

Bad Ink: Visible Tattoos and Recidivism

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Abstract

This study examines whether tattoo visibility affects recidivism length of ex-offenders. Conventional wisdom suggests that visible tattoos may negatively influence employment outcomes. Additionally, research on recidivism argues that employment post-release is a main determinant of reductions in recidivism. Taken together, these two bodies of literature suggest there may be a relationship between tattoos visible in the workplace and recidivism of released inmates. Using data from the Florida Department of Corrections, I estimate a log-logistic survival model and compare estimated survival length for inmates with and without visible tattoos. The findings suggest that inmates with visible tattoos return to incarceration faster than those without tattoos or with tattoos easily hidden by clothing.

Keywords: Recidivism, Tattoos, Survival Analysis, Crime

JEL Codes: J00, J60, J71

I. Introduction

In 2011, over 600,000 inmates were released from prison and reentered into society (Carson and Sabol, 2011). This large influx of ex-offenders into American communities means large populations of individuals attempting to reenter the labor force. A variety of factors may limit an ex-offender's propensity to obtain employment post-release, such as educational background and skill knowledge, medical issues, and personal appearance. Although previous research has examined the impact of education, skill level, and medical health on gaining employment (Freeman, 2003), the impact of personal appearance on the likelihood of obtaining employment post-release from prison has received less attention.

Conventional wisdom suggests that tattoos that are visible in the workplace may limit the employment opportunities of individuals with those tattoos. A 2013 study by Career Builder found that employers ranking personal attributes that would keep them from offering someone a job selected "having a visible tattoo" 31% of the time (Hennessey, 2013). A workplace stigma associated with having visible tattoos exists, with many employers formally requiring tattoos of existing employees to be covered during work (Crowe, 2012). Even if visible tattoos are not formally outlawed in the workplace, often during interviews job candidates cover their tattoos and conditional on receiving the job, keep the tattoos covered to conform to workplace norms (Kaufman, 2013). The impact of a visible tattoo on obtaining employment is so important that a job training program for ex-convicts and ex-gang members teaches a workshop on how to cover visible tattoos with makeup for job interviews and workplace interactions (Kilgannon, 2009). The goal of hiding tattoos is to decrease the likelihood of removal from the applicant pool due to characteristics unrelated to skill-level (Kilgannon, 2009).

Another area of recent research suggests that employment of ex-offenders post-release may be of direct importance to decreasing the likelihood of future incarceration. Several articles citing anecdotal evidence argue that small-scale reentry programs emphasizing fast employment post-release successfully reduce recidivism rates of program participants compared to similar individuals recently released from prison that do not participate in work-first programs (Freeman, 2003; Tahmincioglu, 2010; Husock, 2012; Pia Negro, 2012; Rosenberg, 2012 to name a few).

Research on criminal signaling mechanisms details how tattoos serve as signaling mechanisms for criminals. In his 2009 book, *Codes of the Underworld*, Diego Gambetta explains that tattoos serve as signals of criminality for ex-offenders. Some criminals consider the tattoos on their body to be a resume for their prior achievements. Additionally, individuals with tattoos may signal that they do not conform to society in the way non-tattooed individuals do (Gambetta, 2009).

If employers are aware that tattoos are used to signal criminal experience, or at the very least non-compliance to social norms, then while interviewing potential employees from a pool of ex-offenders, non-tattooed or non-visibly tattooed ex-offenders may seem more criminally reformed than ex-offenders with tattoos that can be seen during an interview.

This study bridges the gap between these two separate literatures. Popular evidence on tattoos and employment outcomes suggests a negative relationship exists between the instance of a tattoo and obtaining employment (Kilgannon, 2009; Crowe, 2012; Hennessey, 2013; Kaufman, 2013). A separate area of popular press focused on recidivism rates and employment post release suggests that employed individuals recidivate at lower rates than similar non-employed individuals (Freeman, 2003; Tahmincioglu, 2010; Husock, 2012; Pia Negro, 2012; Rosenberg,

2012). Using data from the Florida Department of Corrections (FDOC) Offender Based Information System (OBIS), I examine whether inmates with tattoos visible in the workplace recidivate at higher rates than their non-tattooed, and non-visibly tattooed counterparts.

Two recent criminology studies also attempt to bridge this gap. Lozano et al. (2010) consider a sample of 81 inmates with prison tattoos, 75 inmates with non-prison tattoos, 52 non-tattooed inmates, and 66 tattooed college students to test whether inmates with prison tattoos have a higher risk of recidivating than non-tattooed inmates and college students. The results from their study suggest that inmates with prison tattoos score higher on recidivism risk assessments than inmates without prison tattoos and college students. Waters (2012) expands upon Lozano et al. (2010) and examines the set of 79,749 inmates released from FDOC between 1995 and 2001. All inmates in this sample were tracked for at least three years following release (Waters, 2012). Using a logistic regression to examine the relationship between visible tattoos and whether or not an inmate returned to incarceration within the last three years, he finds that inmates with visible tattoos are more likely to be reconvicted for new felony offenses and new violent offenses within three years.

Although these studies take a first step at linking tattoos to recidivism, both have important limitations. Lozano et al. (2010) include only 274 individuals in their sample. It is possible that the relationships found within their data are a function of this small sample size. Additionally, the self-reported survey data used within their analysis may be subject to errors due to inmates overestimating or underestimating their criminality. Finally, although their results reflect a first attempt to link tattoos to recidivism, their analysis is limited in that they examine the covariance between inmate groups and do not extend their analysis to include regressions. This approach is subject to selection effects as it cannot control for differences in unobservable

characteristics across inmates with prison tattoos, inmates with tattoos, inmates without tattoos, and college students.

Waters (2012) exploration of this relationship largely improves upon the data issues present in Lozano et al. (2010). His analysis includes all inmates released from FDOC facilities over seven years, a sample of almost 80,000 inmates. Additionally, he utilizes logistic regressions to examine the relationship between having a visible tattoo and reconviction within three years. Despite these improvements, Waters' (2012) analysis fails to account for the timing of recidivism within the three year follow-up period. Previous work identifies the use of hazard or survival analysis to analyze recidivism as the preferred approach, as it accounts for both the timing and occurrence of reoffense (Baumer, 1997). Although, Waters (2012) examines the likelihood of reconviction within three years, inmates reconvicted within the first month of the follow-up period and inmates reconvicted within the last month of the follow-up period are identical under his approach. Finally, Waters' (2012) develops only one visibility classification and fails to address differences in unobserved characteristics across inmates with visible tattoos and inmates with non-visible tattoos.

The current study makes three significant contributions to this growing literature on inmate tattoos and recidivism. First, I examine a sample of all inmates released from FDOC facilities during 2008, 2009, and 2010. This sample is larger than those used in most previous research and covers the criminal history of all inmates exiting FDOC facilities over those three years. This large dataset provides more detailed information on the relationship between visible tattoos and recidivism than previously found within the literature.

Second, I develop two classifications of visibility whereas previous literature defines a tattoo as visible only if it is located on the arms, hands, neck, or face of an individual (Waters,

2012). Whether or not a tattoo is visible in the workplace is dependent on the type of work environment in question. A tattoo located on the bicep of an individual's right arm may not be visible in an office setting where suits are the normal dress code, but may be visible in construction work where shirts with shorter sleeves are appropriate. However, there are some tattoo locations considered visible in a very small subset of potential jobs. A tattoo located on an individual's upper back for example, would be visible for a lifeguard, but almost no other common occupations. The use of two measures of visibility sheds light on which tattoo locations matter most for employment. It is possible that employers do not find tattoos on the arms or legs concerning, but a tattoo on the face or neck may provide a different signal.

Finally, I extend previous work on tattoos and reoffense using a survival methodology as suggested within the literature as the appropriate approach to examining recidivism. Survival analyses contain a two part dependent variable that accounts for both the timing and occurrence of recidivism. Thus, inmates in the sample who return to incarceration in the first month of the follow-up period are differentiated from inmates surviving without reincarceration until the end of the follow-up period.

The remainder of this paper progresses as follows. Section II describes the FDOC OBIS data. Section III explains the methodology used to analyze this data. Section IV presents the results and section V concludes.

II. Data

The FDOC OBIS database provides inmate-level data on all individuals incarcerated within or released from FDOC facilities between October 1997 and October 2013. For each inmate the database documents demographic information including gender, race, weight, height, hair color, eye color, and age. Criminal histories for all inmates incarcerated in or released from

FDOC facilities since October 1997 are also provided by the database and include information on the type of crime committed for every crime an inmate has been incarcerated for within the Florida prison system, the county in which each crime was committed, the prison sentence for each crime, and the facility and security level in which this prison sentence is/was served.¹ In addition to providing demographic and criminal profiles for each inmate, the FDOC OBIS database also provides information on the location, type, and description of tattoos (if any) on an inmate's body. Additionally, upon release from a FDOC facility, all inmates complete a plan for release which includes information on where the inmate plans to reside post-release.

Taken together, the data available from the FDOC OBIS database provide a demographic profile, a list of prior offenses, an account of the county in which each offense took place, the prison sentences for prior offenses, addresses of inmates once released, and a list and description including location of each tattoo on the each inmate's body.

A number of previous studies examine recidivism as rearrest, reoffense, or reincarceration within three years following release (Benda and Toombs, 2002; Langan and Levin, 2002; Duwe and Donnay, 2008; Waters, 2012). In order to construct a dataset that is comparable to other studies which examine three-year recidivism rates, I limit my sample to inmates released between Jan 1st, 2008 and Dec. 31st, 2010, and track each inmate for exactly three years post-release. After limiting my data to inmates released in 2008, 2009, or 2010, the final dataset consists of 97,156 inmates.

¹ The FDOC began recording *all* receipts and releases from FDOC facilities in October 1997 and thus data post-1997 is complete, containing all inmates from that time period, whereas data on incarcerations pre-1997 is only included for inmates who returned to incarceration post-1997. For example, if an inmate was incarcerated in 1998 and was also previously incarcerated in an FDOC facility in 1960, that inmate's criminal history includes both the 1960 incarceration and the 1998 incarceration. However, if an individual served time in a FDOC facility during 1960 and did not recidivate post-1997, they do not appear within the FDOC OBIS database.

Using the information present within the FDOC OBIS database, I create a dataset of variables identified as important factors for recidivism within the literature. Previous research suggests that age, gender, race, and previous criminal activity are the most consistent predictors of recidivism (Hepburn and Albonetti, 1994; Baumer, 1997; Hanley and Latessa, 1997; Benedict et al. 1998; Gainey et al., 2000; Kruttschnitt et al., 2000, Spohn and Holleran, 2002). Previous research suggests less consistently that employment status, marital status, and drug use post-release affect recidivism risk, with marriage and employment negatively affecting recidivism and drug use positively affecting recidivism (Jurik, 1983; Visser and Linster, 1990; Hanley and Latessa, 1997; Gainey et al., 2000; Kruttschnitt et al., 2000; Benda and Toombs, 2002; Spohn and Holleran, 2002). Unfortunately, the FDOC OBIS database does not provide information on the employment², marital, or drug use status of inmates³. Despite these limitations, the FDOC OBIS database provides information that allows for the control of factors most consistently identified within the literature as impacting recidivism risk and timing including age, gender, race, and previous criminal behavior.

Beginning with demographic factors identified as important for recidivism in prior research (gender, race, and age at release), I create demographic control variables from the FDOC OBIS database. Recidivism risk is higher for men than women (Baumer, 1997; Gainey et al., 2000; Langan and Levin, 2002; Spohn and Holleran, 2002; Duwe and Donnay, 2008; Waters 2012) and thus I create a dummy variable to control for the impact of gender on recidivism, where gender equals one if the inmate is male and zero if the inmate is female. Male inmates account for roughly 88% percent of the sample.

² Kling (2006) matches encrypted social security numbers from FDOC to those listed on unemployment claims from Florida's unemployment insurance office, providing a link between inmates and employment status post-release. However, this data is not publically available and requests for access to the data were denied.

³ The FDOC denied requests for access to information on inmate marital status and drug use.

Previous research also identifies race as an important determinant for recidivism. Findings from previous studies suggest Black inmates are more likely to recidivate than White inmates according to a number of studies (Blumstein et al., 1986; Beck and Shipley, 1987; Anderson et al., 1991; Helpburn and Albonetti, 1994; Gendreau et al., 1996; Beck and Shipley 1997; Benda and Toombs, 2002; Langan and Levin, 2002; Spohn and Holleran, 2002; Langan et al., 2003; Kubrin and Stewart, 2006; Bales and Mears, 2008; Kohl et al., 2008). Race is defined within my analysis using the categories the FDOC OBIS database uses to classify race (Black, White, Hispanic, Asian or Pacific Islander, American Indian, or unknown). I create dummy variables for each of these categories to control for race within my analysis. Within my sample, roughly 50% of inmates are White, 46% are Black, 3.6% are Hispanic, and the remaining 0.4% are either Asian, Pacific Islander, American Indian, or Unknown.

Age at release has also been identified within previous research to negatively affect recidivism risk (Visser et al., 1991; Hepburn and Albonetti, 1994; Baumer, 1997; Benedict et al., 1998; Uggen, 2000; Benda and Toombs, 2002; Spohn and Holleran, 2002; Windzio, 2006; Duwe and Donnay, 2008, Lozano et al., 2010, Waters, 2012). It is possible that this is a result of learning by doing, and that criminals become more efficient over time. Another possibility is that once older criminals find employment they substitute into more stable lifestyles (Uggen, 2000).

The FDOC OBIS database contains a birthdate for each inmate, which I use to calculate age at release for each inmate's first release during the follow-up period. Fifteen years of age is the minimum age at release within the sample and the maximum age is 88.⁴ I limit the sample to

⁴ Cross-checks of my calculation of age at release with the FDOC OBIS database for the inmates' whose ages are the minimum and maximum verify the validity of the calculation.

exclude inmates who are listed in the FDOC database but are deceased as they do not have the opportunity to commit future crimes.

Next, I construct several variables to control for the effect of prior criminal history on recidivism. Langan and Levin (2002) suggest that the number of prior offenses or incarcerations affect recidivism risk. Inmates with prior criminal histories may be more likely to return to incarceration, as this may reflect a lifestyle rather than an isolated incident. Previous research finds that previous incarceration is positively related to recidivism risk. To control for the effect of prior criminal activity on future recidivism risk, I construct a variable that counts the number of prior incarcerations of an inmate as of their first release during the follow-up period. This variable ranges from 1 to 16 previous incarcerations depending on the inmate.

Another area of previous research suggests that the prison environment may ‘harden’ offenders. Chen and Shapiro (2007) use a regression discontinuity framework to examine the effect of differences in security levels of inmates housed in federal incarceration facilities on recidivism rates post release. Their analysis finds no evidence that harsher prison conditions deter criminals from recidivating in the future. Drago, et al. (2011) expand on the Chen and Shapiro (2007) framework and examine the impact of prison conditions in Italy on post release behavior of released inmates. Using a regression discontinuity approach they find evidence that harsher prison conditions increase the likelihood of recidivating post-release (Drago, et al., 2011).⁵

⁵ Chen and Shapiro (2007) and Drago et al. (2011) find evidence that harsher prison conditions may increase recidivism. The FDOC OBIS database provides the custody classification of each inmates’ most recent incarceration. For inmates who do not return to incarceration during the follow-up period, the custody level variable allows for the control of the effect of security level on recidivism. However, as FDOC only provides the custody description for the most recent incarceration, the custody variable for inmates who returned to incarceration during the follow-up period measures their second incarceration during the period. As such, the custody variable for inmates who recidivated does not provide a control for the effect of security level on recidivism.

A related area of research suggests mixed findings on whether the length of incarceration affects criminal behavior once ex-offenders return to society (Baumer, 1997). It is possible that an inmate who was recently released from a long-term sentence may have greater difficulty adjusting to civilian life than an inmate sentenced to a shorter prison term. If that is the case, time served and recidivism should be positively related (Baumer, 1997). It is also possible that as the length of the prison sentence increases, the likelihood of recidivism decreases. If prison is truly corrective and provides rehabilitative services to inmates such as education or job training, inmates who served longer sentences should be less likely to return to incarceration assuming they have taken advantage of these rehabilitative programs. Other studies find no effect of sentence length on recidivism risk once controlling for additional criminal history factors (Baumer, 1997).

To control for the potential effect of prison conditions on recidivism, I construct a variable which measures the length in days of the most recent sentence each inmate was released from during the follow-up period. The length of the most recent incarceration for inmates within my sample ranges from 365 days (1 year) to 367,745 days (1,000 years).⁶

I also control for violent and property offenses within each inmates' history. Research suggests that violent offenders are more likely to recidivate than similar non-violent offenders (Baumer, 1997; Langan and Levin, 2002). Offenders with property crimes may also be more likely to recidivate as property crimes may be a source of income for these individuals once released (Baumer, 1997; Langan and Levin, 2002).

The FDOC data provides a description of each offense in an inmates' record. To create dummy variables to control for prior violent and property offenses, I search within the text description provided. The FBI classifies violent crimes as inclusive of rape, robbery, aggravated

⁶ Inmates serving multiple life sentences have prison sentences that compile to 1,000 years.

assault, and murder.⁷ I create dummy variables for each of these classifications by searching the FDOC offense descriptions for these words or their abbreviations⁸. The dummy variable controlling for violent crimes in an inmate's history is constructed as equal to one if an inmate had a previous rape, robbery, homicide, or murder in their FDOC record, and equal to zero if not.⁹ The same process is used to create a dummy variable to control for the FBI's list of property crimes; burglary, larceny, motor vehicle theft. Within my sample, roughly 22% of inmates had prior violent offenses, and roughly 35% had prior property crime offenses at the time of release.

The focus of this analysis centers on whether tattoo visibility affects recidivism. Previous research defines a tattoo as visible if located on the arms, hands, neck, or face of an individual (Waters, 2012). Although this definition clearly captures visibility, there are some occupations in which arm tattoos may not be visible in the workplace. As such, additional tests to examine different levels of visibility help to clarify if tattoos in some locations affect recidivism more than others.

The unique data from FDOC allows for two classifications of visibility to be tested within my analysis. The first classification, *visible_1*, considers tattoos on the face, head, neck, and hands visible. *Visible_1* represents tattoos visible if a suit is worn each day in the workplace. Roughly 22% of ex-offenders within my sample have tattoos on their face, head, neck, or hands. A less stringent classification, *visible_2*, classifies visible tattoos as those appearing on the face, head, neck, hands, arms, or legs. The second visibility classification represents tattoos visible if

⁷ Descriptions of property and violent crime descriptions are taken from www.FBI.gov.

⁸ For example, the FDOC descriptions abbreviate murder to "mur".

⁹ The construction of this variable is limited in that the FDOC offense list may abbreviate or describe offenses differently than the FBI. For example, a search for "rape" returns no results, but there are many sexual assault offenses listed within this description. This limitation may underestimate the number of criminals with previous violent crime offenses.

an individual is wearing a t-shirt and shorts. 63% of inmates within my sample have tattoos located on the face, head, neck, hands, arms, or legs. Exploiting different levels of tattoo visibility allows for a robustness check to ensure that my classification of visibility is not driving the results. Figures 1 and 2 in the contain diagrams which visually depict the visibility classifications.

To create a measure of days until recidivism, I utilize FDOC data on receipt and release dates of all inmates into or out of FDOC facilities. Recidivism length is calculated as the difference in days between an inmates' first release during the follow-up period and their next receipt into an FDOC facility, if any.¹⁰ As I limit recidivism to a three year follow-up period, inmates who were reincarcerated more than three years from their initial release are listed as not recidivating. Failure is a dummy variable indicating whether an inmate returned to incarceration during the three year follow-up period. Roughly 22% of inmates in my sample returned to incarceration during the three year follow-up period. This calculated recidivism rate is comparable to those identified in FDOC publications, which place three-year recidivism rates for inmates released between 2004 and 2008 at an average of 31.5% (FDOC, 2013).

The dataset I construct is limited in a few ways. First, I only observe reincarceration, not rearrest. Thus, for the purposes of this analysis recidivism is interpreted as reincarceration. However, the literature often measures recidivism as the first rearrest or parole violation within the follow-up period (Visser et al., 1991). This difference in the definition of recidivism may limit the comparability of my study to others. However, measuring reincarceration would tend to underestimate the results as I am measuring only crimes that the public convicted the inmate of and sentenced the inmate prison time for. An advantage to using re-incarceration is that it

¹⁰ The FDOC data only include inmates who were convicted of a crime and sentenced to prison time.

increases confidence that the inmate actually committed another offense as opposed to rearrest which could measure minor infractions with the law (Baumer, 1997; Waters, 2012).

Second, the FDOC database provides incarceration histories of all individuals who served time in a FDOC facility since October 1997, but provides no information on crimes of those individuals out of state. Although this certainly limits the information available on each inmate, this limitation would also tend to underestimate my results.

In sum, I construct a dataset of demographic, criminal history, survival, and tattoo classifications for all inmates released from FDOC facilities between 2008 and 2010. Table 1a presents summary statistics for the entire inmate sample included within my analysis and table 1b contains summary statistics on the subsample of tattooed inmates, separated by visibility classification.

III. Methodology

Given that I am estimating days until re-incarceration, a survival model is used within my analysis with the goal of estimating the number of days an inmate ‘survives’ outside of prison without reincarceration. Recidivism is often estimated using a survival or hazard framework because these models account for both the timing and occurrence of recidivism through a two part dependent variable (Baumer, 1997). Within my analysis, the number of days between an inmate’s release from prison and reincarceration measures the survival length for each inmate and a failure dummy variable indicates whether or not an inmate returned to incarceration during the follow-up period.

Several previous articles utilize the Cox proportional hazards model to study recidivism (Baumer, 1997; Benda and Toombs, 2002; Windzio, 2006, Duwe and Donnay, 2008). This

model assumes proportionality of the hazard ratios across treatment and non-treatment groups. To verify this assumption, I examine log-log survival plots for tattooed inmates versus non-tattooed inmates, shown in Figure 3. Parallel survival plots indicate the proportional hazards assumption is not violated. However, as seen in figure 3 the log-log survival functions for tattooed and non-tattooed inmates within my sample are not parallel. A further test of the proportionality assumption using Schoenfeld residuals reveals that the assumption is violated within my data and thus a proportional hazards model is inappropriate within this analysis.¹¹

Given that I cannot use a proportional hazard model due to the violation of the proportionality assumption, I use an accelerated failure time (AFT) model. Specifically, I use a survival model with a log-logistic distribution.¹² Using a log-logistic survival model, I estimate the relationship between visible tattoos and days until recidivism.

A variety of control variables are used, including demographic control variables of gender, race (Black, White, Hispanic, Asian or Pacific Islander, American Indian), and age, inmate characteristic control variables of number of previous incarcerations, length of most recent incarceration, and dummy variables indicating violent or property crimes in an inmate's history.

IV. Results

Table 2a contains estimates for the log-logistic survival time of ex-offenders using the entire sample of inmates released during 2008, 2009, or 2010. The baseline specification is presented in column (1), column (2) expands upon column (1) with the inclusion of control

¹¹ Although figure 1 only depicts the violation of the proportionality assumption for the tattoo dummy variable, both visibility variables, visible_1 and visible-2, also violate this assumption.

¹² The log-logistic distribution provides the best fit to my data however the use of other distributions within the AFT framework produces similar results to those found within this paper.

variables mentioned earlier, and column (3) expands upon column (2) by including county fixed effects to control for county-level differences that may affect recidivism rates, such as differences in clearance rates across counties. Using the constant from the log-logistic survival estimates, an estimate for the median predicted baseline survival length can be obtained. Recall that within this analysis, recidivism is measured as reincarceration, and thus survival length is the number of days an ex-offender lives in society without returning to incarceration. The median predicted baseline survival length from the baseline specification is 4,944 days.¹³ Based on the estimates presented in the baseline specification, having a tattoo decreases the median expected survival length by 2,329 days. Upon the inclusion of control variables in column (2) the median predicted baseline survival length drops to 2,724 days. Once controls are included, ex-offenders with tattoos survive on average 1,697 days less than ex-offenders without tattoos. Finally column (3) presents the most complete specification within table 2a, and includes estimates from log-logistic survival regressions of the tattoo dummy variable, all control variables, and county-level fixed effects. The median predicted baseline survival length based on the estimates presented in column (3) is 2,118 days. Ex-offenders without tattoos survive on average 1,249 days longer than ex-offenders with tattoos.

Overall, the estimates from columns (1), (2), and (3) all indicate that having a tattoo has a negative and significant relationship with survival length. Figure (3) shows survival curves for tattooed and non-tattooed inmates within the data. As inferred from the regressions, tattooed inmates are less likely to survive than non-tattooed inmates. The most complete specification suggests that tattooed ex-offenders tend to return to incarceration roughly 3.4 years faster than

¹³ Although the follow-up period within my analysis is limited to a three year period, or 1095 days, it is not surprising that the baseline survival length exceeds that threshold given that roughly 78% of ex-offenders in my sample do not return to incarceration within three years, and that in the baseline specification I have not controlled for several factors which serve to decrease expected survival time.

non-tattooed ex-offenders. Race does not seem to significantly impact survival of ex-offenders within my analysis.

Although other papers find that race has a differential effect on recidivism (Blumstein et al., 1986; Beck and Shipley, 1987; Anderson et al., 1991; Helpburn and Albonetti, 1994; Gendreau et al., 1996; Beck and Shipley 1997; Benda and Toombs, 2002; Langan and Levin, 2002; Spohn and Holleran, 2002; Langan et al., 2003; Kubrin and Stewart, 2006; Bales and Mears, 2008; Kohl et al., 2008)) this may be a feature of small sample sizes used in some analyses. It is also possible that the lack of significance of race in affecting recidivism is a unique feature of the Florida-specific data I am using.

The gender dummy variable indicates that female offenders survive longer than male offenders and is consistent with findings within previous research (Baumer, 1997; Gainey et al., 2000; Langan and Levin, 2002; Spohn and Holleran, 2002; Duwe and Donnay, 2008; Waters 2012). The results also indicate that ex-offenders with property offenses in their criminal histories tend to return to incarceration fast than those without property offenses. Again, this result is consistent with results in previous work (Baumer, 1997; Langan and Levin, 2002). The length of last incarceration appears to be statistically and significantly related to survival time, however the estimated impact equals zero, and as such although it is statistically significant, the effect of the length of the last incarceration is not intuitively meaningful. As the number of previous incarcerations increases, the estimated survival time decreases. Again, this is consistent with previous research which suggests that inmates who are incarcerated often are more committed to or involved in a criminal lifestyle (Baumer, 1997). The only variable within my analysis which produces an unexpected result is the dummy variable for ex-offenders with a violent offense in their history. In this case, ex-offenders with violent offenses in their history

are expected to survive longer than those without violent offenses. Taking column (3) as the most complete specification, a coefficient of 0.040 indicates an increase in median predicted baseline survival time of 220 days. However, as seen later in tables 3a and 3b, once looking within the tattooed subsample the significance of this result largely disappears.

Table 2b presents the same specifications as table 2a, instead listing time ratio results, which offer a different interpretation than log-logistic coefficients. Time ratio results show how a one unit change in a given variable affects survival length. Time ratios, with values greater than one, signify that unit increases in the given variable correspond to increase in the survival length by the time ratio subtracted by 1. For example, examining table 2b column (3) shows a statistically significant time ratio of 1.052 for the variable, age at release. This indicates that a one year increase in age at release increases the expected survival time by 5.2%. This result is consistent with previous research suggesting that as inmates age they are less likely to recidivate (Uggen, 2000). Time ratios less than one correspond to percent decreases in predicted survival time for each unit increase in the variable being considered. Again looking at table 2b, column (3), the time ratio for the gender variable is 0.767, which corresponds to a decrease in predicted survival time by 23.3%. This indicates that survival times for male inmates are on average 23.3% lower than predicted survival times for female inmates.

The baseline specification in table 2b suggests that having a tattoo decreases expected survival time by 47.1% and is statistically significant. When control variables are included in column (2), the expected survival time is decreased by 32.6% for inmates with tattoos. Column (3) expands upon this and includes county fixed effects to control for differences in clearance rates across counties. The results from column (3), the most complete specification, indicate that having a tattoo decreases expected survival time by 32.4%. In column (3) the baseline predicted

survival length is 2116 days and the decrease in survival length corresponding to having a tattoo is equivalent to 686 days.

The results presented in tables 2a and 2b are limited in that it is possible that inmates with tattoos are inherently different in some way than non-tattooed inmates in that they have selected to get a tattoo whereas non-tattooed inmates have not. If selection into tattoo treatment indicates some type of unobservable characteristic that makes an inmate more likely to commit future crimes and thus return to incarceration, it is not surprising that the results show that non-tattooed inmates survive longer. As a first step to removing this selection effect, the next portion of the analysis considers first only the tattooed subsample of inmates, and second only the visibly tattooed inmates. The results from the tattooed and visibly tattooed inmate regressions are presented in tables 3a and 3b. Again, table 3a presents the log-logistic regression coefficients and table 3b presents the time ratio coefficients.

Within table 3a, columns (1) and (2) present results for the effects of visible_1 and visible_2 tattoos within the tattooed subsample, respectively. Column (3) considers the effect of a visible_1 tattoo within the subset of inmates with visible tattoos. Estimates for control variables in all columns within tables 3a and 3b follow the expected signs mentioned earlier.

Beginning with column (1), the results suggest that ex-offenders with tattoos on the face, head, neck, or hands return to incarceration faster than other tattooed ex-offenders. Specifically, visible_1 tattooed ex-offenders fail 714 days earlier than other tattooed ex-offenders. The results from column (2) compare ex-offenders with tattoos on face, head, neck, hands, arms, or legs, to ex-offenders with tattoos in other locations. Thus, column (2) considers the less stringent visibility measure. The results from that specification again suggest ex-offenders with visible tattoos return to incarceration faster than ex-offenders with non-visible tattoos. Putting the

estimate in terms of survival length, ex-offenders with visible_2 tattoos have a predicted median survival length 530 days shorter than ex-offenders with non-visible tattoos.

However, the same caveat from earlier regarding self-selection still applies. It is possible that individuals choosing to get visible tattoos are inherently different from those choosing to get tattoos in other locations. This difference may be unobservable and correlated with commitment to a criminal lifestyle. In this case, the results found in columns (1) and (2) are not surprising. In an attempt to minimize this self-selection even further, column (3) considers the effect of a tattoo located on the face, head, neck, or hands on survival time within the subset of visibly tattooed inmates, where tattoos are considered visible if located on head, face, neck, hands, arms, or legs. Thus, column (3) considers only those inmates who self-selected into receiving visible tattoos, in turn minimizing the unobservable differences associated with choosing to receive a visible tattoo.

The results from column (3) follow a similar pattern. As before, inmates with tattoos located on their face, head, neck, or hands, return to incarceration faster than inmates with tattoos in other visible locations. In general, ex-offenders with tattoos located on their face, head, neck, or hands fail 674 days earlier than ex-offenders with visible tattoos in other locations.

The time ratio results for these regressions are presented in table 3b and the specifications presented are identical to those in table 3a. The control variables within these regressions perform as expected. Column (1) suggests that inmates with visible_1 tattoos have an expected survival time 27.4% lower than ex-offenders with tattoos that are not located on the face, head, neck, or hands. That is equivalent to a decrease in expected survival time by 437 days. Column (2) presents a similar estimate suggesting that ex-offenders with visible_2 tattoos have an expected survival time 18.4% lower than ex-offenders with non-visible tattoos, resulting in a

difference of 263 days. Column (3), which contains estimates examining only ex-offenders with visible tattoos, suggests that inmates with tattoos on their head, face, neck, or hands return to incarceration 26.4% faster than ex-offenders with visible tattoos not located on the head, face, neck, or hands. This difference equates to a decrease in expected survival length of 419 days.

The FDOC website lists the daily average cost of housing an inmate at \$47.50 and the average annual cost per inmate at \$17,338. Looking at the most complete specification, in table 3b column (3), the decrease in expected survival length of 419 days, equates to a cost of \$19,903 per inmate with a visible_1 tattoo. Within the FDOC sample of inmates released during 2008, 2009, or 2010, 20,990 inmates have tattoos located on their head, face, neck, or hands. The per inmate cost of \$19,903 adds up to a total cost of almost \$418 million in housing costs over the three release years I consider. Of course, this back of the envelope calculation may be imprecise; however it reflects an important finding regarding the impact of tattoos as a signaling mechanism for ex-offenders to employers. Future research in this area should be expanded to consider the effect of personal appearance on inmate survival post-release.

V. Conclusion

This paper explores the relationship between visible tattoos and recidivism. Within this analysis I measure recidivism as re-incarceration within a FDOC facility within a three year follow-up period. This paper makes two contributions to the literature. First, I develop two classifications of tattoo visibility based on different types of workplace attire. Second, this paper expands on an existing literature on criminal signaling mechanisms and examines whether ex-offenders with visible tattoos return to incarceration faster than ex-offenders with non-visible tattoos. This finding is robust to the different types of visibility developed within the paper.

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Appendix

Table 1a: Summary Statistics for Entire Sample

Variable	Observations	Mean	St. Dev.	Min	Max
Survival Indicators					
Failure	97156	0.221	0.415	0	1
Days until recidivism	97156	974	266	0	1095
Tattoo Indicators					
Tattoo	97156	0.694	0.461	0	1
Visible_1	97156	0.216	0.412	0	1
Visible_2	97156	0.634	0.482	0	1
Demographic Controls					
Black	97156	0.461	0.499	0	1
Asian/Pacific Islander	97156	0.0001	0.011	0	1
Hispanic	97156	0.036	0.186	0	1
White	97156	0.500	0.500	0	1
American Indian	97156	0.0009	0.030	0	1
Age at release	97156	36	11	15	88
Gender	97156	0.882	0.323	0	1
Criminal Controls					
Violent offense in history	96907	0.218	0.413	0	1
Property offense in history	96907	0.349	0.477	0	1
Length of last incarceration	95756	1383	10856	365	367745
Number of previous incarcerations	97156	2	2	1	16

Table 1b: Summary Statistics for Tattooed Subsample						
	Visible_1		Visible_2		Non-Visible Tattooed	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Survival Indicators						
Failure	0.351	0.477	0.267	0.442	0.165	0.371
Days until recidivism	907	308	951	283	1003	242
Tattoo Indicators						
Tattoo	1	0	1	0	1	0
Visible_1	1	0	0.341	0.474	0	0
Visible_2	1	0	1	0	0	0
Demographic Controls						
Black	0.447	0.497	0.457	0.498	0.320	0.466
Asian/Pacific Islander	0.000	0.010	0.000	0.009	0.000	0.019
Hispanic	0.044	0.204	0.036	0.186	0.040	0.196
White	0.506	0.500	0.504	0.500	0.637	0.481
American Indian	0.001	0.037	0.001	0.031	0.001	0.032
Age at release	30	8	33	9	36	10
Gender	0.877	0.328	0.900	0.300	0.740	0.439
Criminal Controls						
Violent offense in history	0.213	0.409	0.224	0.417	0.166	0.373
Property offense in history	0.394	0.489	0.372	0.483	0.317	0.465
Length of last incarceration	981	5146	1060	5017	1126	6919
Number of previous incarcerations	2	2	2	2	2	2

Table 2a: Loglogistic Survival Regressions of Tattooed versus Non-Tattooed Inmates.			
	(1)	(2)	(3)
Tattoo	-0.637*** (0.016)	-0.395*** (0.017)	-0.391*** (0.017)
Black		-0.026 (0.165)	-0.029 (0.166)
Asian/Pacific Islander		-0.014 (0.787)	-0.087 (0.778)
Hispanic		0.011 (0.168)	-0.002 (0.169)
White		-0.184 (0.165)	-0.164 (0.166)
American Indian		-0.316 (0.294)	-0.164 (0.289)
Age at release		0.051*** (0.001)	0.050*** (0.001)
Gender		-0.263*** (0.022)	-0.266*** (0.022)
Violent offense in history		0.061*** (0.015)	0.040*** (0.015)
Property offense in history		-0.043*** (0.013)	-0.064*** (0.013)
Length of last incarceration		-0.000*** (0.000)	-0.000*** (0.000)
Number of previous incarcerations		-0.426*** (0.005)	-0.428*** (0.005)
Constant	8.506*** 0.017	7.910*** 0.169	7.658*** 0.175
County Fixed Effects	No	No	Yes
Observations	97,040	95,645	95,645

Robust standard errors appear in parentheses. Significance is denoted by ***, **, and * indicating $p < 0.01$, $p < 0.05$, and $p < 0.1$ respectively. The dependent variable in this analysis is comprised of two parts, a dummy variable indicating whether or not an inmate returned to incarceration during the three year follow-up period, and a timing variable indicating the number of days an inmate ‘survived’ in society. The tattoo variable is a dummy variable indicating whether or not an inmate is tattooed. Demographic control variables include gender, race (Black, White, Hispanic, Asian or Pacific Islander, American Indian), and Age at release. Length of the most recent prison term, violent or property crimes in an inmate’s history, and the number of previous incarcerations are also controlled for. County fixed effects control for unobservable differences across counties, such as differences in clearance rates. The county variable lists the county in which the most recent crime for each inmate was committed.

Table 2b: Loglogistic Survival Regressions of Tattooed versus Non-Tattooed Inmates. Time Ratios Reported.

	(1)	(2)	(3)
Tattoo	0.529*** (0.008)	0.674*** (0.011)	0.676*** (0.011)
Black		0.974 (0.161)	0.972 (0.161)
Asian/Pacific Islander		0.986 (0.776)	0.916 (0.713)
Hispanic		1.012 (0.170)	0.998 (0.169)
White		0.832 (0.137)	0.849 (0.141)
American Indian		0.729 (0.214)	0.713 (0.207)
Age at release		1.052*** (0.001)	1.052*** (0.0009)
Gender		0.769*** (0.017)	0.767*** (0.017)
Violent offense in history		1.063*** (0.016)	1.041*** (0.015)
Property offense in history		0.958*** (0.013)	0.938*** (0.012)
Length of last incarceration		1.000*** (0.000)	1.000*** (0.000)
Number of previous incarcerations		0.653*** (0.003)	0.652*** (0.003)
Constant	4945.164*** (83.318)	2724.980*** (460.669)	2116.502*** (369.828)
County Fixed Effects	No	No	Yes
Observations	97,040	95,645	95,645

Robust standard errors appear in parentheses. Significance is denoted by ***, **, and * indicating $p < 0.01$, $p < 0.05$, and $p < 0.1$ respectively. The dependent variable in this analysis is comprised of two parts, a dummy variable indicating whether or not an inmate returned to incarceration during the three year follow-up period, and a timing variable indicating the number of days an inmate 'survived' in society. The tattoo variable is a dummy variable indicating whether or not an inmate is tattooed. Demographic control variables include gender, race (Black, White, Hispanic, Asian or Pacific Islander, American Indian), and Age at release. Length of the most recent prison term, violent or property crimes in an inmate's history, and the number of previous incarcerations are also controlled for. County fixed effects control for unobservable differences across counties, such as differences in clearance rates. The county variable lists the county in which the most recent crime for each inmate was committed.

Table 3a: Loglogistic Survival Regressions of Inmate Subsamples.

	(1)	(2)	(3)
	Visible_1	Visible_2	Visible_3
Visibility classification	-0.320*** (0.013)	-0.203*** (0.028)	-0.306*** (0.013)
Black	-0.009 (0.173)	0.030 (0.171)	-0.028 (0.174)
Asian/Pacific Islander	-0.190 (0.746)	-0.182 (0.768)	-0.340 (0.780)
Hispanic	-0.023 (0.177)	-0.012 (0.174)	-0.045 (0.178)
White	-0.160 (0.173)	-0.133 (0.171)	-0.187 (0.174)
American Indian	-0.168 (0.328)	-0.179 (0.326)	-0.217 (0.333)
Age at release	0.053*** (0.001)	0.058*** (0.001)	0.054*** (0.001)
Gender	-0.287*** (0.024)	-0.250*** (0.024)	-0.317*** (0.026)
Violent offense in history	0.025 (0.016)	0.029* (0.016)	0.026 (0.016)
Property offense in history	-0.055*** (0.014)	-0.058*** (0.014)	-0.051*** (0.014)
Length of last incarceration	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Number of previous incarcerations	-0.450*** (0.006)	-0.458*** (0.006)	-0.449*** (0.006)
Constant	7.374*** (0.183)	7.263*** (0.183)	7.370*** (0.185)
County Fixed Effects	Yes	Yes	Yes
Observations	66,574	66,574	60,843

Columns (1) and (2), present results for the tattooed subsample, column (3) presents results for the visibly tattooed subsample of inmates. Robust standard errors appear in parentheses. Significance is denoted by ***, **, and * indicating $p < 0.01$, $p < 0.05$, and $p < 0.1$ respectively. The dependent variable in this analysis is comprised of two parts, a dummy variable indicating whether or not an inmate returned to incarceration during the three year follow-up period, and a timing variable indicating the number of days an inmate ‘survived’ in society. These regressions are limited to the tattooed subsample. The visible_1 variable is a dummy variable indicating whether or not an inmate has a tattoo located on the face, head, neck or hands. Visible_2 is a dummy variable indicating whether or not an inmate has a tattoo located on the face, head, neck, hands, arms, or legs. The visible_3 classification compares the effect of having a visible_1 tattoo (face, head, neck, or hands) within the visibly tattooed subsample. That is, column 3 is limited to only inmates with either visible_1 or visible_2 tattoos. Demographic control variables include gender, race (Black, White, Hispanic, Asian or Pacific Islander, American Indian), and Age at release. Length of the most recent prison term, violent or property crimes in an inmate’s history, and the number of previous incarcerations are also controlled for. County fixed effects control for unobservable differences across counties, such as differences in clearance rates. The county variable lists the county in which the most recent crime for each inmate was committed.

Table 3b: Loglogistic Survival Regressions of Inmate Subsamples. Time Ratios Reported.			
	(1)	(2)	(3)
Visibility classification	0.726*** (0.010)	0.816*** (0.023)	0.736*** (0.010)
Black	0.991 (0.172)	1.031 (0.176)	0.972 (0.170)
Asian/Pacific Islander	0.827 (0.617)	0.834 (0.640)	0.712 (0.555)
Hispanic	0.977 (0.173)	0.988 (0.172)	0.956 (0.170)
White	0.852 (0.148)	0.875 (0.149)	0.830 (0.145)
American Indian	0.846 (0.277)	0.836 (0.273)	0.805 (0.268)
Age at release	1.054*** (0.001)	1.059*** (0.001)	1.055*** (0.001)
Gender	0.750*** (0.018)	0.779*** (0.019)	0.728*** (0.019)
Violent offense in history	1.026 (0.016)	1.029* (0.016)	1.026 (0.017)
Property offense in history	0.946*** (0.013)	0.943*** (0.013)	0.950*** (0.013)
Length of last incarceration	1.000*** (0.000)	1.000*** (0.000)	1.000*** (0.000)
Number of previous incarcerations	0.638*** (0.004)	0.632*** (0.000)	0.639*** (0.004)
Constant	1594.642*** (292.423)	1426.883*** (260.370)	1588.013*** (293.848)
County Fixed Effects	Yes	Yes	Yes
Observations	66,574	66,574	60,843

Columns (1) and (2), present results for the tattooed subsample, column (3) presents results for the visibly tattooed subsample of inmates. Robust standard errors appear in parentheses. Significance is denoted by ***, **, and * indicating $p < 0.01$, $p < 0.05$, and $p < 0.1$ respectively. The dependent variable in this analysis is comprised of two parts, a dummy variable indicating whether or not an inmate returned to incarceration during the three year follow-up period, and a timing variable indicating the number of days an inmate ‘survived’ in society. These regressions are limited to the tattooed subsample. The visible_1 variable is a dummy variable indicating whether or not an inmate has a tattoo located on the face, head, neck or hands. Visible_2 is a dummy variable indicating whether or not an inmate has a tattoo located on the face, head, neck, hands, arms, or legs. The visible_3 classification compares the effect of having a visible_1 tattoo (face, head, neck, or hands) within the visibly tattooed subsample. That is, column 3 is limited to only inmates with either visible_1 or visible_2 tattoos. Demographic control variables include gender, race (Black, White, Hispanic, Asian or Pacific Islander, American Indian), and Age at release. Length of the most recent prison term, violent or property crimes in an inmate’s history, and the number of previous incarcerations are also controlled for. County fixed effects control for unobservable differences across counties, such as differences in clearance rates. The county variable lists the county in which the most recent crime for each inmate was committed.