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**Unpacking the relationship between age and prison misconduct\***

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## Unpacking the relationship between age and prison misconduct

### Abstract

Purpose: Age constitutes one of the most robust correlates of prison misconduct— younger inmates are more likely to commit infractions. Minimal theoretical or empirical attention, however, has been given to the potential nonlinear effect of age on misconduct. The current study examines the age-misconduct relationship and how it may vary by timing of misconduct after admission and by type of infraction. The paper also assesses the utility of different nonlinear transformations to estimate the age-misconduct relationship.

Methods: The study examines 137,552 offenders admitted to state prison in Florida from 1995 to 2000 and uses negative binomial regression to assess the relationship between age and misconduct.

Results: Analyses indicate that the youngest inmates, especially those age 24 and under, are substantially more likely to engage in misconduct, that this relationship is more pronounced during the initial months of incarceration, and that it holds regardless of type of offense.

Conclusions: The youngest inmates appear to be especially likely to engage in misconduct. Nonlinear specifications of the age-misconduct relationship should be employed in future research. Studies are needed to explain why misconduct is disproportionately higher among young inmates. Policies are needed that effectively reduce misconduct among this population.

**Keywords:** age; prison misconduct; disciplinary infractions; prison; nonlinear

## **Unpacking the relationship between age and prison misconduct**

The effect of age on institutional misconduct stands as one of the most consistent and robust determinants of misconduct found in both juvenile and adult prison research (Blackburn & Trulson, 2010; Camp, Gaes, Langan, & Saylor, 2003; Cunningham & Sorensen, 2007; DeLisi et al., 2010; Gaes, Wallace, Gilman, Klein-Saffran, & Suppa, 2002; Griffin & Hepburn, 2006; Harer & Langan, 2001; Kuanliang, Sorensen, & Cunningham, 2008; Steiner, Butler, & Ellison, 2014; Toch, Adams, & Grant, 1989; Trulson, 2007; Trulson, DeLisi, Caudill, Belshaw, & Marquart, 2010; Walters & Crawford, 2013; Wooldredge, Griffin, & Pratt, 2001). The bulk of the research assumes a linear relationship between age and misconduct and has consistently demonstrated that younger inmates are more likely than older inmates to engage in misconduct, after controlling for other correlates.

However, several lines of theoretical and empirical scholarship anticipate that the age-misconduct relationship is not linear and that the youngest inmates engage in disproportionately more misconduct (e.g., Bishop & Frazier, 2000, Cao, Zhao, & Dine, 1997; Kuanliang et al., 2008; MacKenzie, 1987; Scott & Steinberg, 2008). Developmental accounts, for example, argue that the youngest inmates will have the highest level of misconduct due to immaturity and to the rapid changes that occur during adolescence and young adulthood (Scott & Steinberg, 2008). Similarly, juvenile justice and inmate deprivation perspectives argue that the youngest inmates, who are less developmentally prepared to adjust to the deprivations of prison, may be more likely to react to the prison environment in hostile or ambivalent ways (Bishop & Frazier, 2000; Scott & Steinberg, 2008). The logic of these accounts suggests not only that misconduct may be substantially more pronounced among the youngest inmates but also that it occurs at a higher

rate during the initial transition to prison.

Understanding the precise functional form of the age-misconduct relationship is important for several reasons. First, research and risk assessment approaches that fail to model a curvilinear relationship when one may exist—such as when lower levels of X exert a greater effect on Y than do higher levels of X—will misestimate the strength of association. Second, a curvilinear relationship, if identified, would lend support to theoretical accounts that identify developmental factors as important for understanding inmate behavior and responses to confinement. Third, by extension, identifying a curvilinear relationship would provide a foundation for developing greater understanding into the causes of inmate behavior.

Against that backdrop, the goal of this study is to contribute to scholarship on prison order and inmate behavior and, in particular, to use developmental perspectives to understand how age and inmate misconduct are related in the adult prison system. To this end, we first discuss prior research on the age-misconduct relationship, why age may be curvilinearly associated with institutional infractions, and how this association itself may vary with respect to the timing and type of misconduct. We then describe the data, which consist of over 137,000 inmate records from the Florida Department of Corrections, and their usefulness in estimating the age-misconduct association. Using negative binomial regression models, we examine if the age-misconduct relationship varies with respect to the timing of and type of misconduct during the first year after admission to prison. We then explore the utility of different nonlinear transformations to examine if there is any substantive improvement associated with a particular approach to estimating the age-misconduct relationship. In the conclusion, we discuss the implication of these findings, the importance of modeling the nonlinear effect of age on inmate misconduct, and avenues for future research.

## Literature Review

### *Age and Inmate Misconduct*

The bulk of prison misconduct research consistently finds a linear relationship between the age of inmates and levels of misconduct and measures age as a continuous variable (DeLisi, 2003; DeLisi et al., 2011; Gover et al., 2008; Kuanliang & Sorensen, 2008; Sorensen & Cunningham, 2010; Steiner & Wooldredge, 2008; 2009a; 2009b). However, few studies have investigated whether this relationship is curvilinear and, in particular, whether younger inmates are disproportionately more likely to engage in misconduct, whether the effect may be more likely during the initial transition to prison and decrease as the length of incarceration increases, and whether the age effect varies across the type of offense for which the inmate was incarcerated. These gaps are surprising in part because younger inmates constitute a substantial part of the inmate population and because scholarship suggests that they may respond to incarceration in ways that differ greatly from how older inmates respond. The potential for such a nonlinear relationship between age and misconduct derives from several lines of scholarship.

First, the rapid development of individuals during adolescence and into early adulthood suggests that misconduct, as with crime, should decline rapidly until individuals are in their early 20s before then slowly tapering off into adulthood. Developmental and juvenile justice scholars have argued that adolescence, especially late adolescence, is a stage of development marked by “rapid and dramatic change within the individual” (Scott & Steinberg, 2008, p. 32). The transformation from adolescence to adulthood is often characterized by changes in maturity and other factors related to physical, cognitive, and emotional development, which may also

influence misconduct. The youngest inmates, then, should have the highest level of misconduct due to their less developed cognitive and psychosocial maturity (Scott & Steinberg, 2008).

Second, research on juvenile offenders suggests that institutionalized juveniles are “most at risk of facing adult imprisonment once they exit the juvenile justice system and transition from adolescence to adulthood” (Blackburn, Mullings, Marquart, & Trulson, 2007, p. 35). Several studies focusing specifically on juveniles and institutional misconduct have illustrated that younger inmates—even among samples consisting only of juveniles—are more likely to engage in various forms of misconduct (Blackburn & Trulson, 2010; DeLisi et al., 2010; Trulson, 2007; Trulson et al., 2010) and that juvenile institutional misconduct can also have an impact on future adult sanctioning (Trulson, Caudill, Belshaw, & DeLisi, 2011) as well as recidivism (Trulson, Haerle, DeLisi, & Marquart, 2011). The implication is that youth who enter the juvenile justice system at a younger age may be among the most likely to engage in misconduct in juvenile facilities, continue to offend after release, and eventually may contribute to the pool of very young inmates in prison who engage in high levels of misconduct. Consistent with an importation argument, younger inmates, whether in juvenile or adult facilities, may be qualitatively different than older inmates (beyond age) causing an increase in their risk for engaging in misconduct (Trulson, 2007).

Conversely, younger inmates may be less able to cope with the deprivations experienced in prison, what Sykes (1958) referred to as the “pains of imprisonment,” and thus may react in disruptive ways. Prisons constitute settings that involve substantial levels of stress and for many individuals can be disorienting. Those who lack the psychological or emotional maturity to negotiate such settings can be anticipated to experience greater strain and to respond through a greater willingness to resort to violence or a desire to act out through non-compliance with

institutional rules and regulations (Bishop & Frazier, 2000; Scott & Steinberg, 2008).

Despite the fact that age has been identified as a strong predictor of misconduct and institutional adjustment, and despite scholarship that suggests that age may be curvilinearly associated with misconduct, only a small number of studies have investigated the precise functional form of the age and misconduct relationship. For example, a study by MacKenzie (1987) investigated a sample of 755 inmates from four institutions and divided the inmates into broad age categories (<19, 20-24, 25-29, etc.). The results revealed that the youngest age group (<19) reported more misconduct in comparison to older age groups and an examination of the mean differences for each age group “revealed a rapid decline from teenage years through the twenties and, thereafter, a more gradual decline” (p. 438). Cao, Zhao, & Dine (1997) also examined the potential nonlinear relationship between age and prison misconduct using an admissions cohort of inmates from five Ohio state prisons and included a quadratic specification for age to capture a possible nonlinear association between age and misconduct. The results revealed a positive, statistically significant effect of age on misconduct; inmates age 27 and younger were more likely to engage in misconduct.

More recent research by Kuanliang & colleagues (2008) also suggests that the age-misconduct curve is not linear but will “dip more dramatically during the younger years” (p. 1191). The authors compared violent misconduct of juveniles (i.e., 17 and younger), youthful adults (i.e., 18-20 and 21-25), and adults (i.e., 26-30, 31-35, 36-40, 41 and older). Similar to MacKenzie (1987), the authors also used broad age categories to examine variation in misconduct; however, official reports of violent infractions were used instead of self-reports to measure misconduct. The authors found that the older the inmate, the less likely the inmate was to engage in violent misconduct. Further, the age trajectories for the rate of violent prison

misconduct displayed a steep decline at first and then a more moderate decline as age increased.

Although these and related studies (e.g., Gaes et al., 2002; Harer & Steffensmeier, 1996; Morris, Longmire, Buffington-Vollum, & Vollum, 2010) have provided important insight into the age-misconduct association, several limitations exist. These include the use of small sample sizes, which reduces the ability to estimate functional form precisely across different inmate groups, and modeling techniques that do not readily allow for the estimation of curvilinear relationships. The latter constitutes a particular concern given the expectation that age effects may decline rapidly in late adolescence and early adulthood. In addition, prior studies typically have not examined misconduct over the first several years of incarceration, how the age effect may vary by type of offense and gender, and, not least, whether the age-misconduct relationship is more pronounced during the initial transition to prison, a period of time when inmates may be at their most vulnerable (Adams, 1992).

### *Age and Type of Inmate Misconduct*

In recent years, scholars have called for the use of disaggregated categories of misconduct in studies examining prison behavior (Camp et al., 2003; Steiner & Wooldredge, 2008b; Trulson, DeLisi, & Marquart, 2011). However, most studies to date have grouped types of misconduct into a general category (Gover, Pérez, & Jennings, 2008; MacKenzie, 1987; McReynolds & Wasserman, 2008) or have focused primarily on violent misconduct (Berg & DeLisi, 2006; Cunningham & Sorensen, 2007; DeLisi, 2003; Kuanliang, Sorensen, & Cunningham, 2008; Sorensen & Cunningham, 2010; Tasca, Griffin, & Rodriguez, 2010). The few studies that have examined multiple categories of types of misconduct have not examined

age effects but instead suggest that additional inmate characteristics, such as race, may differ in their influence on certain types of misconduct (DeLisi et al., 2011; Harer & Steffensmeier, 1996; Steiner & Wooldredge, 2009a; 2009b).

There are several reasons why late adolescent and young adult inmates may be more likely to engage in specific types of misconduct and, in particular, violence. First, research suggests that young inmates are more likely to be victimized in correctional facilities. To protect themselves from further victimization, they may need to respond to such threats through recourse to violence (Bishop & Frazier, 2000; McCorkle, 1992). Second, late adolescent and young adult inmates may feel that they have to prove their toughness not only to protect themselves but also to attain higher status in prison; consequently, they may engage in more violent misconduct (Bishop & Frazier, 2000; Scott & Steinberg, 2008). Conversely, young offenders may be a versatile group and there might not be substantial differences in the type of misconduct.

#### *Age and Timing of Inmate Misconduct*

There remains minimal research that focuses on the precise timing of misconduct, especially for young inmates, after they enter prison. Most research has examined cross-sectional data, which do not permit estimation of timing effects (Cunningham & Sorensen, 2007; Harer & Steffensmeier, 1996; Steiner & Wooldredge, 2008; 2009a), or has examined timing effects using only broad time frames (e.g., the first 6 months of prison) (Craddock, 1996; Griffin & Hepburn, 2006; Kuanliang, Sorensen, & Cunningham, 2008; McShane & Williams, 1989; Morris et al., 2010). Toch, Adams, & Grant (1989), however, did attempt to examine the specific timing of misconduct and found that disciplinary infraction rates were somewhat higher after initial prison

admission, peaked within the first six to nine months, and then slowly declined. Furthermore, this pattern was especially true for young inmates. However, their study only examined a sample of inmates with chronic disciplinary problems and did not include inmates with moderate or less severe disciplinary problems.

The initial transition into prison is arguably the most stressful period during incarceration and one that may affect younger inmates more acutely. A finding that the effect of age on misconduct is more pronounced during the transitional period would support this argument. At the same time, it would highlight the importance of more carefully estimating age effects and, for practitioners, identifying strategies for facilitating young inmate transitions to prison to reduce their infraction rates (Morris et al., 2010).

### **The Current Study**

The current study extends prior research by systematically examining the relationship between age and both the type of and timing of misconduct. In addition, it examines whether the approach to modeling a potential curvilinear relationship between age and misconduct is consequential. In particular, we investigate the following questions:

*1. Does the age-misconduct relationship vary with respect to the timing of misconduct during the first year after admission to prison?* Presumptively, we can anticipate that no timing effect exists. Here, then, the age and misconduct relationship is similar in the early months of incarceration to what occurs subsequently. From this perspective, younger inmates engage in more misconduct, and the difference in effect is relatively constant across the incarceration term. However, scholarship suggests that the initial transition into prison can be especially difficult

(see, e.g., Adams, 1992; Goodstein & Wright, 1989; Toch, 1977). Accordingly, age differences may be more pronounced during the first few months of prison, leading to even greater differences in misconduct in that period as compared to what arises in subsequent months.

*2. Does the age-misconduct relationship vary by type of infraction?* As discussed above, several reasons exist to anticipate that the age-misconduct relationship may be more pronounced for violent behavior. For example, young inmates may be more likely than older inmates to engage in such behavior to establish themselves as “tough” and to defend against victimization (Bishop & Frazier, 2000; McCorkle, 1992). Conversely, younger inmates may be more likely to act out more frequently engage in more diverse types of misconduct in response to the strains of incarceration than older inmates due to lower levels of self-control (DeLisi & Berg, 2006).

*3. Is there a substantive change in the age-misconduct relationship based on the type of nonlinear transformation used in the model?* Prior research examining the relationship between age and prison misconduct has estimated the effect of age in one of three ways: (1) it has assumed that age has a linear effect on prison misconduct; (2) it has considered the possibility of a nonlinear or curvilinear relationship and then adjusted for it using some type of mathematical transformation; or (3) it has employed a dummy variable method to estimate the nonlinear function of age. In the latter instance, the dummy variable approach typically has involved the use of age groups. Mathematical transformations or dummy variable approaches using age groups may be an efficient way to model age. However, such approaches can limit the ability to estimate certain nonlinear associations between two variables. The use of a dummy-variable method built on one-year age increments can overcome this limitation, given that it does not impose any particular pattern on the relationship between age and prison misconduct. We estimate whether the different approaches to modeling the age-misconduct relationship accord

with one another, and whether specific mathematical transformations for age produce estimates that approximate those produced through the use of age-year dummy variable models.

### *Data*

The data used in this study include all inmates admitted to the Florida Department of Corrections (FDOC) from 1995 to 2000 ( $N=137,552$ ). The data in the current study were used for several reasons. First, the large corrections dataset allows for the systematic investigation of granular age-dummy variables to examine the precise effect of age on misconduct. Specifically, one can use year-specific age dummies (age 18, age 19, age 20, etc.). Second, the FDOC data provides an abundance of information about inmate demographics, their prior criminal history, and their conduct while in prison. Further, the data allow for the examination of the association between age and the type and timing of misconduct.

### *Variables*

The dependent variables in this study were based on official disciplinary infraction records and include several types of prison misconduct. To create outcome variables, infractions were coded into five categories of misconduct based on level of seriousness: all types or general, violent (e.g., fighting, assault, threats), property (e.g., theft, vandalism, contraband), drug (e.g., possession, manufacturing, trafficking), and disorderly (e.g., disorderly conduct, disobeying an order, unauthorized activity). For each type of misconduct, a count of the number of disciplinary infractions for each inmate was used in the analyses. Table 1 displays that the range in the

number of disciplinarily infractions and the average number of infractions varied for each type of misconduct: general (0 – 208;  $\bar{x}$  = 2.92), violent (0 – 75;  $\bar{x}$  = 0.39), property (0 – 46;  $\bar{x}$  = 0.41), drug (0 – 10;  $\bar{x}$  = 0.10), and disorderly (0 – 184;  $\bar{x}$  = 2.03).

The main independent variable is age at admission, which ranged from 13 to 88 and averaged 31.5 years. Granular age-dummy variables (e.g., 16 or younger, 17, 18, 19, 20, etc.) were constructed to examine the precise functional form of the age-misconduct relationship. No studies to date have used this more precise approach; in part because larger sample sizes are necessary given the broads age range of inmates and the corresponding number of dummy variables (less the omitted age category).

The remaining covariates in the analyses include demographic characteristics, criminal background measures, and in-prison behavior. The demographic variables include race and ethnicity and gender. The current study goes beyond examining only white and non-white differences (Harer & Steffensmeier, 1996) and examines white, non-Hispanic black, and Hispanic inmates. Thus, dichotomous measures (0 = no, 1 = yes) were created for non-Hispanic black (52.18%) and Hispanic (9.05%) inmates. The omitted group was white inmates (38.77%). Gender is also a dichotomous measure (0 = female and 1 = male) with the majority of inmates (91.64%) being male. Most studies that examine prison misconduct only include male inmates (Cunningham & Sorensen, 2007; DeLisi et al., 2011; Harer & Steffensmeier, 1996; Kuanliang, Sorensen, & Cunningham, 2008; McReynolds & Wasserman, 2008; McShane & Williams, 1989; Morris et al., 2010; Steiner & Wooldredge, 2009a; Tasca, Griffin, & Rodriguez, 2010). Findings from the limited number studies that examine both males and females are mixed (Berg & DeLisi, 2006; Camp et al., 2003; Craddock 1996; Gover, Pérez, & Jennings, 2008). For example, Gover & colleagues (2008) found that older female inmates had significantly fewer infractions, but

found no statistically significant relationship between age and misconduct for males. By contrast, Berg & DeLisi (2006) found that age was not significantly related to prison violence for either males or females, respectively.

Two in-prison measures are also included in the analyses. First, the number of transfers an inmate had while incarcerated, which ranged from 0 to 93 and the average number of transfers was 7. Second, we introduce a control for the total time served (in months) in prison, which averaged 25 months. Four criminal history background measures were also included in the analyses. First, most serious offense for which inmates were serving time, which was categorized as violent or sex, property, drug, or other (0 = no; 1 = yes). Second, the number of prior Florida prison sentences and third is the number of prior Florida supervision violations. The final criminal history measure is the number of prior convictions for crimes by type (i.e., violent, property, drug, and other). Descriptive statistics for the variables described above are provided in Table 1.

### *Analytic Strategy*

Count-based models are utilized frequently in social science research to correct for the inefficient, inconsistent, and biased estimates that are produced using ordinary least-squares regression when the dependent variable is measured as a count or frequency of an event (Long, 1997; Berg & DeLisi, 2006; Gover, Pérez, & Jennings, 2008; Trulson, DeLisi, & Marquart, 2011). Ordinary least squares regression assumes a normal distribution; however, inmate misconduct is heavily skewed toward 0. Poisson regression models are the preferred method for highly skewed dependent variables. However, when there is overdispersion in the dependent

variable Poisson is not preferred since it can lead to severe underestimates of standard errors and overestimates in tests of statistical significance (Allison, 1999; Long, 1997). If the data display overdispersion in the dependent variables—meaning that the conditional variance is larger than the conditional mean—a negative binomial regression model is more appropriate because it better accounts for the overdispersion (Long & Freese, 2006).

In this study, a test of overdispersion, which is a likelihood ratio test of the differences in the log likelihood between the negative binomial and Poisson regression models, was conducted for each type of misconduct. The results of the likelihood ratio chi-square ( $LR\chi^2$ ) coefficients for each model were as follows: for general misconduct, the model  $LR\chi^2(137,552) = 29,545.00$ ,  $p = 0.000$ ; for violent misconduct, the model  $LR\chi^2(137,552) = 12,698.55$ ,  $p = 0.000$ ; for property misconduct, the model  $LR\chi^2(137,552) = 12,326.57$ ,  $p = 0.000$ ; for drug misconduct, the model  $LR\chi^2(137,552) = 4,315.72$ ,  $p = 0.000$ ; and for disorderly misconduct, the model  $LR\chi^2(137,552) = 25,338.45$ ,  $p = 0.000$ . All models showed evidence of overdispersion.<sup>1</sup> Similar to previous studies that have used negative binomial models, an exposure variable, time served, was used to account for the exposure to an event (Gaes et al., 2002; Haynie & Armstrong, 2006).

The final set of analyses below examines if there is a substantive change in the age-misconduct relationship based on the type of nonlinear transformation used in the model. One way to model the potential nonlinear relationship between age and misconduct is to include a polynomial specification for age, such as a quadratic or cubic term, which can better approximate a range of nonlinear forms (see, e.g., Cao et al. 1997; Morris et al. 2010). Some studies have used other mathematical transformations, such as the natural logarithm (Gaes et al., 2002; Harer & Steffensmeier, 1996). Mathematical transformations can be useful in modeling curvilinear relationships but can be limited in their ability to capture dramatic, or especially steep, increases

or decreases in a given outcome. The use of year-specific dummy variables can be useful in this situation. However, studies to date have lacked sufficiently large sample sizes to use them. The current study attempts to expand on prior work by using a large sample of inmates and one-year dummy variables to estimate the functional form of the age-misconduct relationship. We compare this approach to alternative methods to determine if this more data-intensive approach appreciably improves the estimation of this relationship as compared to other approaches.

## **Results**

### *Descriptive Statistics*

The analyses begin by examining if the age-misconduct relationship varies with respect to the timing of misconduct during the first year after admission to prison. We first examine descriptive statistics, which display the percentage of inmates engaging in any type of misconduct during the first three months and the first twelve months of incarceration. Inspection of Figure 1 shows that inmates 16 years and younger engage in more misconduct than any other group. Over 50% of inmates 16 years and younger received a disciplinary infraction during the first three months of prison, indicating that misconduct is more prevalent among the youngest offenders even during the first few months of incarceration. After twelve months, over 90% of inmates 16 years and younger receive a disciplinary infraction. Furthermore, the prevalence of misconduct decreases more rapidly during the younger age categories during the first three months as compared to the first twelve months.

Inspection of Figure 1 also displays that the prevalence of misconduct for the first three months and the first twelve months is much greater among the youngest inmates (i.e., 24 and

younger). One major finding illustrated by Figure 1, then, is that prison misconduct occurs at a considerably higher rate among young inmates across various time periods (i.e., during the first three months versus during the first twelve months). The youngest inmates, in particular, engage in substantially more misconduct than young adults. In addition, the prevalence of misconduct among all age groups dramatically increases during the course of incarceration.

### *Age and Misconduct*

Next, we examine whether the age-misconduct relationship illustrated above holds after controlling for inmate differences and whether it varies with respect to the type of misconduct. Table 2 presents the negative binomial regression results for inmate infractions during the first three months and the first twelve months, respectively, after admission to prison. The results show that age is inversely related to misconduct, but the effects after age 24 substantially diminish. What we can see, then, is that age effects dramatically decline from age 16 to age 24. This pattern surfaces for most offense types and for both the 3-month and the 12-month observation periods. The one clear exception is drug misconduct.

To facilitate the discussion of these results, Figures 2 through 5 present the predicted number of disciplinary infractions per month for each time period. To create the estimated counts, we evaluated each regression model for each particular age group, with covariates set at their mean values. As inspection of the figures reveals, violent, property, and disorderly misconduct, respectively, all display similar curvilinear relationships—infractions are pronounced among the age 24-and-younger inmates. Although the patterns are similar in the figures, disorderly conduct occurs at a much higher rate. There is no indication that the age-

misconduct relationship is more pronounced for violent infractions.

The clear exception to this overall pattern is drug misconduct. Drug infractions occur infrequently, and the age-misconduct relationship is less clearly curvilinear. Indeed, during the first three months of incarceration, the relationship is linear. Although the relationship appears curvilinear when we focus on a 12-month period, the base rate of drug misconduct is low and not significant at the  $p \leq .01$  level.

In ancillary analyses, we examined infractions during the first 24 months of incarceration as well as additional analyses that included an inmate's entire prison sentence. These results revealed the same pattern—younger inmates (e.g., 24 and under) were substantially more likely than older inmates to engage in misconduct. That pattern held regardless of whether one examined the first three months, twelve months, twenty-four months, or longer time frames. In all instances, the age effect was more pronounced in the first few months of incarceration. That is, during the initial transition to prison, younger inmates were considerably more likely to engage in misconduct as compared to older inmates. In addition, violent, property, and disorderly misconduct all displayed similar curvilinear relationships, indicating that age is uniformly associated with an increased likelihood of engaging in various types of misconduct and not specific types, such as violent offending. This pattern is evident for all types of misconduct as well, as shown in Figure 6 (discussed immediately below).<sup>2</sup>

### *Curvilinearity in the Age-Misconduct Relationship*

The final objective of this study is to clarify the best method for estimating the relationship between age and misconduct. In the analyses discussed above, we used dummy

variables for each one-year age group because doing so provided flexibility in estimating more precisely the functional form of the age and misconduct relationship. Here, we compare this approach with that of assuming a linear association and of using age transformations. The latter included quadratic and cubic terms as well as the logarithm of age and the square root of age.

Figure 6 presents the predicted number of disciplinary infractions per month from the regression results using each mathematical approach.<sup>3</sup> The findings illustrate that the relationship between age and prison misconduct is, in fact, curvilinear. Each of the nonlinear transformations provides a more accurate depiction of the relationship between age and prison misconduct than does a linear specification. However—using the dummy variable model as the “gold standard”—the polynomial models, specifically the cubic model, are the most accurate models for predicting prison misconduct, especially during the younger ages (i.e., 20 and younger).

In each instance, we can see that assuming a linear relationship between age and prison misconduct severely underestimates the predicted number of disciplinary infractions, especially during the late adolescence and young adulthood years. For example, with the linear specification, the predicted number of disciplinary infractions for an inmate 16 years or younger is .23 infractions per month (or 2.76 per year). By contrast, use of the dummy variable model results provides a substantially different prediction. Here, the predicted number of disciplinary infractions for an inmate 16 years or younger is .38 infractions per month (or 4.56 per year).

Given that all of the mathematical transformations (quadratic, cubic, log, and square root) mirror that of the dummy variable model, which should be used? In many prison studies, sample sizes preclude the use of the dummy variable approach. The results here, however, indicate that use of a cubic specification can closely approximate the dummy variable approach. Ancillary analyses (available upon request) indicate that the same pattern holds when estimating

the relationship between age and specific types of misconduct.

## **Conclusion and Discussion**

Although a considerable body of research has examined the relationship between age and prison misconduct, few accounts have examined the potential nonlinear effect of age. This study aimed to address this research gap by examining the precise nature of the age-misconduct relationship and, to this end, answered three interrelated questions: (1) Does the age-misconduct relationship vary with respect to the timing of misconduct during the first year after admission to prison? (2) Does it vary by type of infraction? And (3) is there a substantive change in the age-misconduct relationship based on the type of nonlinear transformation used?

The findings can be summarized briefly. First, the prevalence of misconduct was greatest among the youngest inmates. Individuals who were age 24 or younger were substantially more likely than older individuals to engage in prison misconduct. However, the youngest inmates were even more likely to engage in violence, disorderly behaviors, and other infractions.

Second, this pattern held for all types of offenses with the exception of drug offending—and not only violent offending, which has been the focus of prior studies—and surfaced within the first three months of incarceration. The latter finding suggests that the higher rates of infraction among young offenders may stem from the strains of incarceration that arise most acutely during the transition into prison.

Third, several nonlinear specifications, as compared to a linear specification, improved estimation of the age-misconduct relationship. A cubic model most closely approximated the results of a dummy variable model,. Accordingly, in cases involving smaller samples, use of a

cubic specification rather than a series of dummy variables is recommended.

In recent decades, considerable attention has been given to understanding prisoner reentry and desistance. Further attention has also been given to in-prison experiences and the factors associated with them. This study highlights that one of the most robust correlates of offending, age, is strongly associated with in-prison misconduct and that the relationship, as the age-crime curve would anticipate, is nonlinear. Indeed, it is markedly curvilinear. It is not the case, for example, that younger inmates in general commit more infractions. Rather, the youngest engage in levels of misconduct that greatly exceed that for all other age groups. The likelihood of misconduct decreases dramatically until age 24 before then substantially tapering off.

In short, the youngest of the young in prison are most likely to engage in misconduct, not younger inmates in general. This pattern lends warrant to the argument that psychosocial immaturity plays a prominent role in prison adjustment. The youngest inmates likely are ill equipped to negotiate prison life. It appears that they engage in violence and violate prison rules either as a consequence of strain or to establish their status within the prison hierarchy. Future research should investigate the possibilities and the extent to which younger inmates are treated differently and react to prison conditions differently than older inmates.

The one exception to the above pattern is drug misconduct, which occurred at a lower rate among the youngest inmates. The overall low base rate of drug misconduct may reflect the effectiveness of the Florida correctional system's drug policy.<sup>4</sup> However, drug misconduct may occur infrequently simply because drugs inside prison are not as available as they are on the outside (Cope, 2000). Even so, it remains unclear why drug misconduct was lower among the youngest inmates. One possibility is that the youngest inmates are less likely than older inmates to have access to drug distribution networks in prisons.

### *Study limitations*

Several limitations of the study bear mention. First, it examined only official measures of misconduct. Differences among various groups in reported misconduct may reflect actual differences in misconduct or a greater likelihood of some groups being reported by corrections officers for misconduct, or a combination of the two (DeLisi, 2003). Thus, observed age differences in misconduct may reflect a greater likelihood of young inmates engaging in misconduct or they may reflect a greater likelihood of officers recording instances of misconduct among young inmates, or some unknown combination of the two (Griffin & Hepburn, 2006; Poole & Regoli, 1980; cf. Cao et al., 1997; DeLisi & Munoz, 2003).

Second, although the study controlled for potential confounding measures that have been used in prior research, it did not include all such confounders, which in turn may result in biased estimates of the age-misconduct relationship. For example, the risk of misconduct upon entry into prison (see, generally, Gonçalves, Gonçalves, Martins, & Dirkzwager, 2014; Sandler, Freeman, Farrell, & Seto, 2013; Shermer, Bierie, & Stock, 2012) may vary by age. Research that includes risk assessments at entry would help to disentangle whether any observed curvilinear relationship between age and misconduct stems from pre-existing risk or from adjustment to prison. Similarly, mental illness may be greater among younger inmates (Gonçalves et al., 2014), which in turn might contribute to an observed age-misconduct relationship.

Finally, the study was not able to account for gang involvement or gang-related activity among inmates. Various forms of gang activity have been found to affect the likelihood of engaging in misconduct (DeLisi et al., 2013; Gaes et al., 2002; Gonçalves et al., 2014; Worrall & Morris, 2012). It is possible that younger inmates are more likely to be gang-involved and, in turn, to engage in more misconduct because of this affiliation. Research that addresses this

potential source of confounding—or, alternatively, that explains the mediating pathways through which an age-misconduct relationship arises—is needed. In the context of the present study, it bears noting that prior research using FDOC data to examine the effect of determinate sentencing on misconduct suggests that gang membership within the Florida correctional system is low (Bales & Miller, 2012), and so omission of this variable may not have greatly affected the estimated association between age and misconduct in this study. More generally, however, there remains a need for research that provides unbiased estimates of the functional form of the age and misconduct relationship and that can explain the relationship.

### *Policy implications*

The findings of this study have potential implications for correctional policy. We found that high levels of misconduct were prevalent among the young offenders even during the first three months of incarceration. Interventions that are established immediately after an inmate enters prison may help to prevent future violations and improve prison order (Trulson et al., 2010). Cost-effective strategies can be implemented to help young offenders conform to prison rules; one general strategy consists of teaching inmates pro-social behavior (Morris et al., 2010).

Another strategy to assist the adaptation of young offenders to prison is to have them participate in programs aimed at reducing aggression and promoting effective communication skills (Iversen et al., 2014). Younger inmates, compared to their older counterparts, may have more trouble communicating their feelings and views, which can lead to frustration and mislead anger. These emotions may escalate to problematic behavior among younger inmates.

Interventions that help them to more effectively manage frustration and anger may help to reduce misconduct among young inmates.

Enhancing an inmate's social bonds with others in prison is another method that may

assist young offenders in coping with the potential deprivations of prison. For example, an increasingly large body of research has found that visitation may affect inmate misconduct as well as post-release offending (Cochran, 2012; Cochran, Mears, Bales, & Stewart, 2014; Siennick, Mears, & Bales, 2013). Visitation may be especially salient for the youngest inmates. If so, correctional systems may want to invest in programs aimed at facilitating visits, as well as phone calls and mail, between these inmates and their family. Such programs would not want to promote visits or social ties with criminogenic peers. However, they might include efforts to create ties to prosocial institutions, such as social service or community-based providers in the areas to which the inmates are to return.

The results of this study underscore the importance of viewing younger inmates as a unique population, one that may have special needs. The juvenile justice system exists in no small part because of the belief that juveniles differ from adults (Mears et al., 2011). The youngest inmates in adult prisons may warrant policies and programs that proceed from a similar premise—that is, they may warrant greater attention. Ultimately, such an approach implies value judgements about whether certain groups merit a greater investment of scarce resources. Even so, to the extent that the youngest inmates engage in disproportionately more misconduct, greater attention may be warranted for pragmatic reasons—it may reduce overall misconduct.

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## Endnotes

<sup>1</sup> Zero-inflated negative binomial regression models were explored because of the large number of inmates who did not receive a disciplinary infraction while incarcerated; however, there is no real theoretical basis for specifying a different structural process or model. Zero-inflated regression models are often used to model count variables with excessive zeros. However, these models also assume that the excess zeros are generated by a separate process from the count values and that the excess zeros can be modeled independently (Hilbe, 2011). All inmates in the current study had the same opportunity to commit an infraction; therefore, there is no clear separate process that specifies the use of a zero-inflated negative binomial regression model.

<sup>2</sup> The curvilinear relationship between age and misconduct is, it seems, more pronounced among high-frequency offenders—that is, inmates who engaged in misconduct repeatedly. To illustrate, we examined inmates who were in the 99th percentile or higher in their frequency of misconduct. Inmates age 22 or younger represented 23% of all inmates in the full sample, yet, in the “frequent misconduct” sub-sample, they accounted for 63% of all individuals who engaged in any misconduct and for 52% of all individuals who engaged in violent misconduct.

<sup>3</sup> The analyses used to produce Figure 6 are available from the authors upon request.

<sup>4</sup> In 1993 the Drug Free Corrections Act, under Florida Statute 944.473, mandated that the department of corrections establish procedures to conduct mandatory random drug or alcohol testing for all inmates during their stay in prison. Inmates were also assessed upon admission for criteria to determine whether the inmate should be assigned to mandatory participation in a substance abuse treatment program. The random selection of inmates and testing began in 1994 and the act mandated that 10% of the Florida prison population to be tested every month. During the first three years, the percentage of positive test decline from 5.89% in FY 1993-1994 to

4.08% in FY 1994-1995 and to 3.30% in FY 1995-1996 (FDOC, 1996). The rare occurrence of drug misconduct may be a result of these correctional policies.

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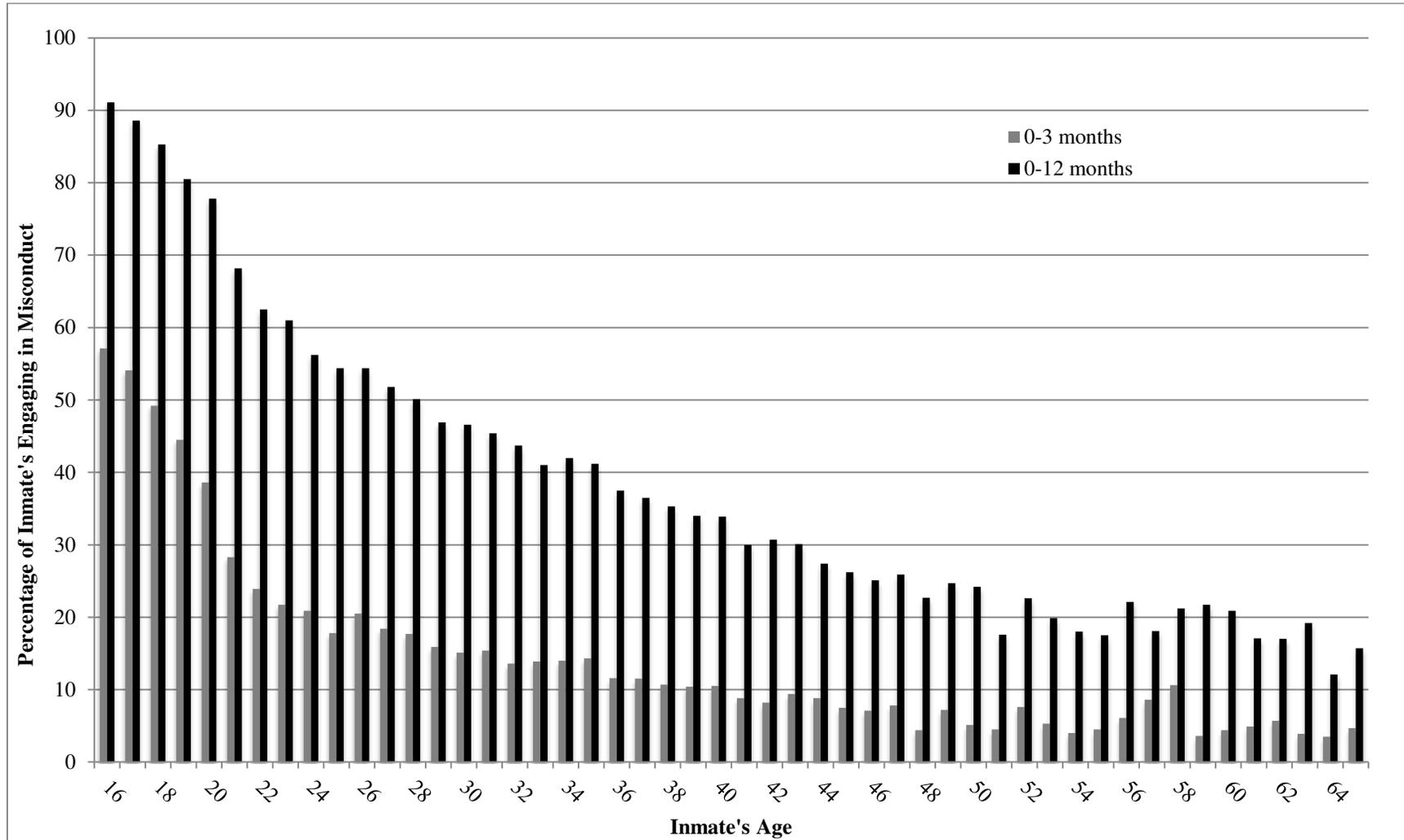
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**Table 1: Descriptive Statistics (N=137,552)**

	<b>Mean</b>	<b>S.D.</b>	<b>Min.</b>	<b>Max.</b>
<b>Dependent Variables</b>				
All Types of Misconduct	2.92	6.00	0	280
Violent Misconduct	0.39	1.23	0	75
Property Misconduct	0.41	1.10	0	46
Drug Misconduct	0.10	0.44	0	10
Disorderly Misconduct	2.03	4.41	0	184
<b>Independent Variable</b>				
Age at Admission (years)	31.54	9.71	13	88
<b>Control Variables</b>				
Black	0.52	0.50	0	1
Hispanic	0.09	0.29	0	1
Male	0.92	0.28	0	1
Current Offense: Violent	0.36	0.48	0	1
Current Offense: Property	0.31	0.46	0	1
Current Offense: Drug	0.25	0.44	0	1
Current Offense: Other	0.08	0.27	0	1
Number of Transfers	7.11	6.70	0	93
Number of Prior Violent Convicted Charges	1.27	1.58	0	45
Number of Prior Property Convicted Charges	2.84	4.61	0	120
Number of Prior Drug Convicted Charges	1.54	2.52	0	70
Number of Prior Other Convicted Charges	0.54	1.00	0	22
Number of Prior Florida Prison Sentences	1.01	1.49	0	14
Number of Prior Supervision Violations	1.48	1.44	0	11
Time Served (months)	25.84	19.29	0.03	95.90

*NOTE:* White is the omitted reference category for race/ethnicity.

**Figure 1: Percentage of Inmates Engaging in Misconduct during the First 3 Months and the First 12 Months by Age (N=59,823)**



*NOTE:* The sample includes inmates who served at least 24 months.

**Table 2: Negative Binomial Regression of Prison Misconduct on Age in the First 3 Months and First 12 Months, Respectively, of Incarceration (N=59,823)**

	Misconduct							
	Violent		Property		Drug		Disorderly	
	3 months	12 months	3 months	12 months	3 months	12 months	3 months	12 months
Intercept	-5.53**	-4.11**	-5.24**	-3.49**	-9.85	-7.65**	-3.92**	-2.33**
Age 17	-0.12	-0.17	-0.15	-0.23*	0.82	-0.06	-0.24*	-0.18*
Age 18	-0.29*	-0.32**	-0.36*	-0.48**	0.77	0.43	-0.24*	-0.29**
Age 19	-0.65**	-0.53**	-0.78**	-0.84**	0.72	0.13	-0.36**	-0.45**
Age 20	-0.73**	-0.79**	-1.00**	-0.95**	0.97	0.10	-0.63**	-0.63**
Age 21	-1.45**	-1.18**	-1.22**	-1.13**	1.10	0.56	-0.99**	-0.87**
Age 22	-1.52**	-1.36**	-1.51**	-1.28**	0.86	0.45	-1.21**	-1.11**
Age 23	-1.83**	-1.59**	-1.66**	-1.55**	0.88	0.50	-1.31**	-1.24**
Age 24	-1.85**	-1.60**	-1.86**	-1.64**	0.32	0.45	-1.38**	-1.35**
Age 25	-2.13**	-1.62**	-1.96**	-1.66**	0.64	0.39	-1.55**	-1.51**
Age 26	-2.29**	-1.76**	-1.88**	-1.83**	0.49	0.30	-1.42**	-1.51**
Age 27	-2.21**	-1.73**	-1.79**	-1.74**	0.85	0.17	-1.62**	-1.59**
Age 28	-2.11**	-1.74**	-1.98**	-1.81**	0.37	0.12	-1.68**	-1.69**
Age 29	-2.49**	-1.92**	-2.14**	-2.00**	0.36	-0.01	-1.76**	-1.75**
Age 30	-2.23**	-1.90**	-2.41**	-2.04**	0.52	-0.13	-1.94**	-1.88**
Age 31	-2.22**	-1.89**	-2.37**	-2.00**	0.10	-0.28	-1.77**	-1.75**
Age 32	-2.54**	-2.07**	-2.51**	-2.22**	0.19	-0.46	-1.85**	-1.91**
Age 33	-2.89**	-2.12**	-2.60**	-2.28**	0.60	-0.32	-1.85**	-1.93**
Age 34	-2.48**	-2.05**	-2.47**	-2.28**	0.45	-0.16	-1.91**	-1.97**
Age 35	-2.55**	-2.00**	-2.15**	-2.09**	-0.06	-0.58	-1.76**	-1.84**
Age 36	-2.33**	-2.23**	-2.75**	-2.36**	-0.16	-0.52	-2.01**	-2.14**
Age 37	-2.70**	-2.27**	-2.64**	-2.35**	-0.69	-0.66	-2.05**	-2.15**
Age 38	-2.64**	-2.35**	-2.48**	-2.35**	-0.57	-0.98*	-2.20**	-2.18**
Age 39	-2.53**	-2.40**	-2.90**	-2.66**	-1.20	-0.86*	-2.11**	-2.24**
Age 40	-2.64**	-2.53**	-2.94**	-2.47**	-0.79	-0.61	-2.00**	-2.18**
Age 41	-2.73**	-2.47**	-3.14**	-2.75**	---	-0.63	-2.42**	-2.37**
Age 42	-2.76**	-2.40**	-3.13**	-2.65**	---	-0.99*	-2.46**	-2.26**
Age 43	-3.07**	-2.75**	-3.69**	-2.71**	---	-1.28*	-2.16**	-2.31**
Age 44	-3.55**	-2.83**	-2.69**	-2.94**	---	-1.63**	-2.31**	-2.54**
Age 45	-3.07**	-2.91**	-3.26**	-2.89**	---	-0.91	-2.47**	-2.49**
Age 46	-2.87**	-2.69**	-2.46**	-2.89**	---	-1.76**	-2.30**	-2.51**
Age 47	-2.94**	-2.85**	-3.01**	-2.85**	---	-0.70	-2.41**	-2.61**
Age 48	-3.62**	-3.59**	-3.01**	-2.94**	---	-1.14*	-3.23**	-3.12**
Age 49	-3.02**	-2.83**	-2.70**	-2.80**	---	-0.91	-2.85**	-2.75**
Age 50	-3.69**	-2.94**	-3.62**	-3.02**	---	-2.04**	-2.83**	-2.78**

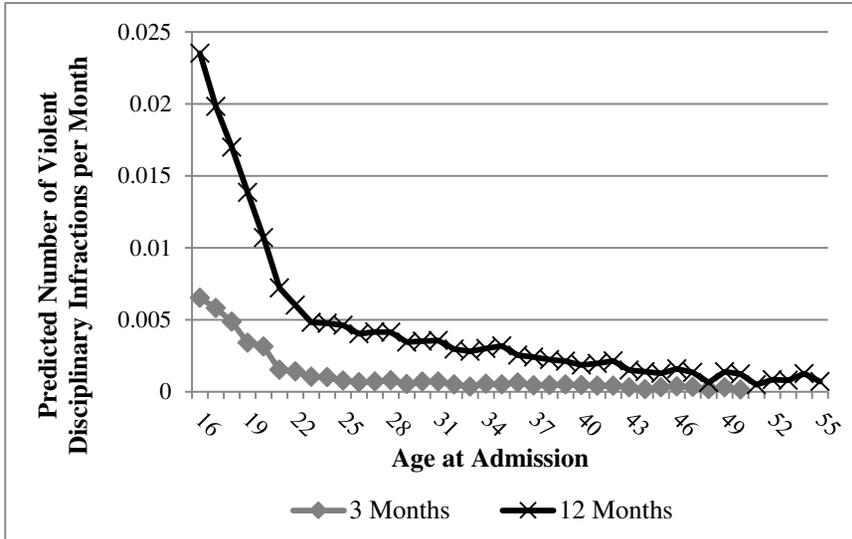
**Table 2: Negative Binomial Regression of Prison Misconduct on Age in the First 3 Months and First 12 Months, Respectively, of Incarceration (N=59,823)**

	Misconduct							
	Violent		Property		Drug		Disorderly	
	3 months	12 months						
Age 51	---	-3.86**	---	-3.05**	---	---	-2.90**	-2.60**
Age 52	---	-3.34**	---	-2.72**	---	---	-2.44**	-2.58**
Age 53	---	-3.38**	---	-3.47**	---	---	-2.78**	-3.15**
Age 54	---	-2.93**	---	-3.45**	---	---	-2.61**	-2.78**
Age 55	---	-3.51**	---	-3.47**	---	---	-2.26**	-2.31**
Age 56	---	---	---	-2.25**	---	---	-2.51**	-2.71**
Age 57	---	---	---	-4.12**	---	---	-1.98**	-2.50**
Age 58	---	---	---	-3.17**	---	---	-2.00**	-2.44**
Age 59	---	---	---	-2.98**	---	---	-3.29**	-3.05**
Age 60	---	---	---	-3.75**	---	---	-3.05**	-2.76**
Age 61	---	---	---	---	---	---	-3.60**	-3.60**
Age 62	---	---	---	---	---	---	-2.68**	-2.96**
Age 63	---	---	---	---	---	---	-2.66**	-2.89**
Age 64	---	---	---	---	---	---	-2.67**	-3.21**
Age 65 and older	---	---	---	---	---	---	-2.90**	-2.79**
Hispanic	0.20*	0.27**	-0.01	0.00	0.16	0.05	0.16**	0.13**
Black	0.48**	0.49**	-0.42**	-0.40**	-1.01**	-1.05**	0.50**	0.38**
Male	-0.26*	-0.44**	-0.35*	-0.37**	0.09	0.48**	-0.50**	-0.47**
Offense: Property	0.32**	0.33**	0.20*	0.24**	0.43*	0.37**	0.23**	0.27**
Offense: Drug	0.16	0.13*	-0.06	0.04	0.52	0.25*	0.07	0.07*
Offense: Other	0.38**	0.25**	0.15	0.21**	0.55	0.33*	0.13*	0.16**
Transfers	0.02**	0.02**	0.02**	0.01**	0.01	0.01**	0.01**	0.02**
Violent Convictions	0.05**	0.06**	-0.03	0.00	0.09*	0.06**	0.00	0.01*
Property Convictions	-0.03**	-0.03**	-0.01	0.00	0.00	0.00	-0.02**	-0.02**
Drug Convictions	-0.05**	-0.05**	-0.03	-0.02*	0.04	0.03	-0.04**	-0.04**
Other Convictions	0.03	0.03	0.05	0.03	0.11	0.09**	0.00	0.01
Prior Prison Sentence	0.08**	0.10**	0.10**	0.12**	0.20**	0.14**	0.07**	0.07**
Supervision Violations	0.08**	0.07**	0.07*	0.05**	-0.05	0.03	0.07**	0.08**
Time Served (months)	(exposure)							
Model X <sup>2</sup>	2175.43**	4737.02**	1234.00**	4122.11**	160.72**	926.75**	4287.96**	10161.45**
Pseudo R <sup>2</sup>	0.09	0.07	0.07	0.06	0.04	0.05	0.06	0.06
Nagelkerke R <sup>2</sup>	0.11	0.11	0.08	0.10	0.04	0.06	0.10	0.17

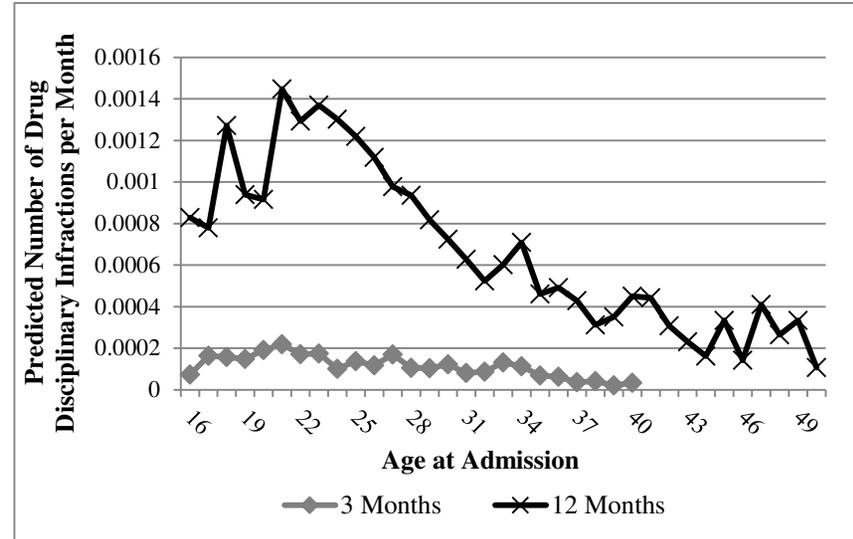
NOTES: \* p < .01 \*\* p < .001; Negative binomial regression coefficients are presented. Age 16 or younger is omitted as the reference category. Violent is the omitted reference category for current offense. --- Indicates the last age dummy variable for misconduct due to the sparse number of inmates engaging in at least one infraction for each age category.

**Figures 2 – 5: Predicted Number of Disciplinary Infractions per Month for Inmates Serving at Least 24 Months (N=59,823)**

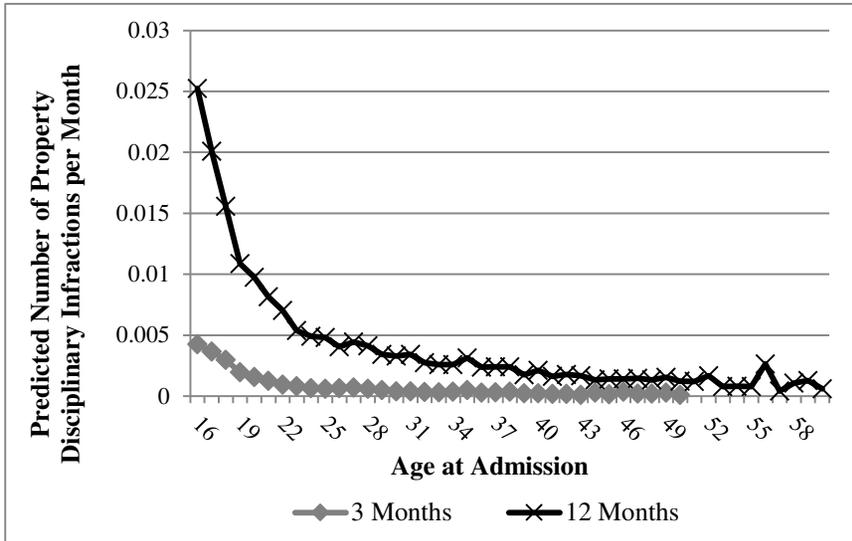
**Figure 2: Violent**



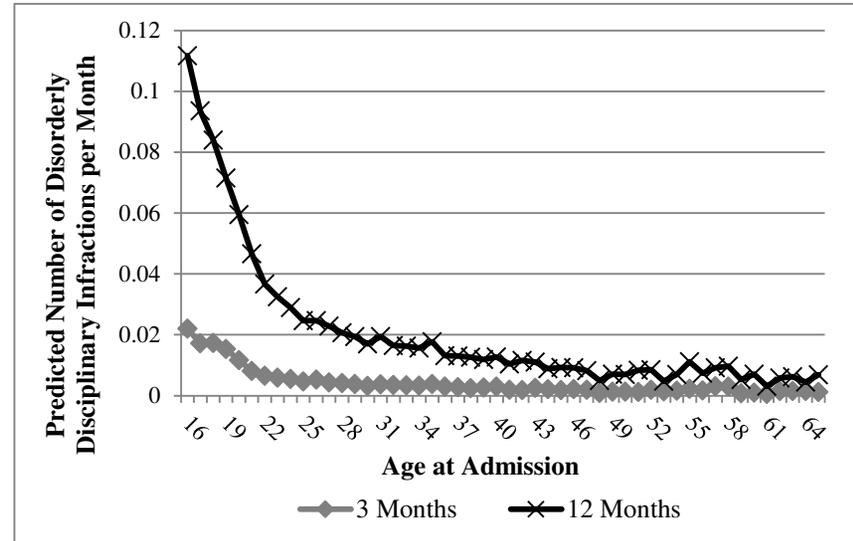
**Figure 4: Drug**



**Figure 3: Property**



**Figure 5: Disorderly**



**Figure 6: Predicted Age-Misconduct Curves using Various Types of Nonlinear Transformations ( $N=137,552$ )**

