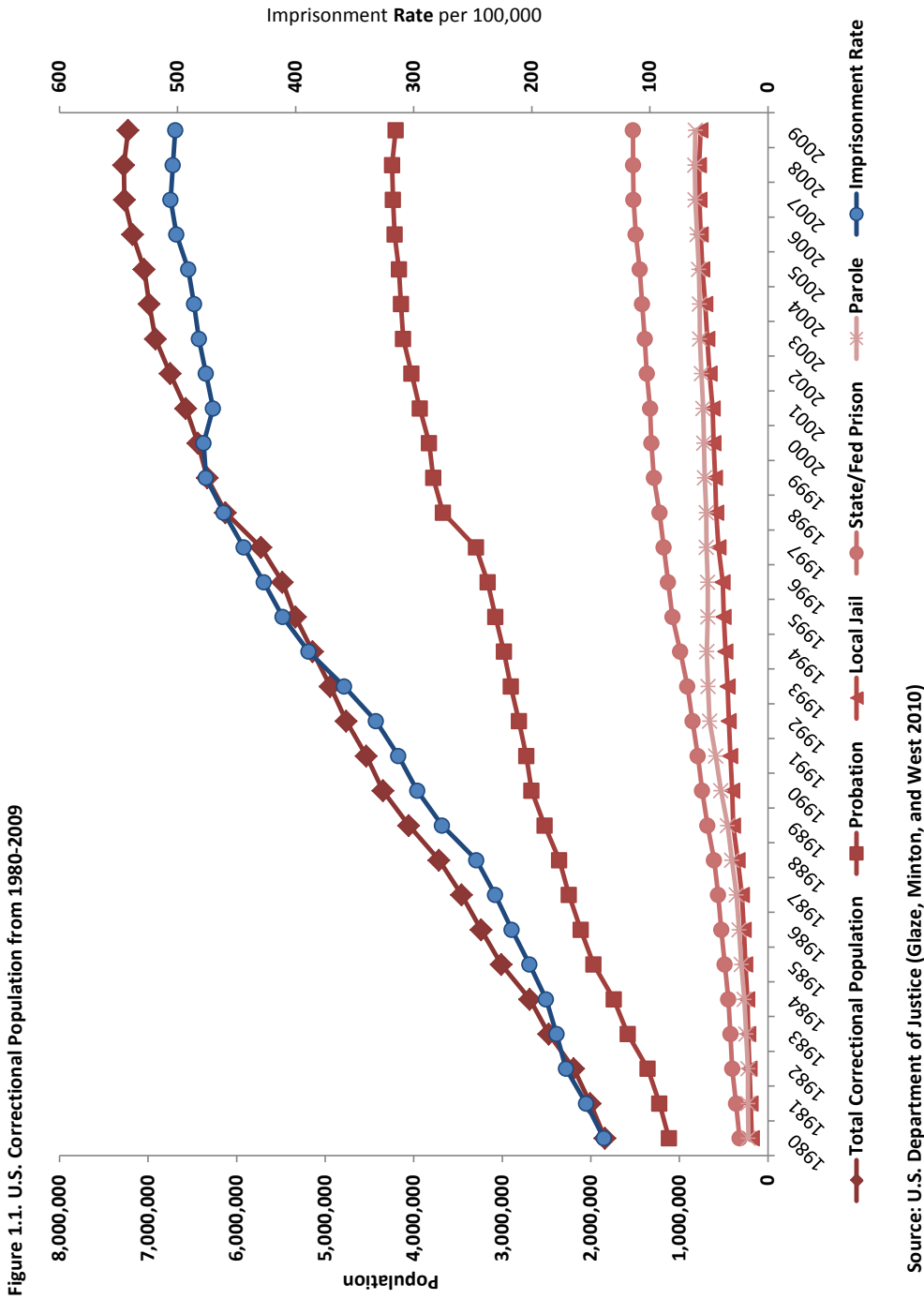


Table 3.1. Descriptive Statistics, Total Sample, NLSY97 Cohort (Waves: 1997-2009)

Person-Level Variables	Total (n=8960)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable - Marriage</i>					
Marriage (failure) ^a	2967	0.33	--	0	1
Months to failure/censorship (t)	--	133.35	38.36	1	195
<i>Dependent Variable - Cohabitation</i>					
Single (censored)	3113	0.35	--	0	1
1st Union=Cohabitation (failure)	4726	0.53	--	0	1
1st Union=Marriage (competing risk)	1121	0.13	--	0	1
Months to failure/censorship (t)	--	105.70	43.30	1	194
<i>Incarceration</i>					
# prior to union	--	0.08	0.37	0	6
Avg duration (mos) prior to union	--	0.34	2.63	0	63
<i>Criminal Behavior</i>					
Drug dealing or possession	1871	0.21	--	0	1
Other non-violent	5082	0.57	--	0	1
Violent	2978	0.33	--	0	1
# of children	--	0.23	0.60	0	8
<i>Socio-economic Status</i>					
Avg days worked per week/past yr ^b	--	3.20	2.27	0	10
Full-time student past yr	1031	0.12	--	0	1
Highest grade completed	--	13.17	2.80	0	20
<i>Demographic Characteristics</i>					
Female	4367	0.49	--	0	1
Race/Ethnicity (comparison: white)					
Non-Hispanic white	4650	0.52	--	0	1
Black	2331	0.26	--	0	1
Hispanic	1896	0.21	--	0	1

^a Ignores whether the respondent entered into any cohabiting unions before first marriage.

^b The total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 3.2. Descriptive Statistics, Incarcerated Sample, NLSY97 Cohort (Waves: 1997-2009)

Person-Level Variables	Ever Incarcerated (n=487)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable - Marriage</i>					
Marriage (failure) ^a	140	0.20	--	0	1
Months to failure/censorship (t)	--	146.21	30.48	37	193
<i>Dependent Variable - Cohabitation</i>					
Single (censored)	160	0.33	--	0	1
1st Union=Cohabitation (failure)	300	0.62	--	0	1
1st Union=Marriage (competing risk)	27	0.06	--	0	1
Months to failure/censorship (t)	--	109.68	42.23	5	191
<i>Incarceration</i>					
# prior to union	--	1.42	0.82	1	6
Avg duration (mos) prior to union	--	6.24	9.50	1	63
<i>Criminal Behavior</i>					
Drug dealing or possession	295	0.61	--	0	1
Other non-violent	443	0.91	--	0	1
Violent	372	0.76	--	0	1
# of children	--	0.43	0.76	0	4
<i>Socio-economic Status</i>					
Avg days worked per week/past yr ^b	--	2.39	2.36	0	10
Full-time student past yr	18	0.04	--	0	1
Highest grade completed	--	10.85	2.10	6	19
<i>Demographic Characteristics</i>					
Female	89	0.18	--	0	1
Race/Ethnicity (comparison: white)					
Non-Hispanic white	191	0.39	--	0	1
Black	179	0.37	--	0	1
Hispanic	112	0.23	--	0	1

^a Ignores whether the respondent entered into any cohabiting unions before first marriage.

^b The total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 3.3. Descriptive Statistics, General Never Incarcerated Sample, NLSY97 Cohort (Waves: 1997-2009)

Person-Level Variables	Never Incarcerated General Sample (n=8473)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable - Marriage</i>					
Marriage (failure) ^a	2827	0.34	--	0	1
Months to failure/censorship (t)	--	132.23	38.77	1	195
<i>Dependent Variable - Cohabitation</i>					
Single (censored)	2953	0.35	--	0	1
1st Union=Cohabitation (failure)	4426	0.52	--	0	1
1st Union=Marriage (competing risk)	1094	0.13	--	0	1
Months to failure/censorship (t)	--	105.47	43.36	1	194
<i>Incarceration</i>					
# prior to union	--	--	--	--	--
Avg duration (mos) prior to union	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug dealing or possession	1576	0.19	--	0	1
Other non-violent	4639	0.55	--	0	1
Violent	2606	0.31	--	0	1
# of children	--	0.22	0.59	0	8
<i>Socio-economic Status</i>					
Avg days worked per week/past yr ^b	--	3.25	2.25	0	10
Full-time student past yr	1013	0.12	--	0	1
Highest grade completed	--	13.30	2.78	0	20
<i>Demographic Characteristics</i>					
Female	4278	0.50	--	0	1
Race/Ethnicity (comparison: white)					
Non-Hispanic white	4459	0.53	--	0	1
Black	2152	0.25	--	0	1
Hispanic	1784	0.21	--	0	1

^aIgnores whether the respondent entered into any cohabiting unions before first marriage.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 3.4. Descriptive Statistics, Convicted/Never Incarcerated Sample, NLSY97 Cohort (Waves: 1997-2009)

Person-Level Variables	Never Incarcerated Ever Convicted of a Crime (n=1195)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable - Marriage</i>					
Marriage (failure) ^a	306	0.32	--	0	1
Months to failure/censorship (t)	--	137.37	36.32	14	195
<i>Dependent Variable - Cohabitation</i>					
Single (censored)	265	0.22	--	0	1
1st Union=Cohabitation (failure)	852	0.71	--	0	1
1st Union=Marriage (competing risk)	78	0.07	--	0	1
Months to failure/censorship (t)	--	93.01	42.80	1	191
<i>Incarceration</i>					
# prior to union	--	--	--	--	--
Avg duration (mos) prior to union	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug dealing or possession	558	0.47	--	0	1
Other non-violent	1025	0.86	--	0	1
Violent	717	0.60	--	0	1
# of children	--	0.25	0.57	0	5
<i>Socio-economic Status</i>					
Avg days worked per week/past yr ^b	--	3	2.34	0.00	10
Full-time student past yr	77	0.06	--	0	1
Highest grade completed	--	11.95	2.57	2	20
<i>Demographic Characteristics</i>					
Female	345	0.29	--	0	1
Race/Ethnicity (comparison: white)					
Non-Hispanic white	649	0.54	--	0	1
Black	303	0.25	--	0	1
Hispanic	228	0.19	--	0	1

^aIgnores whether the respondent entered into any cohabiting unions before first marriage.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 3.5. Odds Ratios and 95% Confidence Intervals for Entry into First Cohabitation from Discrete-Time Event History Analysis, NLSY97 Cohort First Cohabitations and Marriages (1997-2009)

Covariates	1st Cohabitation (competing risk: 1st marriage)			
	Total Sample (n=8960)		Convicted Sample (n=1682)	
	OR	(95% CI)	OR	(95% CI)
<i>Incarceration</i>				
# incarcerations (time-varying)	0.66	(0.42 - 1.02)	0.52 *	(0.32 - 0.85)
Avg. duration (mos, t-v)	1.02	(0.99 - 1.04)	1.02	(0.99 - 1.04)
<i>Criminal Behavior</i>				
Drug dealing or possession	1.23 *	(1.14 - 1.33)	0.91	(0.78 - 1.05)
Non-violent	1.30 *	(1.21 - 1.39)	0.90	(0.74 - 1.10)
Violent	1.42 *	(1.32 - 1.52)	1.23 *	(1.06 - 1.44)
# of children	1.56 *	(1.48 - 1.64)	1.68 *	(1.49 - 1.89)
<i>Socio-economic status</i>				
Avg days worked per week (t-v)	1.24 *	(1.22 - 1.26)	1.21 *	(1.17 - 1.25)
Full-time college student past yr (t-v)	0.82 *	(0.75 - 0.90)	0.67 *	(0.50 - 0.90)
Highest grade completed (t-v)	1.09 *	(1.07 - 1.11)	1.11 *	(1.07 - 1.16)
<i>Demographic Characteristics</i>				
Female	1.64 *	(1.54 - 1.75)	1.68 *	(1.45 - 1.96)
Race/Ethnicity				
Black	0.70 *	(0.65 - 0.76)	0.94	(0.80 - 1.11)
Hispanic	1.03	(0.95 - 1.11)	1.13	(0.95 - 1.36)
Age	0.49 *	(0.48 - 0.49)	0.51 *	(0.49 - 0.53)
Age ²	1.02 *	(1.02 - 1.02)	1.02 *	(1.02 - 1.02)

*p < 0.05

Table 3.6. Odds Ratios and 95% Confidence Intervals for Entry into First Marriage from Discrete-Time Event History Analysis, NLSY97 Cohort First Cohabitations and Marriages (1997-2009)

Covariates	1st Marriage			
	Total Sample (n=8960)		Convicted Sample (n=1682)	
	OR	(95% CI)	OR	(95% CI)
<i>Incarceration</i>				
# incarcerations (time-varying)	0.82 *	(0.75 - 0.89)	0.87 *	(0.80 - 0.94)
Avg. duration (mos, t-v)	0.99 *	(0.98 - 0.99)	0.99 *	(0.98 - 0.99)
<i>Criminal Behavior</i>				
Drug dealing or possession	0.86 *	(0.85 - 0.87)	0.77 *	(0.75 - 0.79)
Non-violent	1.29 *	(1.28 - 1.31)	3.06 *	(2.92 - 3.20)
Violent	1.09 *	(1.08 - 1.10)	1.27 *	(1.23 - 1.31)
# of children	1.19 *	(1.17 - 1.20)	1.31 *	(1.27 - 1.34)
<i>Socio-economic status</i>				
Avg days worked per week (t-v)	1.12 *	(1.12 - 1.12)	1.10 *	(1.09 - 1.11)
Full-time college student past yr (t-v)	1.07 *	(1.06 - 1.09)	1.08 *	(1.03 - 1.14)
Highest grade completed (t-v)	1.08 *	(1.08 - 1.09)	1.07 *	(1.06 - 1.08)
<i>Demographic Characteristics</i>				
Female	1.43 *	(1.41 - 1.44)	1.26 *	(1.22 - 1.29)
Race/Ethnicity				
Black	0.40 *	(0.39 - 0.40)	0.52 *	(0.50 - 0.53)
Hispanic	0.84 *	(0.83 - 0.85)	1.07 *	(1.04 - 1.11)
Age	1.00	(1.00 - 1.00)	0.88 *	(0.87 - 0.88)
Age ²	0.99 *	(0.99 - 0.99)	1.00 *	(1.00 - 1.00)

*p < 0.05

Table 3.7. Descriptive Statistics, Cohabitations, Total Sample, NLSY97 Cohort (Waves: 1997-2009)

Total (n=6455)					
Union-Level Variables	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Marriage (failure)	1612	0.25	--	0.00	1.00
Months to failure/censorship (t)	--	23.30	23.34	0.50	172.00
<i>Incarceration</i>					
During union	172	0.03	--	0.00	1.00
# prior to union	--	0.12	0.46	0.00	5.00
Avg. duration (mos) prior to union	--	0.57	3.56	0.00	72.00
<i>Criminal Behavior</i>					
Drug dealing or possession	1967	0.30	--	0.00	1.00
Other non-violent	4129	0.64	--	0.00	1.00
Violent	2756	0.43	--	0.00	1.00
<i>Union Characteristics</i>					
Cohabitation order	--	1.36	0.69	1.00	7.00
Age at union	--	21.82	3.04	13.75	29.83
# of children prior to union	--	0.37	0.74	0.00	9.00
Child with current partner	1375	0.21	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^a	--	3.42	2.30	0.00	10.19
Full-time student in past yr	465	0.07	--	0.00	1.00
Highest grade completed	--	12.56	2.72002	6.00	20.00
Total (n=4733)					
Person-Level Variables	Freq	Mean	SD	Min	Max
<i>Demographics</i>					
Female	2511	0.53	--	0.00	1.00
Race/ethnicity					
Non-Hispanic white	2496	0.53	--	0.00	1.00
Black	1192	0.25	--	0.00	1.00
Hispanic	998	0.21	--	0.00	1.00

^aThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

**Table 3.8. Descriptive Statistics, Cohabitations, Incarcerated Sample, NLSY97 Cohort
(Waves: 1997-2009)**

Union-Level Variables	Ever Incarcerated (n=676)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Marriage (failure)	105	0.16	--	0.00	1.00
Months to failure/censorship (t)	--	24.84	25.30	0.50	135.00
<i>Incarceration</i>					
During union	172	0.25	--	0.00	1.00
# prior to union	--	1.18	0.90	0.00	5.00
Avg. duration (mos) prior to union	--	5.41	9.75	0.00	72.00
<i>Criminal Behavior</i>					
Drug dealing or possession	439	0.65	--	0.00	1.00
Other non-violent	617	0.91	--	0.00	1.00
Violent	523	0.77	--	0.00	1.00
<i>Union Characteristics</i>					
Cohabitation order	--	1.67	0.95	1.00	6.00
Age at union	--	22.28	3.12	14.42	29.83
# of children prior to union	--	0.68	1.01	0.00	9.00
Child with current partner	186	0.28	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^a	--	2.80	2.36	0.00	10.19
Full-time student in past yr	17	0.03	--	0.00	1.00
Highest grade completed	--	10.66	2.12	6.00	19.00
Person-Level Variables	Ever Incarcerated (n=575)				
	Freq	Mean	SD	Min	Max
<i>Demographics</i>					
Female	123	0.21	--	0.00	1.00
Race/ethnicity					
Non-Hispanic white	243	0.42	--	0.00	1.00
Black	198	0.34	--	0.00	1.00
Hispanic	126	0.22	--	0.00	1.00

^aThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 3.9. Descriptive Statistics, Cohabitations, General Never Incarcerated Sample, NLSY97 Cohort (Waves: 1997-2009)

Union-Level Variables	Never Incarcerated General Sample (n=5779)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Marriage (failure)	1507	0.26	--	0.00	1.00
Months to failure/censorship (t)	--	23.12	23.09	0.50	172.00
<i>Incarceration</i>					
During union	--	--	--	--	--
# prior to union	--	--	--	--	--
Avg. duration (mos) prior to union	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug dealing or possession	1528	0.26	--	0.00	1.00
Other non-violent	3512	0.61	--	0.00	1.00
Violent	2233	0.39	--	0.00	1.00
<i>Union Characteristics</i>					
Cohabitation order	--	1.32	0.65	1.00	7.00
Age at union	--	21.76	3.02	13.75	29.67
# of children prior to union	--	0.33	0.70	0.00	6.00
Child with current partner	1189	0.21	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^a	--	3.49	2.28	0.00	10.19
Full-time student in past yr	448	0.08	--	0.00	1.00
Highest grade completed	--	12.78	2.70	6.00	20.00
Person-Level Variables	Never Incarcerated General Sample (n=4158)				
	Freq	Mean	SD	Min	Max
<i>Demographics</i>					
Female	2388	0.57	--	0.00	1.00
Race/ethnicity					
Non-Hispanic white	2253	0.54	--	0.00	1.00
Black	994	0.24	--	0.00	1.00
Hispanic	872	0.21	--	0.00	1.00

^aThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 3.10. Descriptive Statistics, Cohabitations, Convicted/Never Incarcerated Sample, NLSY97 Cohort (Waves: 1997-2009)

Union-Level Variables	Never Incarcerated Ever Convicted of a Crime (n=1107)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Marriage (failure)	175	0.16	--	0.00	1.00
Months to failure/censorship (t)	--	21.13	22.59	0.50	130.00
<i>Incarceration</i>					
During union	--	--	--	--	--
# prior to union	--	--	--	--	--
Avg. duration (mos) prior to union	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug dealing or possession	577	0.52	--	0.00	1.00
Other non-violent	956	0.86	--	0.00	1.00
Violent	712	0.64	--	0.00	1.00
<i>Union Characteristics</i>					
Cohabitation order	--	1.39	0.70	1.00	7.00
Age at union	--	21.28	3.08	13.83	29.33
# of children prior to union	--	0.38	0.76	0.00	6.00
Child with current partner	236	0.21	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^a	--	3.22	2.40	0.00	10.19
Full-time student in past yr	50	0.05	--	0.00	1.00
Highest grade completed	--	11.72	2.46	6.00	20.00

Person-Level Variables	Never Incarcerated Ever Convicted of a Crime (n=579)				
	Freq	Mean	SD	Min	Max
<i>Demographics</i>					
Female	213	0.37	--	0.00	1.00
Race/ethnicity					
Non-Hispanic white	336	0.58	--	0.00	1.00
Black	124	0.21	--	0.00	1.00
Hispanic	110	0.19	--	0.00	1.00

^aThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 3.11. Odd Ratios and 95% Confidence Intervals for Transition from Cohabitation to Marriage from Discrete-Time Event History Analysis, NLSY97 Cohort Cohabitations (1997-2009)

Covariates	Full Sample (n _j =4733; n _i =6455)		Convicted Sample (n _j =1154; n _i =1783)	
	OR	Logit (95% CI)	OR	Logit (95% CI)
<i>Incarceration</i>				
During union (time-varying)	0.47 *	(0.41 - 0.55)	0.49 *	(0.43 - 0.58)
# prior to union	0.81 *	(0.77 - 0.85)	0.86 *	(0.81 - 0.90)
Avg. duration (mos) prior to union	1.00	(1.00 - 1.01)	1.00	(0.99 - 1.01)
<i>Criminal Behavior</i>				
Drug dealing or possession	0.95 *	(0.92 - 0.99)	0.95	(0.89 - 1.01)
Non-violent	1.29 *	(1.25 - 1.33)	1.44 *	(1.32 - 1.58)
Violent	1.13 *	(1.09 - 1.16)	1.55 *	(1.44 - 1.67)
<i>Union Characteristics</i>				
Duration (years)	0.87 *	(0.84 - 0.89)	0.84 *	(0.80 - 0.89)
Duration ² (years)	0.97 *	(0.97 - 0.98)	0.98 *	(0.97 - 0.99)
# of previous unions	1.07 *	(1.04 - 1.10)	1.03	(0.97 - 1.09)
Age at union	0.89 *	(0.88 - 0.89)	0.87 *	(0.86 - 0.88)
# of children prior to union	0.91 *	(0.88 - 0.93)	0.87 *	(0.83 - 0.92)
Child with current partner (t-v)	1.21 *	(1.16 - 1.25)	0.95	(0.89 - 1.03)
<i>Socio-economic status</i>				
Avg. days worked per week (t-v)	1.03 *	(1.02 - 1.04)	1.07 *	(1.05 - 1.08)
Full-time student (t-v)	1.30 *	(1.24 - 1.37)	0.94	(0.81 - 1.10)
Highest grade completed (t-v)	1.19 *	(1.18 - 1.20)	1.19 *	(1.17 - 1.21)
<i>Demographics</i>				
Female	1.37 *	(1.33 - 1.41)	1.27 *	(1.18 - 1.36)
Race/ethnicity (comparison: white)				
Black	0.70 *	(0.67 - 0.73)	0.88 *	(0.81 - 0.96)
Hispanic	0.74 *	(0.71 - 0.77)	0.98	(0.91 - 1.06)

*p < 0.05

ni=number of cohabitations in the analysis sample

nj=number of respondents in the analysis sample

Table 4.1. Descriptive Statistics, All Cohabitations and Marriages Reported by the NLSY97 Cohort (Waves: 1997-2009)

Union-Level Variables	Total (n=8042)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Union dissolution (failure)	3943	0.49	--	0.00	1.00
Months to failure/censorship (t)	--	36.01	31.90	0.50	185.00
<i>Incarceration</i>					
During union	206	0.03	--	0.00	1.00
# prior to union	--	0.11	0.44	0.00	5.00
Avg. duration (mos) prior to union	--	0.52	3.79	0.00	155.00
<i>Criminal Behavior</i>					
Drug dealing or possession	2214	0.28	--	0.00	1.00
Other non-violent	4875	0.61	--	0.00	1.00
Violent	3201	0.40	--	0.00	1.00
<i>Union Characteristics</i>					
Cohabitation	4843	0.60	--	0.00	1.00
Marriage	3199	0.40	--	0.00	1.00
Cohabited before marriage	1612	0.20	--	0.00	1.00
Union order	--	1.36	0.68	1.00	7.00
1st union	5851	0.73	--	0.00	1.00
Higher-order union	2191	0.27	--	0.00	1.00
Age at union	--	21.98	3.0151	12.67	29.92
Child with current partner	1723	0.21	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. hours worked/week	--	26.82	16.076	0.00	80.00
High school dropout	2270	0.29	--	0.00	1.00
Person-Level Variables	Total (n=5851)				
	Freq	Mean	SD	Min	Max
<i>Socio-economic status</i>					
High school dropout	1426	0.25	--	0.00	1.00
<i>Demographics</i>					
Female	3108	0.53	--	0.00	1.00
Race/ethnicity					
Non-Hispanic white	3102	0.53	--	0.00	1.00
Black	1363	0.23	--	0.00	1.00
Hispanic	1329	0.23	--	0.00	1.00

Table 4.2. Descriptive Statistics, Cohabitations and Marriages, Incarcerated Sample, NLSY97 Cohort (Waves: 1997-2009)

Union-Level Variables	Ever Incarcerated (n=767)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Union dissolution (failure)	438	0.57	--	0.00	1.00
Months to failure/censorship (t)	--	32.53	30.40	0.50	156.00
<i>Incarceration</i>					
During union	206	0.27	--	0.00	1.00
# prior to union	--	1.18	0.90	0.00	5.00
Avg. duration (mos) prior to union	--	5.47	11.11	0.00	155.00
<i>Criminal Behavior</i>					
Drug dealing or possession	491	0.64	--	0.00	1.00
Other non-violent	690	0.90	--	0.00	1.00
Violent	584	0.76	--	0.00	1.00
<i>Union Characteristics</i>					
Cohabitation	571	0.74	--	0.00	1.00
Marriage	196	0.26	--	0.00	1.00
Cohabited before marriage	105	0.14	--	0.00	1.00
Union order	--	1.70	0.94	1.00	6.00
1st union	417	0.54	--	0.00	1.00
Higher-order union	350	0.46	--	0.00	1.00
Age at union	--	22.33	3.1127	14.42	29.83
Child with current partner	213	0.28	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. hours worked/week	--	22.43	16.729	0.00	75.48
High school dropout	497	0.66	--	0.00	1.00
Person-Level Variables	Ever Incarcerated (n=627)				
	Freq	Mean	SD	Min	Max
<i>Socio-economic status</i>					
High school dropout	388	0.63	--	0.00	1.00
<i>Demographics</i>					
Female	135	0.22	--	0.00	1.00
Race/ethnicity					
Non-Hispanic white	268	0.43	--	0.00	1.00
Black	208	0.33	--	0.00	1.00
Hispanic	143	0.23	--	0.00	1.00

Table 4.3. Descriptive Statistics, Cohabitations and Marriages, General Never Incarcerated Sample, NLSY97 Cohort (Waves: 1997-2009)

Union-Level Variables	Never Incarcerated General Sample (n=7275)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Union dissolution (failure)	3505	0.48	--	0.00	1.00
Months to failure/censorship (t)	--	36.37	32.03	0.50	185.00
<i>Incarceration</i>					
During union	--	--	--	--	--
# prior to union	--	--	--	--	--
Avg. duration (mos) prior to union	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug dealing or possession	1723	0.24	--	0.00	1.00
Other non-violent	4185	0.58	--	0.00	1.00
Violent	2617	0.36	--	0.00	1.00
<i>Union Characteristics</i>					
Cohabitation	4272	0.59	--	0.00	1.00
Marriage	3003	0.41	--	0.00	1.00
Cohabited before marriage	1507	0.21	--	0.00	1.00
Union order	--	1.33	0.64	1.00	7.00
1st union	5434	0.75	--	0.00	1.00
Higher-order union	1841	0.25	--	0.00	1.00
Age at union	--	21.94	3.0024	12.67	29.92
Child with current partner	1510	0.21	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. hours worked/week	--	27.28	15.937	0.00	80.00
High school dropout	1773	0.25	--	0.00	1.00
Person-Level Variables	Never Incarcerated General Sample (n=5224)				
	Freq	Mean	SD	Min	Max
<i>Socio-economic status</i>					
High school dropout	1038	0.20	--	0.00	1.00
<i>Demographics</i>					
Female	2973	0.57	--	0.00	1.00
Race/ethnicity					
Non-Hispanic white	2834	0.54	--	0.00	1.00
Black	1155	0.22	--	0.00	1.00
Hispanic	1186	0.23	--	0.00	1.00

Table 4.4. Descriptive Statistics, Cohabitations and Marriages, Convicted/Never Incarcerated Sample, NLSY97 Cohort (Waves: 1997-2009)

Union-Level Variables	Never Incarcerated Ever Convicted of a Crime (n=1233)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Union dissolution (failure)	824	0.67	--	0.00	1.00
Months to failure/censorship (t)	--	27.67	28.18	0.50	153.00
<i>Incarceration</i>					
During union	--	--	--	--	--
# prior to union	--	--	--	--	--
Avg. duration (mos) prior to union	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug dealing or possession	630	0.51	--	0.00	1.00
Other non-violent	1061	0.86	--	0.00	1.00
Violent	783	0.64	--	0.00	1.00
<i>Union Characteristics</i>					
Cohabitation	932	0.76	--	0.00	1.00
Marriage	301	0.24	--	0.00	1.00
Cohabited before marriage	175	0.14	--	0.00	1.00
Union order	--	1.41	0.70	1.00	7.00
1st union	841	0.68	--	0.00	1.00
Higher-order union	392	0.32	--	0.00	1.00
Age at union	--	21.39	3.1168	13.83	29.33
Child with current partner	269	0.22	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. hours worked/week	--	25.52	17.448	0.00	80.00
High school dropout	509	0.42	--	0.00	1.00
Person-Level Variables	Never Incarcerated Ever Convicted of a Crime (n=631)				
	Freq	Mean	SD	Min	Max
<i>Socio-economic status</i>					
High school dropout	205	0.33	--	0.00	1.00
<i>Demographics</i>					
Female	230	0.36	--	0.00	1.00
Race/ethnicity					
Non-Hispanic white	368	0.58	--	0.00	1.00
Black	130	0.21	--	0.00	1.00
Hispanic	124	0.20	--	0.00	1.00

Table 4.5. Odds Ratios and 95% Confidence Intervals for Union Dissolution from Discrete-Time Event History Analysis, Full Sample, NLSY97 Cohort Cohabitations and Marriages (1997-2009)

Covariates	Full Sample (n _j =5711; n _i =8042)			
	Logit		Random Intercepts	
	OR	(95% CI)	OR	(95% CI)
<i>Incarceration</i>				
During union (time-varying)	1.24	(0.98 - 1.58)	1.53 *	(1.09 - 2.16)
# prior to union	0.95	(0.84 - 1.07)	0.95	(0.79 - 1.14)
Avg. duration (mos) prior to union	1.01	(1.00 - 1.02)	1.01	(0.99 - 1.03)
<i>Criminal Behavior</i>				
Drug dealing or possession	1.11 *	(1.01 - 1.22)	1.20 *	(1.04 - 1.39)
Non-violent	1.32 *	(1.21 - 1.45)	1.48 *	(1.29 - 1.70)
Violent	1.32 *	(1.21 - 1.44)	1.50 *	(1.31 - 1.72)
<i>Union Characteristics</i>				
Duration (years)	0.72 *	(0.68 - 0.76)	1.13	(0.95 - 1.34)
Duration ² (years)	1.02 *	(1.02 - 1.03)	0.99	(0.98 - 1.01)
Marriage (time-varying)	0.10 *	(0.08 - 0.14)	0.10 *	(0.07 - 0.13)
Marriage (time-varying)*duration	1.65 *	(1.43 - 1.89)	1.28 *	(1.08 - 1.52)
Marriage (time-varying)*duration ²	0.96 *	(0.95 - 0.98)	0.98	(0.96 - 1.00)
# of previous unions	2.32 *	(1.55 - 3.47)	2.45 *	(1.35 - 4.44)
Age at union	0.91 *	(0.90 - 0.93)	0.87 *	(0.84 - 0.89)
Child with current partner	0.67 *	(0.61 - 0.73)	0.52 *	(0.44 - 0.61)
<i>Socio-economic status</i>				
Avg. hours worked/week	0.99 *	(0.99 - 0.99)	0.99 *	(0.98 - 0.99)
High school dropout	0.91	(0.83 - 1.00)	0.92	(0.80 - 1.06)
<i>Demographic Characteristics</i>				
Female	0.97	(0.89 - 1.06)	0.96	(0.85 - 1.09)
Race/ethnicity (comparison: non-Hispanic white)				
Black	1.44 *	(1.32 - 1.58)	1.77 *	(1.52 - 2.06)
Hispanic	0.93	(0.84 - 1.03)	0.89	(0.77 - 1.03)
Constant	0.09 *	(0.06 - 0.16)	0.13 *	(0.06 - 0.28)
<i>Unobserved Heterogeneity Component</i>				
ln(σ_u^2)			0.51	(0.09 - 0.93)
σ_u			1.29	
ρ			0.34	

*p < 0.05

ni=number of unions in the analysis sample

nj=number of respondents in the analysis sample

Table 4.6. Odds Ratios and 95% Confidence Intervals for Union Dissolution from Discrete-Time Event History Analysis, Convicted Sample, NLSY97 Cohort Cohabitations and Marriages (1997-2009)

Covariates	Convicted Sample ($n_j=1214$; $n_i=2000$)			
	Logit		Random Intercepts	
	OR	(95% CI)	OR	(95% CI)
<i>Incarceration</i>				
During union (time-varying)	1.16	(0.90 - 1.50)	1.41	(0.96 - 2.06)
# prior to union	0.87 *	(0.77 - 1.00)	0.83	(0.66 - 1.03)
Avg. duration (mos) prior to union	1.01	(1.00 - 1.02)	1.01	(0.99 - 1.03)
<i>Criminal Behavior</i>				
Drug dealing or possession	0.99	(0.85 - 1.15)	1.02	(0.78 - 1.34)
Non-violent	1.31 *	(1.01 - 1.71)	1.57	(1.00 - 2.48)
Violent	1.27 *	(1.07 - 1.50)	1.50 *	(1.10 - 2.04)
<i>Union Characteristics</i>				
Duration (years)	0.65 *	(0.58 - 0.73)	1.33	(0.95 - 1.87)
Duration ² (years)	1.04 *	(1.02 - 1.06)	0.99	(0.96 - 1.02)
Marriage (time-varying)	0.12 *	(0.07 - 0.21)	0.10 *	(0.05 - 0.20)
Marriage (time-varying)*duration	1.91 *	(1.43 - 2.54)	1.38	(0.97 - 1.97)
Marriage (time-varying)*duration ²	0.94 *	(0.91 - 0.97)	0.98	(0.94 - 1.02)
# of previous unions	2.38 *	(1.26 - 4.48)	2.29	(0.75 - 6.97)
Age at union	0.94 *	(0.91 - 0.97)	0.89 *	(0.84 - 0.94)
Child with current partner	0.64 *	(0.54 - 0.76)	0.43 *	(0.30 - 0.61)
<i>Socio-economic status</i>				
Avg. hours worked/week	0.99 *	(0.98 - 0.99)	0.98 *	(0.97 - 0.99)
High school dropout	1.02	(0.87 - 1.19)	1.13	(0.85 - 1.51)
<i>Demographic Characteristics</i>				
Female	1.02	(0.87 - 1.20)	1.07	(0.79 - 1.44)
Race/ethnicity (comparison: non-Hispanic white)				
Black	1.23 *	(1.03 - 1.46)	1.40 *	(1.01 - 1.94)
Hispanic	0.77 *	(0.64 - 0.94)	0.59 *	(0.41 - 0.84)
Constant	0.07 *	(0.03 - 0.17)	0.10 *	(0.02 - 0.51)
<i>Unobserved Heterogeneity Component</i>				
$\ln(\sigma_u^2)$			0.99	(0.41 - 1.57)
σ_u			1.64	
ρ			0.45	

*p < 0.05

ni=number of unions in the analysis sample

nj=number of respondents in the analysis sample

Table 5.1. Males - Descriptive Statistics, Births Reported by the NLSY97 Cohort (Waves: 1997-2009)^a

Variables	Total (n=4599)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Birth (<i>failure</i>)	1775	0.39	--	0.00	1.00
Total parity	--	0.66	1.02	0.00	8.00
Months to failure/censor (<i>t</i>)	--	161.20	43.67	11.00	230.00
Age at birth (years)	--	22.01	3.22	11.92	29.33
<i>Incarcerations</i>					
# of incarcerations	--	0.15	0.54	0.00	6.00
Avg. mos incarcerated	--	0.67	3.58	0.00	63.00
<i>Criminal Behavior</i>					
Drug	1221	0.27	--	0.00	1.00
Non-violent	2895	0.63	--	0.00	1.00
Violent	1842	0.40	--	0.00	1.00
<i>Marital Status</i>					
Single	2897	0.63	--	0.00	1.00
Cohabiting	875	0.19	--	0.00	1.00
Married	956	0.21	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^b	--	3.62	2.37	0.00	10.00
Full-time student	310	0.07	--	0.00	1.00
Highest grade completed	--	12.42	2.81	2.00	20.00
<i>Race/Ethnicity</i>					
Non-Hispanic white	2413	0.52	--	0.00	1.00
Black	1169	0.25	--	0.00	1.00
Hispanic	977	0.21	--	0.00	1.00

^aDescriptive statistics exclude higher-order births with the exception of total parity.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 5.2. Males, Ever Incarcerated Sample - Descriptive Statistics, Births Reported by the NLSY97 Cohort (Waves: 1997-2009)^a

Variables	Ever Incarcerated (n=460)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Birth (<i>failure</i>)	224	0.49	--	0.00	1.00
Total parity	--	0.88	1.16	0.00	6.00
Months to failure/censor (<i>t</i>)	--	158.99	43.46	44.00	227.00
Age at birth (years)	--	21.75	3.09	14.67	28.92
<i>Incarcerations</i>					
# of incarcerations	--	1.52	0.92	1.00	6.00
Avg. mos incarcerated	--	6.74	9.37	0.50	63.00
<i>Criminal Behavior</i>					
Drug	272	0.59	--	0.00	1.00
Non-violent	397	0.86	--	0.00	1.00
Violent	346	0.75	--	0.00	1.00
<i>Marital Status</i>					
Single	295	0.64	--	0.00	1.00
Cohabiting	126	0.27	--	0.00	1.00
Married	49	0.11	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^b	--	2.67	2.41	0.00	9.23
Full-time student	16	0.03	--	0.00	1.00
Highest grade completed	--	10.51	2.03	5.00	18.00
<i>Race/Ethnicity</i>					
Non-Hispanic white	188	0.41	0.4921	0.00	1.00
Black	162	0.35	0.4782	0.00	1.00
Hispanic	107	0.23	0.423	0.00	1.00

^aDescriptive statistics exclude higher-order births with the exception of total parity.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 5.3. Males, General Never Incarcerated Sample - Descriptive Statistics, Births Reported by the NLSY97 Cohort (Waves: 1997-2009)^a

Variables	Never Incarcerated General Sample (n=4139)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Birth (<i>failure</i>)	1551	0.37	--	0.00	1.00
Total parity	--	0.63	1.00	0.00	8.00
Months to failure/censor (<i>t</i>)	--	161.45	43.69	11.00	230.00
Age at birth (years)	--	22.04	3.23	11.92	29.33
<i>Incarcerations</i>					
# of incarcerations	--	--	--	--	--
Avg. mos incarcerated	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug	949	0.23	--	0.00	1.00
Non-violent	2498	0.60	--	0.00	1.00
Violent	1496	0.36	--	0.00	1.00
<i>Marital Status</i>					
Single	2602	0.63	--	0.00	1.00
Cohabiting	749	0.18	--	0.00	1.00
Married	907	0.22	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^b	--	3.73	2.34	0.00	10.00
Full-time student	294	0.07	--	0.00	1.00
Highest grade completed	--	12.64	2.81	2.00	20.00
<i>Race/Ethnicity</i>					
Non-Hispanic white	2225	0.54	0.4986	0.00	1.00
Black	1007	0.24	0.4291	0.00	1.00
Hispanic	870	0.21	0.4075	0.00	1.00

^aDescriptive statistics exclude higher-order births with the exception of total parity.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 5.4. Males, Convicted/Never Incarcerated Sample - Descriptive Statistics, Births Reported by the NLSY97 Cohort (Waves: 1997-2009)^a

Variables	Never Incarcerated Ever Convicted of a Crime (n=789)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Birth (<i>failure</i>)	436	0.55	--	0.00	1.00
Total parity	--	1.03	1.23	0.00	8.00
Months to failure/censor (<i>t</i>)	--	150.66	46.74	11.00	229.00
Age at birth (years)	--	21.14	3.25	11.92	28.50
<i>Incarcerations</i>					
# of incarcerations	--	--	--	--	--
Avg. mos incarcerated	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug	378	0.48	--	0.00	1.00
Non-violent	664	0.84	--	0.00	1.00
Violent	471	0.60	--	0.00	1.00
<i>Marital Status</i>					
Single	486	0.62	--	0.00	1.00
Cohabiting	208	0.26	--	0.00	1.00
Married	131	0.17	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^b	--	3.41	2.37	0.00	10.00
Full-time student	45	0.06	--	0.00	1.00
Highest grade completed	--	11.47	2.61	2.00	20.00
<i>Race/Ethnicity</i>					
Non-Hispanic white	417	0.53	0.4995	0.00	1.00
Black	211	0.27	0.4429	0.00	1.00
Hispanic	156	0.20	0.3985	0.00	1.00

^aDescriptive statistics exclude higher-order births with the exception of total parity.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

**Table 5.5. Females - Descriptive Statistics, Births Reported by the NLSY97 Cohort
(Waves: 1997-2009)^a**

Variables	Total (n=4385)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Birth (<i>failure</i>)	2291	0.52	--	0.00	1.00
Total parity	--	1.02	1.21	0.00	7.00
Months to failure/censor (<i>t</i>)	--	147.50	49.33	3.00	231.00
Age at birth (years)	--	20.95	3.33	11.25	30.08
<i>Incarcerations</i>					
# of incarcerations	--	0.03	0.23	0.00	6.00
Avg. mos incarcerated	--	0.13	1.86	0.00	63.00
<i>Criminal Behavior</i>					
Drug	603	0.14	--	0.00	1.00
Non-violent	1980	0.45	--	0.00	1.00
Violent	1055	0.24	--	0.00	1.00
<i>Marital Status</i>					
Single	2421	0.55	--	0.00	1.00
Cohabiting	954	0.22	--	0.00	1.00
Married	1183	0.27	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^b	--	2.90	2.23	0.00	10.00
Full-time student	332	0.08	--	0.00	1.00
Highest grade completed	--	12.76	3.11	0.00	20.00
<i>Race/Ethnicity</i>					
Non-Hispanic white	2252	0.51	--	0.00	1.00
Black	1166	0.27	--	0.00	1.00
Hispanic	924	0.21	--	0.00	1.00

^aDescriptive statistics exclude higher-order births with the exception of total parity.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 5.6. Females, Ever Incarcerated Sample - Descriptive Statistics, Births Reported by the NLSY97 Cohort (Waves: 1997-2009)^a

Variables	Ever Incarcerated (n=96)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Birth (<i>failure</i>)	60	0.63	--	0.00	1.00
Total parity	--	1.27	1.35	0.00	6.00
Months to failure/censor (<i>t</i>)	--	143.57	47.96	44.00	225.00
Age at birth (years)	--	20.69	3.12	14.67	28.00
<i>Incarcerations</i>					
# of incarcerations	--	1.36	0.78	1.00	6.00
Avg. mos incarcerated	--	5.74	11.29	0.50	63.00
<i>Criminal Behavior</i>					
Drug	51	0.53	--	0.00	1.00
Non-violent	82	0.85	--	0.00	1.00
Violent	64	0.67	--	0.00	1.00
<i>Marital Status</i>					
Single	60	0.63	--	0.00	1.00
Cohabiting	24	0.25	--	0.00	1.00
Married	15	0.16	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^b	--	1.85	2.14	0.00	7.73
Full-time student	5	0.05	--	0.00	1.00
Highest grade completed	--	10.71	2.29	6.00	18.00
<i>Race/Ethnicity</i>					
Non-Hispanic white	50	0.52	0.5022	0.00	1.00
Black	26	0.27	0.4467	0.00	1.00
Hispanic	18	0.19	0.3924	0.00	1.00

^aDescriptive statistics exclude higher-order births with the exception of total parity.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 5.7. Females, General Never Incarcerated Sample - Descriptive Statistics, Births Reported by the NLSY97 Cohort (Waves: 1997-2009)^a

Variables	Never Incarcerated General Sample (n=4289)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Birth (<i>failure</i>)	2231	0.52	--	0.00	1.00
Total parity	--	1.01	1.21	0.00	7.00
Months to failure/censor (<i>t</i>)	--	147.58	49.36	3.00	231.00
Age at birth (years)	--	20.95	3.33	11.25	30.08
<i>Incarcerations</i>					
# of incarcerations	--	--	--	--	--
Avg. mos incarcerated	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug	552	0.13	--	0.00	1.00
Non-violent	1898	0.44	--	0.00	1.00
Violent	991	0.23	--	0.00	1.00
<i>Marital Status</i>					
Single	2361	0.55	--	0.00	1.00
Cohabiting	930	0.22	--	0.00	1.00
Married	1168	0.27	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^b	--	2.92	2.22	0.00	10.00
Full-time student	327	0.08	--	0.00	1.00
Highest grade completed	--	12.81	3.11	0.00	20.00
<i>Race/Ethnicity</i>					
Non-Hispanic white	2202	0.51	0.4999	0.00	1.00
Black	1140	0.27	0.4418	0.00	1.00
Hispanic	906	0.21	0.4082	0.00	1.00

^aDescriptive statistics exclude higher-order births with the exception of total parity.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 5.8. Females, Convicted/Never Incarcerated Sample - Descriptive Statistics, Births Reported by the NLSY97 Cohort (Waves: 1997-2009)^a

Variables	Never Incarcerated Ever Convicted of a Crime (n=338)				
	Freq	Mean	SD	Min	Max
<i>Dependent Variable</i>					
Birth (<i>failure</i>)	240	0.71	--	0.00	1.00
Total parity	--	1.46	1.33	0.00	6.00
Months to failure/censor (<i>t</i>)	--	128.14	51.95	37.00	231.00
Age at birth (years)	--	19.64	3.24	14.08	27.50
<i>Incarcerations</i>					
# of incarcerations	--	--	--	--	--
Avg. mos incarcerated	--	--	--	--	--
<i>Criminal Behavior</i>					
Drug	131	0.39	--	0.00	1.00
Non-violent	275	0.81	--	0.00	1.00
Violent	180	0.53	--	0.00	1.00
<i>Marital Status</i>					
Single	194	0.57	--	0.00	1.00
Cohabiting	98	0.29	--	0.00	1.00
Married	61	0.18	--	0.00	1.00
<i>Socio-economic status</i>					
Avg. days worked per week ^b	--	2.23	2.22	0.00	8.41
Full-time student	11	0.03	--	0.00	1.00
Highest grade completed	--	11.09	2.96	0.00	20.00
<i>Race/Ethnicity</i>					
Non-Hispanic white	186	0.55	0.4982	0.00	1.00
Black	83	0.25	0.4311	0.00	1.00
Hispanic	59	0.17	0.3801	0.00	1.00

^aDescriptive statistics exclude higher-order births with the exception of total parity.

^bThe total number of days worked in the past year was scaled to represent the average number of 8-hour shifts per week. Some respondents reported working more than 56 hours per week, so the maximum number of days worked per week is allowed to be greater than 7.

Table 5.9. Males, Full Sample - Odds Ratios and 95% Confidence Intervals for Births from Discrete-Time Event History Analysis, NLSY97 Cohort (1997-2009)

Covariates	Full Sample ($n_i=5855$; $n_j=4599$)			
	Logit		Random Intercepts	
	OR	(95% CI)	OR	(95% CI)
<i>Incarceration (time-varying)</i>				
# incarcerations	1.14 *	(1.05 - 1.24)	1.16 *	(1.06 - 1.26)
Avg. duration (mos)	1.00	(0.99 - 1.00)	0.99	(0.99 - 1.00)
<i>Criminal Behavior (t-v)</i>				
Drug dealing or possession	1.04	(0.96 - 1.13)	1.04	(0.95 - 1.14)
Non-violent	1.22 *	(1.11 - 1.34)	1.23 *	(1.12 - 1.36)
Violent	1.33 *	(1.22 - 1.45)	1.35 *	(1.23 - 1.48)
<i>Previous Birth</i>	3.16 *	(2.89 - 3.46)	2.94 *	(2.61 - 3.32)
<i>Marital status (t-v; comparison: single)</i>				
Cohabiting	2.05 *	(1.88 - 2.22)	2.07 *	(1.90 - 2.26)
Married	3.12 *	(2.87 - 3.40)	3.33 *	(2.99 - 3.71)
<i>Socio-economic status (t-v)</i>				
Avg. days worked/week past year	1.03 *	(1.01 - 1.05)	1.03 *	(1.01 - 1.05)
Full-time student	0.45 *	(0.37 - 0.55)	0.46 *	(0.37 - 0.56)
Highest grade completed	0.92 *	(0.90 - 0.93)	0.91 *	(0.89 - 0.93)
<i>Demographic Characteristics</i>				
Race/ethnicity (comparison: white)				
Black	2.08 *	(1.90 - 2.28)	2.19 *	(1.97 - 2.43)
Hispanic	1.50 *	(1.37 - 1.65)	1.55 *	(1.40 - 1.72)
Age (t-v)	2.45 *	(2.14 - 2.80)	2.43 *	(2.13 - 2.79)
Age ² (t-v)	0.98 *	(0.98 - 0.99)	0.98 *	(0.98 - 0.99)
<i>Interaction term (t-v)</i>				
# incarcerations*Previous birth	0.80 *	(0.71 - 0.89)	0.78 *	(0.69 - 0.88)
<i>Unobserved Heterogeneity Component</i>				
$\ln(\sigma_u^2)$			-2.55	-(3.64 - -1.47)
σ_u			0.28	
ρ			0.02	

*p < 0.05

ni=number of birth episodes in the analysis sample

nj=number of respondents in the analysis sample

Table 5.10. Males, Convicted Sample - Odds Ratios and 95% Confidence Intervals for Births from Discrete-Time Event History Analysis, NLSY97 Cohort (1997-2009)

Covariates	Convicted Sample ($n_i=1804$; $n_j=1249$)			
	Logit		Random Intercepts	
	OR	(95% CI)	OR	(95% CI)
<i>Incarceration (time-varying)</i>				
# incarcerations	1.11 *	(1.01 - 1.22)	1.11 *	(1.01 - 1.22)
Avg. duration (mos)	0.99	(0.98 - 1.00)	0.99	(0.98 - 1.00)
<i>Criminal Behavior (t-v)</i>				
Drug dealing or possession	0.92	(0.82 - 1.05)	0.92	(0.81 - 1.05)
Non-violent	1.13	(0.91 - 1.40)	1.13	(0.91 - 1.40)
Violent	1.34 *	(1.15 - 1.56)	1.35 *	(1.15 - 1.58)
<i>Previous Birth</i>	3.35 *	(2.85 - 3.92)	3.29 *	(2.73 - 3.98)
<i>Marital status (t-v; comparison: single)</i>				
Cohabiting	2.18 *	(1.92 - 2.47)	2.19 *	(1.92 - 2.50)
Married	2.10 *	(1.81 - 2.43)	2.13 *	(1.80 - 2.51)
<i>Socio-economic status (t-v)</i>				
Avg. days worked/week past year	1.01	(0.99 - 1.04)	1.01	(0.99 - 1.04)
Full-time student	0.54 *	(0.36 - 0.82)	0.54 *	(0.36 - 0.82)
Highest grade completed	0.93 *	(0.90 - 0.96)	0.93 *	(0.90 - 0.96)
<i>Demographic Characteristics</i>				
Race/ethnicity (comparison: white)				
Black	1.97 *	(1.71 - 2.27)	1.99 *	(1.70 - 2.34)
Hispanic	1.56 *	(1.34 - 1.82)	1.58 *	(1.34 - 1.86)
Age (t-v)	2.29 *	(1.86 - 2.82)	2.29 *	(1.86 - 2.82)
Age ² (t-v)	0.98 *	(0.98 - 0.99)	0.98 *	(0.98 - 0.99)
<i>Interaction term (t-v)</i>				
# incarcerations*Previous birth	0.79 *	(0.69 - 0.90)	0.79 *	(0.69 - 0.90)
<i>Unobserved Heterogeneity Component</i>				
$\ln(\sigma_u^2)$			-4.05	-(10.19 - 2.08)
σ_u			0.13	
ρ			0.01	

*p < 0.05

ni=number of birth episodes in the analysis sample

nj=number of respondents in the analysis sample

Table 5.11. Females, Full Sample - Odds Ratios and 95% Confidence Intervals for Births from Discrete-Time Event History Analysis, NLSY97 Cohort (1997-2009)

Covariates	Full Sample ($n_i=6550$; $n_j=4385$)			
	Logit		Random Intercepts	
	OR	(95% CI)	OR	(95% CI)
<i>Incarceration (time-varying)</i>				
# incarcerations	1.07	(0.90 - 1.26)	1.07	(0.90 - 1.27)
Avg. duration (mos)	0.99	(0.98 - 1.01)	0.99	(0.98 - 1.01)
<i>Criminal Behavior (t-v)</i>				
Drug dealing or possession	0.96	(0.88 - 1.06)	0.96	(0.87 - 1.05)
Non-violent	1.12 *	(1.05 - 1.20)	1.12 *	(1.05 - 1.20)
Violent	1.24 *	(1.16 - 1.34)	1.26 *	(1.17 - 1.36)
<i># of previous children</i>	2.59 *	(2.41 - 2.78)	2.45 *	(2.21 - 2.70)
<i>Marital status (t-v; comparison: single)</i>				
Cohabiting	1.65 *	(1.54 - 1.77)	1.66 *	(1.55 - 1.79)
Married	2.44 *	(2.28 - 2.62)	2.53 *	(2.33 - 2.75)
<i>Socio-economic status (t-v)</i>				
Avg. days worked/week	0.87 *	(0.86 - 0.89)	0.87 *	(0.85 - 0.88)
Full-time student	0.30 *	(0.25 - 0.34)	0.30 *	(0.25 - 0.34)
Highest grade completed	0.93 *	(0.92 - 0.95)	0.93 *	(0.91 - 0.94)
<i>Socio-Demographic Characteristics</i>				
Race/ethnicity (comparison: white)				
Black	1.86 *	(1.72 - 2.00)	1.92 *	(1.76 - 2.09)
Hispanic	1.32 *	(1.22 - 1.42)	1.34 *	(1.24 - 1.46)
Age (t-v)	2.64 *	(2.37 - 2.93)	2.67 *	(2.40 - 2.97)
Age ² (t-v)	0.98 *	(0.98 - 0.98)	0.98 *	(0.98 - 0.98)
<i>Interaction term (t-v)</i>				
# incarcerations*Previous birth	0.85	(0.68 - 1.07)	0.84	(0.67 - 1.06)
<i>Unobserved Heterogeneity Component</i>				
$\ln(\sigma_u^2)$			-3.01	-(4.23 - -1.79)
σ_u			0.22	
ρ			0.01	

*p < 0.05

ni=number of birth episodes in the analysis sample

nj=number of respondents in the analysis sample

Table 5.12. Females, Convicted Sample - Odds Ratios and 95% Confidence Intervals for Births from Discrete-Time Event History Analysis, NLSY97 Cohort (1997-2009)

Covariates	Convicted Sample (n _i =751; n _j =434)			
	Logit		Random Intercepts	
	OR	(95% CI)	OR	(95% CI)
<i>Incarceration (time-varying)</i>				
# incarcerations	1.06	(0.88 - 1.29)	1.06	(0.88 - 1.29)
Avg. duration (mos)	0.99	(0.97 - 1.00)	0.99	(0.97 - 1.00)
<i>Criminal Behavior (t-v)</i>				
Drug dealing or possession	0.92	(0.77 - 1.09)	0.92	(0.77 - 1.10)
Non-violent	1.19	(0.92 - 1.53)	1.19	(0.92 - 1.53)
Violent	1.44 *	(1.18 - 1.74)	1.44 *	(1.18 - 1.75)
# of previous children	1.18	(0.95 - 1.46)	1.17	(0.87 - 1.57)
<i>Marital status (t-v; comparison: single)</i>				
Cohabiting	1.90 *	(1.59 - 2.27)	1.90 *	(1.59 - 2.27)
Married	2.34 *	(1.93 - 2.83)	2.34 *	(1.92 - 2.86)
<i>Socio-economic status (t-v)</i>				
Avg. days worked/week	0.84 *	(0.80 - 0.88)	0.84 *	(0.80 - 0.88)
Full-time student	0.25 *	(0.14 - 0.47)	0.25 *	(0.14 - 0.47)
Highest grade completed	0.95 *	(0.91 - 1.00)	0.95 *	(0.91 - 1.00)
<i>Socio-Demographic Characteristics</i>				
Race/ethnicity (comparison: white)				
Black	1.25 *	(1.03 - 1.52)	1.25 *	(1.03 - 1.52)
Hispanic	0.90	(0.72 - 1.13)	0.90	(0.72 - 1.13)
Age (t-v)	3.86 *	(2.89 - 5.15)	3.87 *	(2.88 - 5.21)
Age ² (t-v)	0.97 *	(0.96 - 0.98)	0.97 *	(0.96 - 0.98)
<i>Interaction term (t-v)</i>				
# incarcerations*Previous birth	0.75 *	(0.58 - 0.96)	0.75 *	(0.58 - 0.96)
<i>Unobserved Heterogeneity Component</i>				
ln(σ_u^2)			-5.05	-(27.11 - 17.01)
σ_u			0.08	
ρ			0.00	

*p < 0.05

ni=number of birth episodes in the analysis sample

nj=number of respondents in the analysis sample

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