



OJJDP

Working for Youth Justice and Safety

JUVENILE JUSTICE BULLETIN

August 2015

Robert L. Listenbee, Administrator

Pathways to Desistance

How and why do many serious adolescent offenders stop offending while others continue to commit crimes? This series of bulletins presents findings from the Pathways to Desistance study, a multidisciplinary investigation that attempts to answer this question.

Investigators interviewed 1,354 young offenders from Philadelphia and Phoenix for 7 years after their convictions to learn what factors (e.g., individual maturation, life changes, and involvement with the criminal justice system) lead youth who have committed serious offenses to persist in or desist from offending.

As a result of these interviews and a review of official records, researchers have collected the most comprehensive dataset available about serious adolescent offenders and their lives in late adolescence and early adulthood.

These data provide an unprecedented look at how young people mature out of offending and what the justice system can do to promote positive changes in the lives of these youth.

Studying Deterrence Among High-Risk Adolescents

Thomas A. Loughran, Robert Brame, Jeffrey Fagan, Alex R. Piquero, Edward P. Mulvey, and Carol A. Schubert

Highlights

The Pathways to Desistance study followed more than 1,300 serious juvenile offenders for 7 years after their conviction. In this bulletin, the authors present some key findings on the link between perceptions of the threat of sanctions and deterrence from crime among serious adolescent offenders. Selected findings are as follows:

- There was no meaningful reduction in offending or arrests in response to more severe punishment (e.g., correctional placement, longer stays).
- Policies targeting specific types of offending may be more effective at deterring youth from engaging in these specific offenses as opposed to general policies aimed at overall crime reduction.
- In response to an arrest, youth slightly increased their risk perceptions, which is a necessary condition for deterrence.
- Creating ambiguity about detection probabilities in certain areas or for certain types of crime may have a deterrent effect by enhancing the perceived risk of getting caught.





AUGUST 2015

Studying Deterrence Among High-Risk Adolescents

Thomas A. Loughran, Robert Brame, Jeffrey Fagan, Alex R. Piquero, Edward P. Mulvey, and Carol A. Schubert

Although deterrence is one of the foundations of the juvenile justice and criminal justice systems, little is known about how the fear or threat of sanctions affects the decisionmaking process among adolescent offenders. These youth are an important focus of research attention, given their disproportionate rates of participation in serious crime, the diversity of their offending patterns and developmental backgrounds, and the strong likelihood of desistance as they transition to adulthood. Policymakers who understand the role of deterrence in a broader context of developmental change and life course transitions have important information as they consider how to respond to crimes that adolescents commit and respond to the offenders themselves.

Yet, researchers and policymakers know very little about how serious adolescent offenders perceive the threat or experience of punishment, which threats or experiences affect them, and in what ways. Consequently, these threats or experiences are important factors in youth's decisions to persist in or desist from crime (Anwar and Loughran, 2011; Paternoster, 1987; Nagin, 1998). In this bulletin, the authors consider—based on their review of recent evidence from the Pathways to Desistance study, a multisite, longitudinal sample of adolescent (primarily felony) offenders (see sidebar, “About the Pathways to Desistance Study”)—several questions regarding how juvenile offenders assess sanctions and the threat of sanctions.¹ Unlike most other research on serious adolescent offenders, the Pathways study draws from both interviews and official records from adolescence and early adulthood. The authors examine several questions related to deterring juveniles:

- Do their offending and punishment experiences mold offenders' perceptions of risks and consequences of offending (which relate directly to their propensity to be deterred from crimes)?

- Does placing offenders in a correctional facility have any tangible deterrent effects?
- Does longer placement have a more deterrent effect on juveniles?

The authors conclude with a discussion of directions for future applied research into deterrence and consider some broader implications for juvenile justice policy and practice.

Background

The criminological literature on deterrence (Beccaria, 1985; Zimring and Hawkins, 1973; Andenaes, 1974) is rooted in the belief that when offenders perceive criminal sanctions will be certain, severe, and swift, they will reduce their criminal activity because they perceive

KEY TERMS

Certainty effect: the negative correlation of crime and deviance with the risk or probability of being sanctioned.

Detection probability: a “certainty effect” of criminal or deviant activity being discovered.

Deterrence: preventing a particular act or event by increasing the perceived risk of detection or sanction.

Risk perception: a subjective assessment of the detection probability.

Threat of sanctions: the calculated risk or “cost” of punishment when deciding whether to commit a crime.

ABOUT THE PATHWAYS TO DESISTANCE STUDY

The Pathways to Desistance study is a multidisciplinary, multisite longitudinal investigation of how serious juvenile offenders make the transition from adolescence to adulthood. It follows 1,354 young offenders from Philadelphia County, PA, and Maricopa County, AZ (metropolitan Phoenix), for 7 years after their court involvement. This study has collected the most comprehensive dataset currently available about serious adolescent offenders and their lives in late adolescence and early adulthood. It looks at the factors that lead youth who have committed serious offenses to persist in or desist from offending. Among the aims of the study are to:

- Identify initial patterns of how serious adolescent offenders stop antisocial activity.
- Describe the role of social context and developmental changes in promoting these positive changes.
- Compare the effects of sanctions and interventions in promoting these changes.

Characteristics of Study Participants

Enrollment took place between November 2000 and March 2003, and the research team concluded data collection in 2010. In general, participating youth were at least 14 years old and younger than 18 years old at the time of their study index petition; 8 youth were 13 years old and 16 youth were older than age 18 but younger than 19 at the time of their index petition. The youth in the sample were adjudicated delinquent or found guilty of a serious (overwhelmingly felony-level) violent crime, property offense, or drug offense at their current court appearance. Although felony drug offenses are among the eligible charges, the study limited the proportion of male drug offenders to no more than 15 percent; this limit ensures a heterogeneous sample of serious offenders. Because investigators wanted to include a large enough sample of female offenders—a group neglected in previous research—this limit did not apply to female drug offenders. In addition, youth whose cases were considered for trial in the criminal justice system were enrolled, regardless of the offense committed.

At the time of enrollment, participants were an average of 16.2 years old. The sample was 84 percent male and 80 percent minority (41 percent black, 34 percent Hispanic, and 5 percent American Indian/other). For approximately one-quarter (25.5 percent) of study participants, the study index petition was their first petition to court. Of the remaining participants (those with a petition before the study index petition), 69 percent had 2 or more prior petitions; the average was 3 in Maricopa County and 2.8 in Philadelphia County (exclusive of the study index offense). At both sites, more than 40 percent of the adolescents enrolled were adjudicated of felony crimes against persons (i.e., murder, robbery, aggravated assault, sex offenses, and kidnapping). At the time of the baseline

interview for the study, 50 percent of these adolescents were in an institutional setting (usually a residential treatment center); during the 7 years after study enrollment, 87 percent of the sample spent some time in an institutional setting.

Interview Methodology

Immediately after enrollment, researchers conducted a structured 4-hour baseline interview (in two sessions) with each adolescent. This interview included a thorough assessment of the adolescent's self-reported social background, developmental history, psychological functioning, psychosocial maturity, attitudes about illegal behavior, intelligence, school achievement and engagement, work experience, mental health, current and previous substance use and abuse, family and peer relationships, use of social services, and antisocial behavior.

After the baseline interview, researchers interviewed study participants every 6 months for the first 3 years, and annually thereafter. At each followup interview, researchers gathered information on the adolescent's self-reported behavior and experiences during the previous 6-month or 1-year reporting period, including any illegal activity, drug or alcohol use, and involvement with treatment or other services. Youth's self-reports about illegal activities included information about the range, the number, and other circumstances of those activities (e.g., whether or not others took part). In addition, the followup interviews collected a wide range of information about changes in life situations (e.g., living arrangements, employment), developmental factors (e.g., likelihood of thinking about and planning for the future, relationships with parents), and functional capacities (e.g., mental health symptoms).

Researchers also asked participants to report monthly about certain variables (e.g., school attendance, work performance, and involvement in interventions and sanctions) to maximize the amount of information obtained and to detect activity cycles shorter than the reporting period.

In addition to the interviews of study participants, for the first 3 years of the study, researchers annually interviewed a family member or friend about the study participant to validate the participant's responses. Each year, researchers also reviewed official records (local juvenile and adult court records and FBI nationwide arrest records) for each adolescent.

Investigators have now completed the last (84-month) set of followup interviews, and the research team is analyzing interview data. The study maintained the adolescents' participation throughout the project: At each followup interview point, researchers found and interviewed approximately 90 percent of the enrolled sample. Researchers have completed more than 21,000 interviews in all.

the risks and costs of sanctions will exceed the returns from crime. Becker (1968) suggested that offenders base their decisions to commit crime on the combined effects of three dimensions of deterrence, each of which forms part of a “sanction regime”—the risks of arrest, the likelihood of conviction, and the costs of punishment (see figure 1).

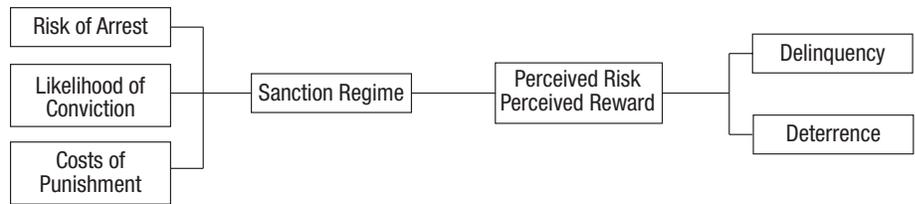
To be effective, the combined effects of the sanction regime must neutralize or exceed the rewards of crime. Acting together, sanction regimes set both the risks and conditional costs of crime and—with timely responses that connect the crime to the costs—they create a deterrent threat. Much of modern deterrence theory can be traced back to Becker’s design.

Since Becker (1968), deterrence theorists typically have distinguished between two types of deterrence: for society as a whole (general deterrence) and for individuals (specific deterrence). General deterrence is predicated on the idea of vicarious learning. According to this perspective, clearly announced laws backed up with aggressive enforcement, prosecution, and punishment send a message to the community that crime will not be tolerated. Potential offenders—who learn from the experiences of others—will mostly choose not to offend. On the other hand, specific deterrence is predicated on the idea of experiential learning. This perspective emphasizes the importance of one’s own prior offending and sanction experiences in framing the costs and benefits of criminal involvement.

What is clear is that the extent to which offenders apply decisionmaking processes varies. Recidivism rates of previously sanctioned juvenile and adult offenders are high; however, they are not 100 percent (Nagin, 1998). Some offenders persist, whereas others desist. Desistance itself takes several forms. For some, it is spontaneous and abrupt; others desist incrementally over time; some desist for varying time intervals; and still others desist from serious crime by shifting to less serious (and potentially less costly) crimes. Perhaps due to differences in maturity, cognitive impairment, prior experiences, and other possible factors, some individuals “don’t get it” when they are punished for criminal activity, whereas others do and still others “get it eventually.” In addition, some may “get it” but decide to continue offending in the face of substantial risks of punishment.

The psychological literature on risk, for example, indicates that a developmental gap in the maturation of the cognitive-control system can help explain some adolescent risk behaviors. It has been well established that the logical reasoning capabilities of adolescents are comparable to

Figure 1. Offenders’ Decisionmaking Process



those of adults by age 15; essentially, adolescents and adults are equally able to perceive risk and its potential effects (Reyna and Farley, 2006; Millstein and Halpern-Felsher, 2002; Steinberg, 2007). However, psychosocial maturation processes (e.g., impulse control, emotion regulation, future orientation, delayed gratification, resistance to peer influence) continue to develop into young adulthood (Steinberg, 2004). As such, it is believed that ongoing psychosocial development weakens the fully mature logical reasoning abilities of adolescents and results in higher vulnerability for engaging in risk-taking behaviors (Steinberg, 2007).

Results from the Pathways study address two of the three prongs of the deterrence equation—the certainty and severity hypotheses. The idea behind the first hypothesis is that more certain punishment should reduce crime because the greater a person’s perceived likelihood that he or she will be caught for committing a crime, the less willingness he or she should have to engage in that crime. The severity hypothesis is based on the assumption that the stronger the penalty associated with a crime, the greater the potential cost of committing the crime, which should also dissuade offenders.² Although the idea that increasing the severity of punishment should serve as a strongly motivating deterrent from crime is intuitive and popular, the majority of deterrence research indicates that the certainty of the punishment, rather than its severity, is the primary mechanism through which deterrence works (Nagin, 1998; Durlauf and Nagin, 2011; Paternoster, 2010). In other words, all things being equal, offenders typically respond to a threatened punishment that is more likely to occur than to one that is more severe. However, it should be noted that the majority—though certainly not all—of deterrence research has been conducted on adults; that is, much of what researchers know about deterrence and risk has not necessarily been studied in juvenile populations (Levitt, 1998). Recent research, described in this bulletin, has begun to close this age gap in the literature.

In this bulletin, the authors review evidence from the Pathways to Desistance study on deterrence among serious adolescent offenders. They find no meaningful reduction

in either offending or arrests in response to more severe punishments (e.g., correctional placement, longer lengths of placement). However, the authors do find evidence that serious adolescent offenders respond to the threat or risk of sanctions; their recidivism is tied strongly and directly to their perceptions of how certain they are that they will be arrested.

Increasing Deterrence Through Severity: Institutional Placement and Length of Stay

In the early 20th century, juvenile courts in the United States worked toward the goal of rehabilitating delinquent youth to be productive members of society through the use of treatment programs. This process was distinctly different than that used in the criminal justice system. However, as public support of rehabilitation waned in the 1950s and 1960s, and serious juvenile offending increased in the 1980s, juvenile courts transformed from treatment-focused institutions to more punitive criminal justice agencies (Snyder and Sickmund, 1999).

Contemporary juvenile courts seek to accommodate the goals of both punishment and intervention in their responses to youth crime. Often, these goals overlap and, at times, punishment is considered to have rehabilitative value by imposing costs on liberty that are designed (in part) to deter further offending. In other instances, punishment is the goal of court sanctions, especially for youth who are transferred to the criminal justice system. Punishments range from varying degrees of probation supervision to more severe sanctions such as institutional placement. Institutional placement is likely to be considered a more costly (and severe) penalty than probation and is therefore thought to have a stronger deterrent effect. Placement itself exacts costs that can vary in terms of the lengths of stay and the conditions of confinement. More prisonlike institutions are purported to have stronger punishment costs than prisons with a more campus-like setting. Deterrence is also thought to co-vary with the length of punishment; in general, individuals who are institutionalized longer will experience a more expensive and severe sanction than those with shorter stays.

Examining the Effect of Severity of Punishment on Deterrence

Loughran and colleagues (2009) explored two distinct but related questions that are relevant to policy regarding specific forms of deterrence and the severity of punishment: (1) The researchers estimated the effect of placement and of probation on offenders and their subsequent rates of self-reported reoffending and rearrest, and (2) they estimated the marginal effect of offenders' lengths of stay in placement

on subsequent offending. The following important policy perspectives explain why the authors focused on these questions (p. 701):

Thus, the policy question germane to this debate is finding the level of punishment and/or treatment within the juvenile justice system that maximizes the public safety benefits of confinement. A demonstration of capacity for effective punishment and the efficient use of resources are essential to the survival of the juvenile court. If longer stays in institutional facilities are not producing gains in reduced offending, then it is questionable whether this use of resources is either justifiable or politically attractive. The financial cost of placing individuals in institutional care for extended periods is substantial, and high levels of spending on this practice should produce some benefit in terms of increased public safety. Without a demonstration that increased or longer institutional stays provide such a benefit, the argument for incurring these costs is substantially weaker.

Comparing recidivism rates for offenders receiving placement versus probation. In the Pathways sample, offenders who were placed in an institution had higher recidivism rates than those placed on probation. These results were borne out in rates of arrest and self-reported offending. Individuals who were removed from the community to a correctional or other out-of-home placement averaged 1.2 new arrests per year (postdisposition for the study index offense). Individuals who received probation averaged 0.63 new arrests per year, nearly half the rate of those placed in correctional settings. Similarly, individuals who were placed in an institution self-reported an average of 2.5 more offenses per each year in the community (10.9 versus 8.3 reported offenses per year) than individuals who received probation. One interpretation of this evidence is that more expensive and severe sanctions have criminogenic—not deterrent—effects.

Selection effect. However, an important theme of deterrence research in the Pathways study is that these kinds of comparisons are not sufficient to support the claim of criminogenic effects of severe sanctions. Essentially, comparing offenders placed in an institution with those placed on probation is not an equivalent comparison. This problem is often referred to in social science research as a “selection effect” (i.e., the highest risk offenders are selected for the most expensive and severe sanctions). A naive comparison of rates of recidivism among a group of offenders sentenced to probation versus a group of offenders sentenced to placement in

a correctional facility would be problematic because the group receiving the harsher penalty of placement would likely be composed of offenders who were repeat offenders, older, or guilty of more severe crimes. In other words, they would possess characteristics that would make them at greater risk to reoffend regardless of the punishment they receive. To rule out such selection effects, Loughran and colleagues (2009) matched offenders on a wide array of background characteristics by comparing similarly situated individuals who received different sanctions.

Matched-Group Comparisons of Offenders

The results were striking. First, after matching, there was essentially no difference between the institutional placement and probation groups in terms of either rearrest or self-reported offending. Contrary to the conclusions that might be reached from a simple comparison of the two groups, this result suggests that neither a specific deterrent effect nor a criminogenic effect of placement exists on average (although the researchers did observe a small average criminogenic effect that they could not rule out as merely the result of random sampling variability). Second, among the individuals in placement, there was no additional reduction in recidivism (either for rearrest or self-reported offending) as a result of institutionalizing individuals for longer time periods. Figure 2 shows expected rates of rearrest and self-reported offending for various lengths of stay. The authors calculated these rates after they accounted for the possible selection bias of more active and serious offenders (i.e., those more likely to recidivate) receiving longer stays in the first place. As figure 2 shows, rates do not diminish substantially for longer stays in either case.

The authors note a few important points regarding this set of analyses. First, the sample sizes for the effects of length of placement are very small for some categories of offenders (e.g., for some in placement for less than 30 days). This factor prevented the researchers from putting much faith in the large decrease in self-reported offending from 0–6 months in custody to 6–10 months in custody. In the analysis, however, the authors used different specifications to test the sensitivity of their findings, which reinforced these basic results. Still, the patterns found in the Pathways sample should be replicated in other samples, and one should interpret the findings with some caution. Second, these analyses offer no insight regarding the effect of length of stay on outcomes other than recidivism, and they do not account for the effects of treatment received during the stay.³

Increasing Deterrence Through Certainty: Offenders' Perceptions of Risk

Research consistently shows that the perception of certainty (or risk of apprehension) is a key mechanism of deterrence. The strength of the relationship between risk perception and offending, however, is related to several person-specific characteristics. Early studies on deterrence assumed that offenders knew the actual or objective risk of arrest, sanction, and punishment (Levitt, 1998; Ehrlich, 1975; Sampson and Cohen, 1988). These studies assumed that if there were more police, if police were more aggressive, or if the length of sentences were increased, then offenders would know the risks and behave accordingly. In fact, these assessments are subjective, based on perceptions of risk and decisions about how to use information concerning risk (Nagin, 1998; Matsueda, Kreager, and Huizinga, 2006). The average subjective probability may approach the objective or actual probability of detection across a sample of individuals, but one will observe quite a bit of variation in any sample. If offenders either fail to perceive risk subjectively or act on that perception even if the subjective risks approximate actual risks, punitive policies will have a weaker deterrent effect. Because of this subjective and experiential nature, a body of literature has developed around the idea that deterrence is a perceptually based—not purely objective—phenomenon (Geerken and Gove, 1975). Individuals must perceive sanction threats to be affected by them. Recent studies of deterrence have focused on how individuals form their perceptions of risk and how those perceptions are applied (Matsueda, Kreager, and Huizinga, 2006).

Studies Regarding Offender Perceptions of Risk

A substantial body of research has examined these perceptions, but it mainly uses samples of adults, nonoffenders, or primarily nonserious offenders (Grasmick and Bursik, 1990; Nagin, 1998; Nagin and Paternoster, 1993; Nagin and Pogarsky, 2001, 2003; Piquero and Tibbetts, 1996). This literature highlights a small but important relationship between individuals' beliefs about the likelihood of getting caught and the extent to which they offend. An important limitation of these studies is the relative lack of attention to active and serious offenders, the precise group for whom studies of deterrence are ultimately most relevant (Apospori, Alpert, and Paternoster, 1992; Decker, Wright, and Logie, 1993; Piquero and Rengert, 1999). The dearth of findings among serious offending adolescents presents a particularly important limitation, given this group's high level of criminal activity and the developmental deficits that may affect their cognition and decisionmaking ability with

respect to both sanction risk (Fagan and Piquero, 2007) and crime (Steinberg and Scott, 2003). As such, a critical policy question is whether adolescents who are more serious, chronic offenders consider and respond to threats of sanctions in their decisionmaking, or whether they can be deterred at all.

Analysis of Pathways Data Regarding Offenders' Perceptions of Risk

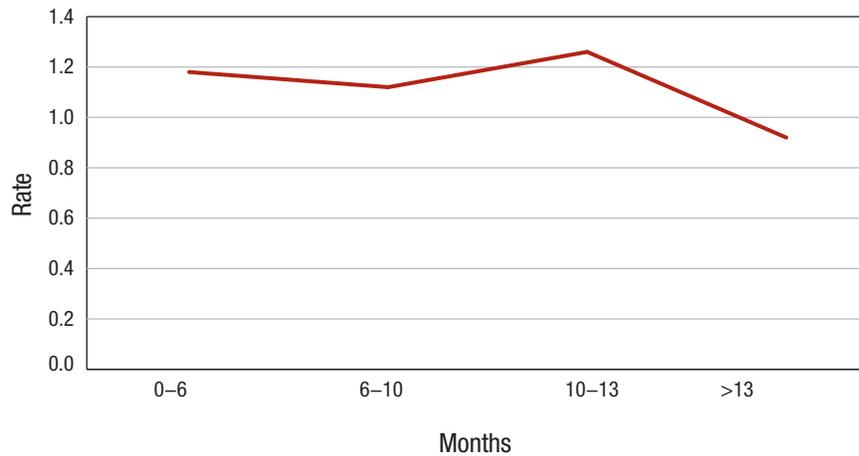
The Pathways data provide comprehensive information to support the study of offender perceptions and how serious youthful offenders think about the risks and benefits of crime. In this section, the authors consider several questions related to perceptions of certainty (and other perceptions, such as rewards) through recent analyses from the Pathways study:

- Do perceptions of the risks and rewards of crime differ based on the frequency of offending?
- Do these perceptions change over time?
- Does the experience of an arrest prompt changes in these perceptions?

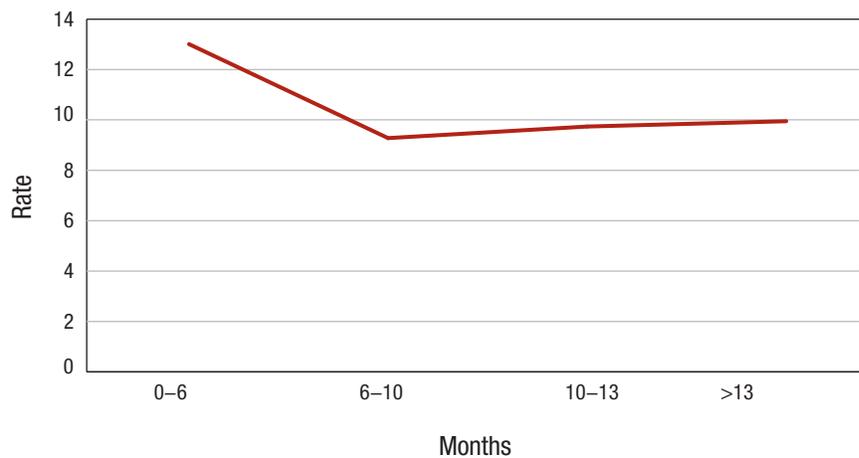
Fagan and Piquero (2007) consider the role of a rational choice framework—including perceptions of risk, reward, and social and personal costs—to explain individual offending trajectories in the Pathways data. They find evidence that rational choice perceptual measures are associated with differences in offending trajectories and desistance. Specifically, when individuals understand the risks and costs of punishment, crime rates tend to be lower over time—both risk perceptions and evaluations of experienced punishment compete with perceived and experienced rewards of crime to influence individual offending trajectories. Fagan and Piquero (2007:718) argue that these factors work through the mechanism of legal socialization (“the internalization of law, rules, and agreements among members of society, and the legitimacy of authority to deal fairly with citizens who violate society’s rules”) to directly influence decisions to offend. These results establish a necessary baseline for showing that even the most serious adolescent offenders can be deterred under certain conditions. Yet, even within

Figure 2. Expected Rate of Reoffending by Length of Stay

A. Expected Rate of Rearrest



B. Expected Rate of Self-Reported Offending



Adapted from Loughran, T.A., Mulvey, E.P., Schubert, C.A., Fagan, J., Piquero, A.R., and Losoya, S.H. 2009. Estimating a dose-response relationship between length of stay and future recidivism in serious juvenile offenders. *Criminology* 47:699–740.

this category of serious and more seasoned offenders, the responsiveness to deterrence varies. This work also suggests that a disconnect may exist between perceptual and actual cost-benefit calculations with regard to individual assessments of severity, as the placement and length of stay analyses suggest no effect exists whereas the perceptual analysis shows an effect exists.

Loughran and colleagues (2012a) explored heterogeneity in perceptions of risks, costs, and rewards for crime among the Pathways sample to extend this work. They show that perceptions may evolve over time differentially among adolescent offenders. Important and prospectively identifiable differences in the sample, based on perceptions of offending, suggest that amenability to deterrence varies widely. The researchers conclude that accumulated offending experience provides a simple way to divide



the sample into groups according to their perceptions of certainty of detection and punishment. Specifically, they identified a group of high-rate offenders who displayed lower perceived risks of detection and punishment for crime (and also higher perceived rewards from crime). Moreover, they identified a group of low-rate offenders who reported higher perceived risk and lower perceived rewards for offending. Finally, they identified a third group of medium-rate offenders whose perceptions of risks (and rewards) fell in between those of the first two groups. Interestingly, these differences seem to be stable over time—the average levels of perceptions of risks and rewards among the three types of offenders did not converge after 36 months. The differences, therefore, continued to be evident as young offenders grew older, persisting in spite of age or maturity effects that otherwise might have influenced group composition.

Findings Regarding Differences in Deterrent Effects

Considering their findings, Loughran and colleagues (2012a) advance the notion of *differential deterrence*, a term that characterizes the wide variation that exists across serious juvenile offenders' decisionmaking, perceptions of rational choice components, and involvement in criminal activity. A similar phenomenon has been observed in other settings. For example, research on adult domestic violence offenders in Milwaukee suggests that arrest acts as a deterrent to future violence among offenders with high stakes in conformity (married and employed), whereas it is criminogenic for offenders with low stakes in conformity (unmarried and unemployed) (Sherman and Smith, 1992). This underscores the notion that some serious offenders may be sensitive to changes in criminal justice tactics aimed at making crime less rewarding and more costly, whereas others, such as those with fewer stakes in conformity, may be less likely to respond to signals of increased risk and cost.

These results open the door to other questions regarding deterrability:

- Do these perceptions change over time in response to offending and its consequences, or do they remain static and largely insensitive to change and updating within individuals?
- Does the composition of cost-benefit perceptions matter to some offenders more than others, and how do these perceptions vary by individual characteristics and over time?
- Can influencing or changing perceptions affect offending for a group of serious adolescent offenders, or does it ultimately not matter in the decision to offend?

The next set of studies address some of the following questions: Do risk perceptions change over time? How do the changes lead to decisions to commit crime or avoid it? How do patterns vary in each group over time? A final item of concern is: What role do perceptions of risks and rewards of crime play in the long-term desistance from crime?

Increasing Certainty Through Arrest

An arrest will deter an individual only if two things happen: (1) The perception of the risk of detection must increase in response to an arrest, and (2) this increase must lead to a reduction in the likelihood of reoffending. Both of these links must be active for deterrence to operate (Pogarsky, Piquero, and Paternoster, 2004). By examining both responses among juveniles in the “deep end” of the system, researchers can determine if serious juvenile offenders, such as those involved in the Pathways study, are in fact deterrable.

Anwar and Loughran (2011) explore the first question in the Pathways data: Do adolescent felony offenders update their subjective beliefs about their perceived risk of detection as they accumulate additional information about

“Individuals who received probation averaged 0.63 new arrests per year, nearly half the rate of those placed in correctional settings.”

both offending and arrests, including undetected offenses? To test this hypothesis, the researchers used the concept of Bayesian learning. Bayesian learning posits that individuals will adjust or update their previously held subjective beliefs in response to newly observed information, known as a “signal” (in this case, the ratio of the number of arrests to self-reported crimes). Their analyses demonstrated that, as is the case with nonoffenders (Pogarsky, Piquero, and Paternoster, 2004; Lochner, 2007; Matsueda, Kreager, and Huizinga, 2006), individuals in the Pathways sample tend to adjust their risk perceptions upward slightly in response to an arrest—by about 5 percent on average, divided by each crime committed. This is a necessary condition for deterrence. However, when offending is undetected or avoids a legal reaction, individuals actually have lower risk perceptions.

Anwar and Loughran (2011) show two other interesting and policy-relevant extensions to this basic updating process. The first is an *experience effect*. Individuals who are far along in their criminal careers might become certain about their true arrest rate and will therefore no longer update their risk perceptions based on new experiences. These individuals may be “maxed-out” on information and, consequently, an arrest has no effect on their subsequent risk perceptions because they are quite certain in their perceptions already. This implies that a deterrent effect of arrests no longer exists, at least in the sense of increasing perceptions of sanction risk (i.e., an individual’s perceived likelihood of detection) for crime. In such instances where experience trumps new information, sanction threats may influence only certain subgroups of offenders (Parker and Grasmick, 1979; Pogarsky, 2002). The balance of this population might then be undeterrable. Anwar and Loughran (2011) present evidence that confirms such an experience effect. They suggest that for those offenders who are farther along in their criminal careers, arrests have a weaker perceptual deterrent effect; by extension, arrests early in an individual’s criminal career may produce a greater deterrent effect than those that occur later on (Smith and Gartin, 1989).

The second extension that Anwar and Loughran (2011) suggest concerns the observation that the risk-updating process may be crime specific. In this view, experiencing an arrest for one type of crime appears to affect perceptions for that type of crime only, rather than all crime risk perceptions, at least at the level of income-generating (e.g., stealing) versus aggressive (e.g., assault) crimes. The policy relevance of this possibility is clear. If risk-perception updating is crime specific, then police crackdowns on one type of crime are unlikely to deter other crimes. They may even encourage other crimes by shifting limited police resources away from detecting certain crimes or by inducing a substitution effect, in which offenders switch their preferences from crimes with a high likelihood of detection to crimes that are more likely to escape detection (Nagin, 1998). However, if risk perceptions are not crime specific, then cracking down on a specific type of crime will have a global deterrent effect.

At least for the adolescents in the Pathways study, crime-specific updating implies that policies targeting specific types of offending may be more effective at deterring individuals from engaging in these offenses than are general policies aimed at overall crime reduction. If a police force has limited resources and thus decides to target selected types of crime, it will likely have to shift its focus away from other types of crime. This shift in focus may result in a reduction in perceived risk of sanctions for the crimes that are not targeted. Results of Anwar and Loughran’s (2011) study support the notion that individuals, in response to targeted crime policies, may engage in crimes that police do not target and are thus at lower risk of detection.

Behavioral Responses to Changes in Risk Perceptions: The Certainty Effect

Individuals updating their subjective risk perceptions in response to arrest is a necessary condition for deterrence. Yet, this connection between arrest and risk perceptions

may ultimately be insufficient if these changes in risk perceptions do not result in changes in offending. Thus, it is important to consider whether changes in risk perceptions are associated with subsequent changes in behavior among serious juvenile offenders and, if so, how these changes manifest across different levels of risk perceptions. It is important to examine this policy question in the Pathways sample, especially because most prior research has been based on samples of nonoffenders (and other low-risk groups) and the effects tend to be small (Pratt and Cullen, 2005). Moreover, even if such risk-certainty/deterrent effects exist, it is not known whether the effects are constant across the risk spectrum or if there is a “tipping point” above which changes in risk deter crime but below which they do not.

Loughran and colleagues (2012b) investigated the presence and salience of a certainty effect among the serious offenders in the Pathways study. The researchers report strong evidence of a negative association between risk and self-reported offending. They reveal some important features of the functional form of this relationship; that is, its shape along different points of the risk continuum. The data show strong evidence of nonlinearity in the risk-offending relationship. Linearity implies that increases in the perception of risk would be associated with corresponding decreases in reported offending regardless of the individual’s prior risk perception; for example, a 10-percent increase in risk from 10 to 20 percent would reduce offending by the same magnitude as a change from 50 to 60 percent or from 80 to 90 percent. The analyses indicate that this is not the case. Instead, the researchers found that, although increases in risk for individuals in the midrange of the risk continuum (i.e., 30 to 90 percent) are associated with a linear decline in the likelihood of offending, the

likelihood of offending for individuals in the lower end of the risk continuum (i.e., less than 30 percent) is relatively insensitive to sanction risk.

The researchers found no evidence of any certainty effect among the members of this group; that is, increases in sanction risk were not associated with a reduction in offending. There appears to be a detection probability threshold that must be reached before any deterrent effect can be realized. This phenomenon has been observed previously but not at the individual level (Tittle and Rowe, 1974; Chamlin, 1991). Individual offenders deem law enforcement capabilities and the perception of sanction threats to be credible only when they are above that threshold. By extension, greater sanction risks are not likely to deter offenders who do not deem such threats credible in the first place. Loughran and colleagues (2012b) also observed that, for juveniles who perceive offending to be very high risk (i.e., perceived risk greater than 90 percent), the rate of decline in offending likelihood increases dramatically with changes in risk. Such “overweighting,” or treating high probabilities as certainty, is again inconsistent with a linear risk-offending relationship and suggests that there is a threshold at which an individual’s perceived risk is so high that they are at virtually no risk of offending. As such, policies aimed at such individuals with high perceptions of risk are perhaps inefficient or unnecessary. Figure 3 summarizes the relationship between levels of perceived risk and potential deterrent effects for these different risk-based categories of offenders.

The Deterrent Effect of Ambiguity in Offender Risk Perceptions

These analyses of the Pathways data also show that considerable ambiguity exists in offender risk perceptions. Loughran and colleagues (2011) investigated not only whether average risk perceptions deter would-be offenders but also whether the variability, or degree of uncertainty, of such perceptions is also important. This concept comes from the literature on behavioral decision theory, where an important distinction is made between risk—or probabilities, known to decisionmakers—and uncertainty,

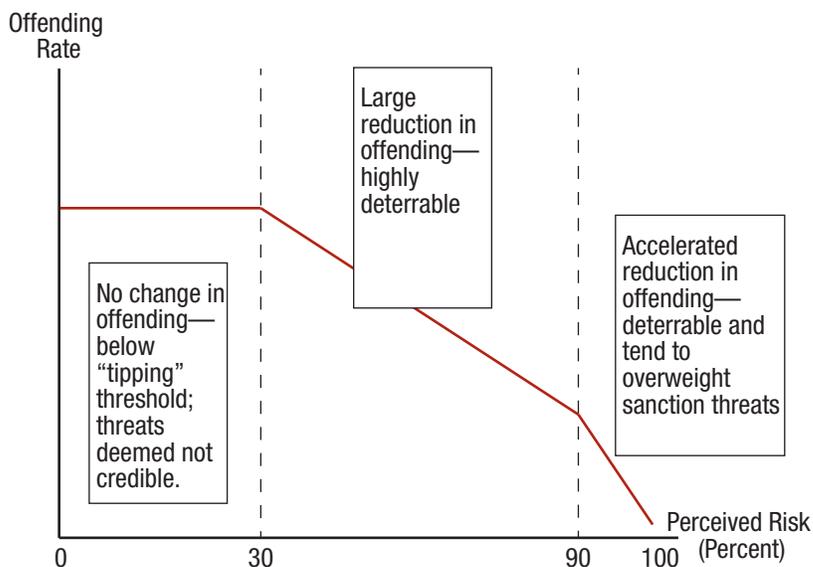


where such risks are unknown and are formed subjectively. This literature has shown that individuals tend to prefer known gambles over more uncertain ones, even for similarly valued outcomes (Camerer and Weber, 1992). For example, when offered the choice between a gamble with a known 50-percent chance to win versus the same gamble with anywhere between a 0- and 100-percent chance to win, individuals tend to prefer the former (where the risk is known) as opposed to the latter (which, on average, is the same gamble but the exact risk is unknown and may be either lower or higher) (Ellsberg, 1961). It is this type of ambiguity, or uncertainty about the subjective risks of detection on the part of the offender, that the authors studied for its relationship to deterrence.

Uncertainty in perceptions of detection probabilities may actually enhance the deterrent effect of increases in perceived certainty. For example, Sherman (1993) noted that it is not possible to raise punishment certainty to very high levels because of limited resources. Yet, as he argues, although the mean level of punishment certainty might continue to be low, it could be unpredictably variable—at times it would be very high in some areas but very low in others. This natural variability would lead to ambiguity regarding the certainty of punishment, thereby increasing its deterrent potential. Thus, Sherman argued that random police activity provides vague or ambiguous information about the risk of punishment, exploiting this natural uncertainty about the risk. Although the overall level of detection may be low, creating uncertainty about specific detection probabilities with respect to certain areas, crime types, or other factors may generate a larger perceived risk of getting caught as compared to a constant, low rate of detection.

To test this idea in the Pathways data, Loughran and colleagues (2011) examined the role of ambiguity in offender risk perceptions and its relationship to the certainty effect. The researchers characterized uncertainty

Figure 3. Differential Offending Responses to Changes in Risk Perceptions by Risk-Class



for each individual as the amount of variability in his or her crime-specific risk perceptions. These results show that, for income-generating crimes, the deterrent effect of offender risk perceptions was enhanced for individuals who reported higher uncertainty in their perceptions near the lower end of the risk continuum. This result is consistent with Sherman’s hypothesis and the concept of “ambiguity aversion” in decision theory, which suggests that individuals are generally adverse to uncertainty (Camerer and Weber, 1992); that is, individuals tend to prefer known risks to unknown risks, even when considering gambles of equally expected payoffs.

The implications of these findings are both considerable and controversial. By increasing the amount of uncertainty about the rate of detection, the deterrent effect of potential detection increased dramatically. This finding argues for the introduction of randomization into police surveillance and patrol—changes that do not necessarily require any additional law enforcement resources. For example, police could rotate their enforcement across both offenses and places so that the risk of punishment is far more unpredictable to active offenders than it normally

“[G]reater sanction risks are not likely to deter offenders who do not deem such threats credible in the first place.”



would be (Harcourt and Meares, 2010). Thus, with the same level of resources, modifying police practice to increase uncertainty could enhance overall deterrence. The implications are controversial because they would require police agencies to substantially rethink how they deploy their scarce resources. The idea is that a random police presence creates a widespread sense of being monitored, wherein the certainty of sanction threats is heightened because offenders will not know where or when they might be caught.

Policy Implications

From a policy perspective, this recent work from the Pathways study has the following important implications:

- Even within a group of serious juvenile offenders, the certainty of punishment can play an important role in deterring future crime. However, the deterrent effect of more severe punishments seems to be limited, in terms of both institutional placement and longer stays.
- This process does not operate in the same way for all offenders—policies that assume a “one size fits all” approach will fail for some offenders.
- Frequency of self-reported offending seems to be an important way to distinguish groups of offenders who may be more or less deterrable.
- Arresting youth before they have gained a sizable reservoir of offenses appears to have the greatest potential to prompt perceptual changes that may curtail future offending. However, those changes in perception are greatest in relationship to the crime associated with the arrest (e.g., perceptions of the risk for getting caught for robbery are likely to increase when the individual has been arrested for robbery).

- Policies that target specific types of offending may be marginally more effective at curbing the targeted offenses than general policies aimed at a widespread reduction in crime levels.
- Changes in offender perceptions of risk may be related to offending, yet the individual’s prior perception is an important determinant of how this change in risk perception will be related to offending. For example, there may be a threshold that an offender must cross for the threat to seem credible.
- Perceived uncertainty in offenders’ subjective interpretations of risk may be utilized to enhance the deterrent effect. This has direct policy implications; for example, unpredictable variability in policing may lead to some additional deterrent effects along with a fixed level of police presence.

Conclusion

The Pathways study has revealed some important relationships between offending and perceptions of risk and rewards of crime in a sample of serious adolescent offenders; these relationships are relevant on both a theoretical and a policy level. For example, the results thus far have shed light on the mechanisms that govern how justice system sanctions may contribute to changes in juvenile offenders’ perceptions of the risks of engaging in crime and the certainty and severity of punishment; this, in turn, may lead these offenders to change their behavior. The findings provide further support for efficiency- and deterrence-oriented police patrol strategies by providing a heightened sense of supervision and, subsequently, of risk (Sherman and Weisburd, 1995; Koper, 1995). Results from the Pathways study are in line with advocates of “justice reinvestment” strategies. The authors’ findings show that severity of punishment (i.e., incarceration) has little specific deterrent effect. Therefore, the authors advocate for shifting resources from prisons to areas that are related to offenders’ perceptions of risk.

The understanding of these mechanisms can be linked to well-developed work in other social sciences dealing with how individuals make decisions. This work also sets the stage for future investigations regarding the following questions:

- Does an identifiable threshold of offending frequency exist above which arrests no longer have an impact on perceptions of risk?
- Are optimal changes in risk perceptions associated with subsequent changes in behavior?

The study investigators will continue to explore these and other areas.

As a whole, the results from the Pathways sample paint a rich picture of how policymakers may begin to think of deterring serious adolescent offenders. However, this picture is incomplete. On the one hand, the results discussed in this bulletin suggest the possibility of effective deterrence for a subgroup of offenders. Many of these offenders contemplate and weigh risk, cost, and rewards when deciding to offend. They tend to adjust these perceptions according to recent sanction experiences and react to these changes in ways that may reflect deterrence. However, what is known about offenders' sanction threat perceptions, and how these perceptions relate to subsequent offending decisions, explains only a small portion of their decisionmaking. The challenge ahead in deterrence research on serious adolescent offenders is to learn more about offenders' decisionmaking so that policies can more efficiently and effectively deter these offenders from crime.

Endnotes

1. OJJDP is sponsoring the Pathways to Desistance study (project number 2007–MU–FX–0002) in partnership with the National Institute of Justice (project number 2008–IJ–CX–0023), the John D. and Catherine T. MacArthur Foundation, the William T. Grant Foundation, the Robert Wood Johnson Foundation, the William Penn Foundation, the National Institute on Drug Abuse (Grant Number R01–DA019697), the Centers for Disease Control and Prevention, the Pennsylvania Commission on Crime and Delinquency, and the Arizona State Governor's Justice Commission. Investigators for this study are Edward P. Mulvey, Ph.D. (University of Pittsburgh), Robert Brame, Ph.D. (University of North Carolina–Charlotte), Elizabeth Cauffman, Ph.D. (University of California–Irvine), Laurie Chassin, Ph.D. (Arizona State University), Sonia Cota-Robles, Ph.D. (Temple University), Jeffrey Fagan, Ph.D. (Columbia University), George Knight, Ph.D. (Arizona State University), Sandra Losoya, Ph.D. (Arizona State University), Alex Piquero, Ph.D. (University of

Texas–Dallas), Carol A. Schubert, M.P.H. (University of Pittsburgh), and Laurence Steinberg, Ph.D. (Temple University). More details about the study can be found in a previous OJJDP fact sheet (Mulvey, 2011) and at the study website (www.pathwaysstudy.pitt.edu), which includes a list of publications from the study.

2. Interestingly, deterrence theorists often speak of the need to maximize the certainty of sanctions while ensuring that their severity is well matched to the seriousness of the crime. This leads to the idea that the severity of sanctions should be meaningfully related to the seriousness of crime so that more serious crimes result in more severe sanctions. Until recently, these proportionality principles were part of the expressive function of punishment (Feinberg, 1965).

3. To the extent that one believes that the juvenile justice system has the dual responsibility to treat as well as to punish, this is an important consideration. Certain types of treatment have best-practices standards regarding length of stay to realize their full effect. For example, National Institute on Drug Abuse standards suggest that treatment for substance use should continue for 90 days to produce stable change (National Institute on Drug Abuse, 2012), and an analysis of this duration effect with the Pathways sample indicates that treatment that does not meet this threshold is not effective in reducing marijuana use (Chassin et al., 2009). Comparing these standards to reports—stating that the average length of stay in juvenile residential settings is 180 days for a person offense (Butts and Adams, 2001)—reveals that more consideration of current practices regarding youth's length of stay in confinement is warranted. Unfortunately, short-term shock incarceration programs (frequently called boot-camp prisons) are known to be ineffective in reducing recidivism (MacKenzie, Wilson, and Kider, 2001). Researchers have also found that exceedingly long incarceration periods are harmful—for example, material restrictions and freedom costs (Fagan and Piquero, 2007); perverse effects, such as increased offending (Agnew, 1992); and increased defiance (Piquero, Langton, and Gomez-Smith, 2004). However, researchers do not know the optimal length of stay that will promote the most positive effects of treatment at the same time it advances deterrence.

References

- Agnew, R.A. 1992. Foundation for a general strain theory of crime and delinquency. *Criminology* 30:47–88.
- Andenaes, J. 1974. *Punishment and Deterrence*. Ann Arbor, MI: University of Michigan Press.
- Anwar, S., and Loughran, T.A. 2011. Testing a Bayesian learning theory of deterrence among serious juvenile offenders. *Criminology* 49(3):667–698.
- Apospori, E., Alpert, G.P., and Paternoster, R. 1992. The effect of involvement with the criminal justice system: A neglected dimension of the relationship between experience and perceptions. *Justice Quarterly* 9:379–392.
- Beccaria, C. 1985. *On Crimes and Punishments*. New York, NY: Macmillan.
- Becker, G. 1968. Crime and punishment: An economic approach. *Journal of Political Economy* 76:169–217.
- Butts, J., and Adams, W. 2001. *Anticipating Space Needs in Juvenile Detention and Correctional Facilities*. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.
- Camerer, C., and Weber, M. 1992. Recent developments in modeling preferences: Uncertainty and ambiguity. *Journal of Risk and Uncertainty* 5:325–370.
- Chamlin, M. 1991. A longitudinal analysis of the arrest-crime relationship: A further examination of the tipping effect. *Justice Quarterly* 8:187–199.
- Chassin, L., Knight, G.P., Vargas-Chanes, D., Losoya, S.H., and Naranjo, D. 2009. Substance use treatment outcomes in a sample of serious juvenile offenders. *Journal of Substance Abuse Treatment* 36(2):183–194.
- Decker, S.H., Wright, R., and Logie, R. 1993. Perceptual deterrence among active residential burglars: A research note. *Criminology* 31:135–147.
- Durlauf, S.N., and Nagin, D. 2011. Imprisonment and crime: Can both be reduced? *Criminology and Public Policy* 10(1):13–54.
- Ehrlich, I. 1975. The deterrent effect of capital punishment: A question of life and death. *American Economic Review* 65:397–417.
- Ellsberg, D. 1961. Risk, ambiguity, and the savage axioms. *Quarterly Journal of Economics* 75:643–669.
- Fagan, J., and Piquero, A.R. 2007. Rational choice and developmental influences on recidivism among adolescent felony offenders. *Journal of Empirical Legal Studies* 4:715–748.
- Feinberg, J. 1965. The expressive function of punishment. *The Monist* 49(3):397–423.
- Geerken, M.R., and Gove, W.R. 1975. Deterrence: Some theoretical considerations. *Law & Society Review* 9:497–513.
- Grasmick, H.G., and Bursik, R.J., Jr. 1990. Conscience, significant others, and rational choice: Extending the deterrence model. *Law & Society Review* 24:837–861.
- Harcourt, B.E., and Meares, T.L. 2010. Randomization and the Fourth Amendment. Yale Law School Working Paper. New Haven, CT: Yale Law School.
- Koper, C. 1995. Just enough police presence: Reducing crime and disorderly behavior by optimizing patrol time in hot spots. *Justice Quarterly* 12:649–672.
- Levitt, S.D. 1998. Juvenile crime and punishment. *Journal of Political Economy* 106:1156–1185.
- Lochner, L. 2007. Individual perceptions of the criminal justice system. *American Economic Review* 97:444–460.
- Loughran, T.A., Mulvey, E.P., Schubert, C.A., Fagan, J., Piquero, A.R., and Losoya, S.H. 2009. Estimating a dose-response relationship between length of stay and future recidivism in serious juvenile offenders. *Criminology* 47:699–740.
- Loughran, T.A., Paternoster, R., Piquero, A.R., and Pogarsky, G. 2011. On ambiguity in perceptions of risk: Implications for criminal decision-making and deterrence. *Criminology* 49(4):1029–1061.
- Loughran, T.A., Piquero, A.R., Fagan, J., and Mulvey, E.P. 2012a. Differential deterrence: Studying heterogeneity and changes in perceptual deterrence among serious youthful offenders. *Crime & Delinquency* 58(1):3–27.
- Loughran, T.A., Pogarsky, G., Piquero, A.R., and Paternoster, R. 2012b. Re-examining the functional form of the certainty effect in deterrence theory. *Justice Quarterly* 29:712–741.
- Mackenzie, D.L., Wilson, D.B., and Kider, S.B. 2001. Effects of correctional boot camps on offending. *Annals of the American Academy of Political and Social Science* 578(1):126–143.
- Matsueda, R.L., Kreager, D.A., and Huizinga, D. 2006. Detering delinquents: A rational choice model of theft and violence. *American Sociological Review* 71:95–122.
- Millstein, S.G., and Halpern-Felsher, B.L. 2002. Perceptions of risk and vulnerability. *Journal of Adolescent Health* 31:10–27.
- Mulvey, E.P. 2011. *Highlights From Pathways to Desistance: A Longitudinal Study of Serious Adolescent Offenders*. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.
- Nagin, D.S. 1998. Criminal deterrence research at the outset of the twenty-first century. In *Crime and Justice: A Review of Research*, vol. 23, edited by M. Tonry. Chicago, IL: University of Chicago Press, pp. 1–42.

- Nagin, D.S., and Paternoster, R. 1993. Enduring individual differences and rational choice theories of crime. *Law & Society Review* 27:467–496.
- Nagin, D.S., and Pogarsky, G. 2001. Integrating celerity, impulsivity, and extralegal sanction threats into a model of general deterrence: Theory and evidence. *Criminology* 39:865–891.
- Nagin, D.S., and Pogarsky, G. 2003. An experimental investigation of deterrence: Cheating, self-serving bias, and impulsivity. *Criminology* 41:167–194.
- National Institute on Drug Abuse. 2012. *Principles of Drug Abuse Treatment for Criminal Justice Populations: A Research-Based Guide*. Rockville, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Institute on Drug Abuse.
- Paternoster, R. 1987. The deterrent effect of the perceived certainty and severity of punishment: A review of the evidence and issues. *Justice Quarterly* 4:173–217.
- Paternoster, R. 2010. How much do we really know about criminal deterrence? *Journal of Criminal Law and Criminology* 100:765–824.
- Parker, J., and Grasmick, H. 1979. Linking actual and perceived certainty and severity of punishment. *Criminology* 17:366–379.
- Piquero, A.R., Langton, L., and Gomez-Smith, Z. 2004. Discerning unfairness where others may not: Low self-control and unfair sanction perceptions. *Criminology* 42:693–727.
- Piquero, A.R., and Rengert, G.F. 1999. Studying deterrence with active residential burglars. *Justice Quarterly* 16:451–471.
- Piquero, A.R., and Tibbetts, S. 1996. Specifying the direct and indirect effects of low self-control and situational factors in offenders' decision making: Toward a more complete model of rational offending. *Justice Quarterly* 13:481–510.
- Pogarsky, G. 2002. Identifying deterrable offenders: Implications for deterrence research. *Justice Quarterly* 19:431–452.
- Pogarsky, G., Piquero, A.R., and Paternoster, R. 2004. Modeling change in perceptions about sanction threats: The neglected linkage in deterrence theory. *Journal of Quantitative Criminology* 20:343–369.
- Pratt, T.C., and Cullen, F.T. 2005. Assessing macro-level predictors and theories of crime: A meta-analysis. In *Crime and Justice: A Review of Research*, vol. 32, edited by M. Tonry. Chicago, IL: University of Chicago Press, pp. 373–450.
- Reyna, V., and Farley, F. 2006. Risk and rationality in adolescent decision making: Implications for theory, practice, and public policy. *Psychological Science in the Public Interest* 7:1–14.
- Sampson, R.J., and Cohen, J. 1988. Deterrent effects of the police on crime: A replication and theoretical extension. *Law & Society Review* 22:163–189.
- Sherman, L.W. 1993. Defiance, deterrence and irrelevance: A theory of the criminal sanction. *Journal of Research in Crime and Delinquency* 30:445–473.
- Sherman, L.W., and Smith, D.A. 1992. Crime, punishment, and stake in conformity: Legal and informal control of domestic violence. *American Sociological Review* 57:680–690.
- Sherman, L.W., and Weisburd, D.A. 1995. General deterrent effects of police patrol in crime “hot spots”: A randomized, controlled trial. *Justice Quarterly* 12:625–648.
- Smith, D.A., and Gartin, P.R. 1989. Specifying specific deterrence: The influence of arrest on future criminal activity. *American Sociological Review* 54:94–106.
- Snyder, H.N., and Sickmund, M. 1999. *Juvenile Offenders and Victims: 1999 National Report*. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.
- Steinberg, L.D. 2004. Risk-taking in adolescence: What changes, and why? *Annals of the New York Academy of Sciences* 1021:51–58.
- Steinberg, L.D. 2007. Risk-taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science* 16:55–59.
- Steinberg, L.D., and Scott, E.S. 2003. Less guilty by reason of adolescence: Developmental immaturity, diminished responsibility, and the juvenile death penalty. *American Psychologist* 58:1009–1018.
- Tittle, C.R., and Rowe, A.R. 1974. Certainty of arrest and crime rates: A further test of the deterrence hypothesis. *Social Forces* 54:455–462.
- Zimring, F.E., and Hawkins, G.J. 1973. *Deterrence: The Legal Threat in Crime Control*. Chicago, IL: University of Chicago Press.

U.S. Department of Justice
Office of Justice Programs
Office of Juvenile Justice and Delinquency Prevention
8660 Cherry Lane
Laurel, MD 20707-4651



PRESORTED STANDARD
POSTAGE & FEES PAID
DOJ/OJJDP/GPO
PERMIT NO. G - 26

Official Business
Penalty for Private Use \$300

Acknowledgments

Thomas A. Loughran, Ph.D., is Assistant Professor, Department of Criminology and Criminal Justice, University of Maryland.

Robert Brame, Ph.D., is Professor, Department of Criminology and Criminal Justice, University of North Carolina–Charlotte.

Jeffrey Fagan, Ph.D., is the Isidor and Seville Sulzbacher Professor of Law, Columbia University Law School.

Alex R. Piquero is Ashbel Smith Professor in the Program in Criminology in the School of Economic, Political, and Policy Sciences at the University of Texas at Dallas and Adjunct Professor, Key Centre for Ethics, Law, Justice, and Governance, Griffith University, Queensland, Australia.

Edward P. Mulvey, Ph.D., is Professor of Psychiatry and Director of the Law and Psychiatry Program at the Western Psychiatric Institute and Clinic (WPIC), University of Pittsburgh School of Medicine.

Carol A. Schubert, M.P.H., is the Research Program Administrator of the Law and Psychiatry Program at WPIC.

This bulletin was prepared under grant number 2007–MU–FX–0002 from the Office of Juvenile Justice and Delinquency Prevention (OJJDP), U.S. Department of Justice.

Points of view or opinions expressed in this document are those of the authors and do not necessarily represent the official position or policies of OJJDP or the U.S. Department of Justice.

The Office of Juvenile Justice and Delinquency Prevention is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance; the Bureau of Justice Statistics; the National Institute of Justice; the Office for Victims of Crime; and the Office of Sex Offender Sentencing, Monitoring, Apprehending, Registering, and Tracking.