Examining Changes in Offender Risk Characteristics and Recidivism Outcomes: A Research Summary

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THE POST CONVICTION Risk Assessment (PCRA) is a correctional assessment tool used by federal probation officers that identifies offenders most likely to commit new crimes and the criminogenic characteristics that, if changed, could reduce the likelihood of recidivism. Implementation of the PCRA allows federal probation officers to measure whether the criminogenic factors of offenders are changing over time and the relationship of these changes to subsequent reoffending behavior. We explored how changes in offender risk influence the likelihood of recidivism (i.e., arrests for either felony or misdemeanor offenses within one year after the second PCRA assessment) by tracking a sample of 64,716 offenders placed on federal supervision. The study found that many offenders initially classified at the highest risk levels moved to a lower risk category in their second assessment and that offenders tended to improve the most in the PCRA risk domains of employment and substance abuse.

The study also found that high, moderate, and low-moderate risk offenders witnessing decreases in either their risk classifications (i.e., going from high to moderate risk) or overall PCRA scores (i.e., going from 18 to 15 points) were less likely to recidivate compared to their counterparts whose risk levels or scores remained unchanged or increased. Conversely, increases in offender risk were associated with higher rates of arrests irrespective of whether the increase in risk involved higher risk levels or overall PCRA scores. For the most part, offenders with decreasing scores in any of the dynamic risk domains were consistently less likely to be rearrested. Finally, offenders in the lowest risk category saw no recidivism reduction if either their overall score or the score of any of their risk domains decreased.

This is a synopsis of key findings from our study examining federally supervised offenders with multiple PCRA assessments, which was published in the journal *Criminology and Public Policy* (Cohen et al., 2016). The PCRA is a dynamic fourth-generation risk assessment tool that predicts an offender's likelihood of recidivism at multiple time points. This instrument identifies offenders who are most likely to recidivate, ascertains crime-supporting characteristics that will benefit from supervision intervention, and provides information on barriers to successful offender re-integration and/or treatment (AOUSC, 2011).

With the implementation of the PCRA, we can for the first time investigate how much the risk levels of offenders are decreasing between assessments, which risk domains are most likely to get better, and whether offenders with declining risk levels are being arrested less frequently compared to their counterparts with stable or increasing risk levels. These issues are explored in this study using a sample of federally supervised offenders with multiple PCRA assessments. Before discussing this study's findings and implications, we briefly provide an overview of the PCRA risk tool, discuss previous research on the PCRA's capacity to assess change in offender recidivism risk, and detail the methodological approaches utilized in this study.

Using the PCRA to Examine Changes in Offender Risk

The PCRA is a dynamic risk assessment instrument that was developed for United States probation officers (Johnson, Lowenkamp, VanBenschoten, & Robinson, 2011; Lowenkamp, Johnson, VanBenschoten, Robinson, & Holsinger, 2013). The instrument uses five general domains that have been shown to be both theoretically and statistically predictive of offender recidivism: criminal history, education/employment, substance abuse, social networks, and cognitions (i.e., attitudes towards supervision) (Johnson et al., 2011; Lowenkamp et al., 2013). The PCRA has been shown to be highly predictive of whether an offender will reoffend after the

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commencement of his or her supervision term. For details of studies describing the construction and validation of the PCRA, see Johnson et al. (2011), Lowenkamp et al. (2013), and Lowenkamp, Holsinger, and Cohen (2015).

Although the predictive utility of the PCRA has been demonstrated, we have only recently begun exploring how this instrument can measure changes in offender risk over multiple assessments and observe how changes in risk are correlated with subsequent recidivism activity. A follow-up PCRA validation study conducted by Lowenkamp et al. (2013) found that offenders whose risk classification increased were more likely to recidivate compared to their counterparts with stable or decreasing risk classifications. In a more recent publication, Cohen and VanBenschoten (2014) found that many offenders initially classified at the highest risk levels moved to a lower risk category in their second assessment and that offenders experiencing improvements in their risk levels were less likely to have their supervision terms revoked compared to offenders with stable or increased risk classifications.

Method

Study Population

We began our inquiry by obtaining data on all offenders within the federal probation system who received an initial PCRA assessment between August 1, 2010, and October 15, 2012.[1] This data extract resulted in us obtaining information on 107,754 offenders with at least one PCRA assessment. From this population of 107,754 offenders, we excluded 43,038 offenders who were not reassessed during the study time frame. Offenders may not receive reassessments for numerous reasons. For instance, prior to the next assessment, they may be revoked, receive an early or successful termination, or be placed on administrative supervision involving minimal officer contact. Ultimately, an offender's initial risk classification influences the type of disposition that might occur before the next assessment. For example, nearly three-fifths of low-risk offenders without second assessments were successfully terminated from supervision before their next assessment, while similar percentages of high-risk offenders were revoked from supervision before receiving their next assessment (see Appendix Table 1).[2] The fact that sizable numbers of offenders with one assessment were never reassessed is intrinsic to most studies examining the relationship between changes in risk characteristics and recidivism (Howard & Dixon, 2013), and illustrates the point that these findings are applicable only to those offenders who received at least two PCRA assessments in our study time frame.

From the initial extract of 107,754 offenders, 64,716 received at least two PCRA assessments between August 2010 and October 2013, which represents the time we stopped tracking these offenders. We used the PCRA assessment rather than the actual supervision start date to anchor this study because when the PCRA was rolled out, PCRAs were done on offenders who may have been well into their supervision term. We decided not to restrict our study population to offenders with short time periods between their supervision start and PCRA assessment dates because we were focused on examining the relationship between changing PCRA risk scores and recidivism irrespective of how long the offender had been on supervision.

The PCRA assessments and re-assessments were conducted as part of the operational supervision duties of federal probation officers. An average of nine months separated the first from the second PCRA assessment. Descriptive information about the study population is provided in Table 1. This table shows that 85 percent of offenders in the study were sentenced to a term of supervised release, meaning that they had finished an incarceration term with the Federal Bureau of Prisons; the remainder had been sentenced directly to a term of probation. According to the PCRA, 78 percent of offenders with at least two PCRA assessments were initially classified as either low (34 percent) or low/moderate (44 percent) risk, while 18 percent were moderate and 5 percent were high risk. A combined 76 percent of offenders examined were either non-Hispanic whites (38 percent) or blacks (38 percent), while another 19 percent were Hispanic. Over four-fifths were male and the average age was 40 years.

TABLE 1.
Characteristics of federally supervised offenders in study sample

Offender characteristics	Descriptive information
Initial PCRA risk classification	
Low	**34%**
Low/Moderate	**44%**
Moderate	**18%**
High	**5%**
Supervised release	**85%**
Offender race and ethnicity	
American Indian or Alaska Native	**2%**
Asian or Pacific Islander	**3%**
Black or African American	**38%**
Hispanic, any race	**19%**
White, not Hispanic	**38%**
Male offender	**82%**
Mean age	**40.1**
Number of offenders	**64,716**

Assessing Change in Offender Risk

The PCRA Scoring Mechanism

Understanding the PCRA scoring mechanism is essential to comprehending how change in risk is measured. Federal probation officers assess an offender's risk of recidivating by scoring offenders on 15 static and dynamic risk predictors. The 15 scored risk predictors can be aggregated into five domains.[3] The first of these involves an offender's criminal history. The criminal history domain is static and includes six risk predictors measuring an offender's prior criminal behavior (AOUSC, 2011). The remaining four PCRA domains assess an offender's dynamic criminogenic characteristics in the areas of education/employment (3 predictors), substance abuse (2 predictors), social networks (3 predictors), and supervision attitudes (1 predictor) (AOUSC, 2011; Johnson et al., 2011; Lowenkamp et al., 2013).

[1] We excluded initial PCRA assessments that occurred after October 2012 because at the time these data files were generated our recidivism measures tracked offenders until October 2013. Obtaining initial PCRA assessments that occurred after October 2012 would not have allowed for sufficient follow-up time between the second PCRA assessment and arrest outcomes.

[2] See Appendix Table 1 comparing the risk characteristics and outcomes of offenders with one versus multiple PCRAs.

[3] This paper only covers changes in the scored PCRA items. For further information about the non-scored PCRA items, see the AOUSC's report that summarizes the PCRA risk tool (AOUSC, 2011).

Of the 15 scored PCRA risk predictors, 13 are assigned values of one, if present, or otherwise zero. The two exceptions are the criminal history factors of prior arrest (3 potential points) and age at intake (2 potential points). In theory, offenders can receive a combined PCRA score ranging from 0 to 18. Of the 18 possible points on the PCRA, nine points appear in the dynamic sections and can be changed. These continuous scores translate into the following four risk categories: low (0-5 points), low/moderate (6-9 points), moderate (10-12 points), or high (13 or more points).[4] These risk categories inform officers about an offender's probability of recidivating and provide guidance on the intensity of supervision that should be directed to a particular offender (AOUSC, 2011; Johnson et al., 2011; Lowenkamp et al., 2013).

How We Measured Change in PCRA Risk Between Two Time Points

In this study, we operationalize changes in an offender's PCRA risk classification through three approaches. First, we explore changes in risk classification by examining the proportion of offenders in each risk category who, at their second assessment, either remained in the same risk category or were reclassified into a higher or lower risk category. Next, we calculate actual point changes in PCRA scores between assessments. Specifically, we subtracted the overall second score from the overall first score to measure how many offenders experienced a one, two, or three or more point increase or decrease in their total score by the next assessment.[5] Last, we explored the percentage of offenders witnessing either a higher or lower score in any of the dynamic domains of education/employment, substance abuse, social networks, or supervision attitudes. Through these approaches, we explore the extent to which change in risk is associated with higher or lower recidivism outcomes.

Measuring Recidivism Outcomes

Recidivism is our primary outcome measure. Recidivism is defined as an arrest for either a felony or misdemeanor offense within one year after the second assessment date. We standardized the follow-up times by tracking only those offenders whose arrest behavior could be observed for 12 months or more after the second assessment. The arrest event was counted only if they were arrested within 12 months after their second PCRA. This standardization resulted in the study sample being reduced from 64,716 to 32,647 offenders. Tracking the study sample within the same uniform time frame allows us to overcome a problem inherent in many recidivism studies where some offenders are followed for longer time periods than others.[6]

Analytical Objectives

By measuring change in offender risk and analyzing the relationship between changes in risk and arrest outcomes, we can address the following research issues.

- What percent of offenders are reclassified from a higher to lower PCRA risk category between assessments or vice versa, and what is the relationship between changes in risk categories and rearrest?
- How many offenders experience a 1, 2, or 3 or more point increase or decrease in their total PCRA scores between assessments, and to what extent are changes in the total PCRA risk scores associated with rearrest?
- Which of the dynamic PCRA domains are most amenable to change, and how is rearrest related to increased or decreased domain scores? For example, does getting a job reduce the probability of arrest to the same extent as obtaining support from a network of prosocial friends or mentors?

Results

Changes in PCRA Risk Classifications, Overall Risk Scores, and Domains

Figure 1 depicts the percent of offenders moving from one risk classification to another between their first and second PCRA assessments by initial risk classification. This figure indicates that many high-risk offenders improve by moving to a lower-risk level by their next assessment. Among offenders initially classified as high risk, 38 percent moved to a lower-risk category in their second assessment; moreover, 27 percent of moderate-risk offenders were reclassified into a lower-risk group at their second assessment. Although not shown, most offenders reclassified to a lower risk level move down only one level (e.g., high to moderate risk). Ninety-two percent of the low-risk offenders and 84 percent of the low/moderate risk offenders demonstrated stability in risk (no change). Further, only seven percent of the low/moderate risk offenders demonstrated a reduction in risk.

Figure 2 focuses on changes in the overall PCRA risk scores and analyzes these changes by an offender's initial risk classification. Unlike Figure 1, this figure shows the percentage of offenders with a 1, 2, or 3 or more point increase or decrease in their total risk scores. In general, the total scores improved the most for high- and moderate-risk offenders. For example, 50 percent of high- and 41 percent of moderate-risk offenders saw reductions by 1 or more points between assessments. Smaller percentages of low-moderate and low-risk offenders have reductions of a point or more in their scores at 25 percent and 13 percent, respectively.[7] The percentage of offenders with increasing scores did not differ as much among the risk categories. For example, the percent of offenders with increasing scores ranged from 17 percent for high-risk to 22 percent for low-moderate and moderate-risk offenders.

Figure 3 presents information on the percentage of offenders with an increase, decrease, or stable score for each of the PCRA domains. Information on the fluctuations in domain scores is analyzed by the offender's initial risk classification. This figure shows the domain of education/employment being the most amenable to change. This was especially the case for offenders in the high-risk category. For instance, 35 percent of high-risk offenders witnessed improvements in their education/employment scores, while 24 percent and 21 percent saw improvements in their substance abuse and social network scores. Similar to the high-risk population,

[4] We note that the PCRA is currently undergoing a revision which will involve the integration of a violence assessment into the instrument and result in offenders being placed into 12 different risk groups. At the time of this study, the revised PCRA had not yet been implemented; hence, we continue anchoring our offender population into the four risk groups discussed above.

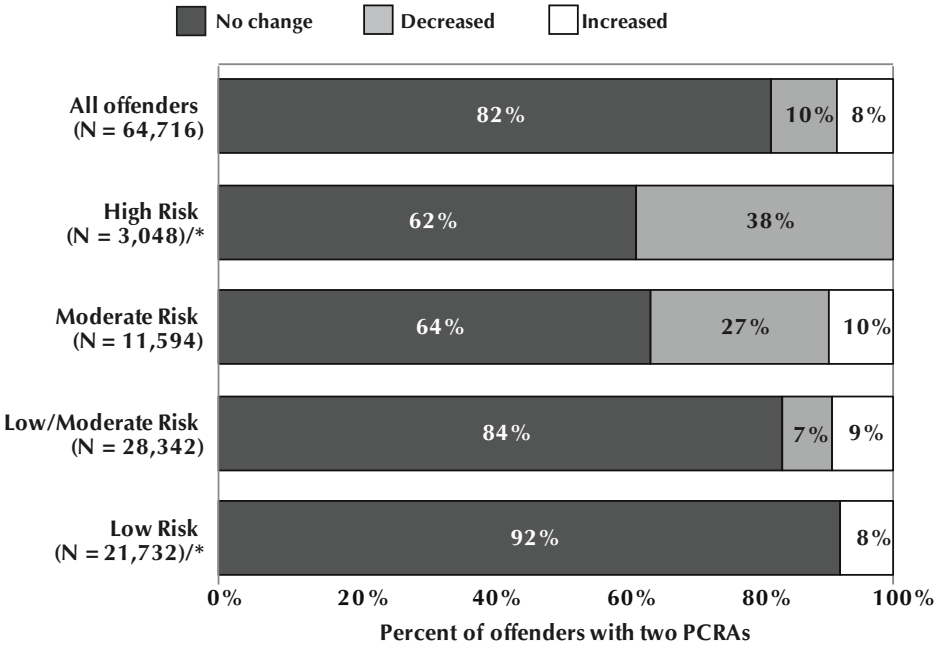
[5] Changes in PCRA scores above or below +/– 4 points were recoded into +/-3 points, as relatively few offenders saw their PCRA scores increase or decrease by 4 or more points.

[6] Although we were unable to track the reoffending behavior for about half of the 64,716 offenders with at least two PCRA assessments, we compared the PCRA risk factors for both groups of offenders using cross tabulations and chi-square tests and for the most part, found negligible differences in their risk characteristics.

[7] The percentage of offenders demonstrating a one point or greater reduction in risk is calculated by adding up the percentages that demonstrated one, two, or three or more point decreases. For example, 19 percent of high-risk offenders demonstrated a one-point decrease in risk, 14 percent a two-point decrease, and 17 percent a three or more point decrease. Adding these three values together equals 50 percent.

FIGURE 1.

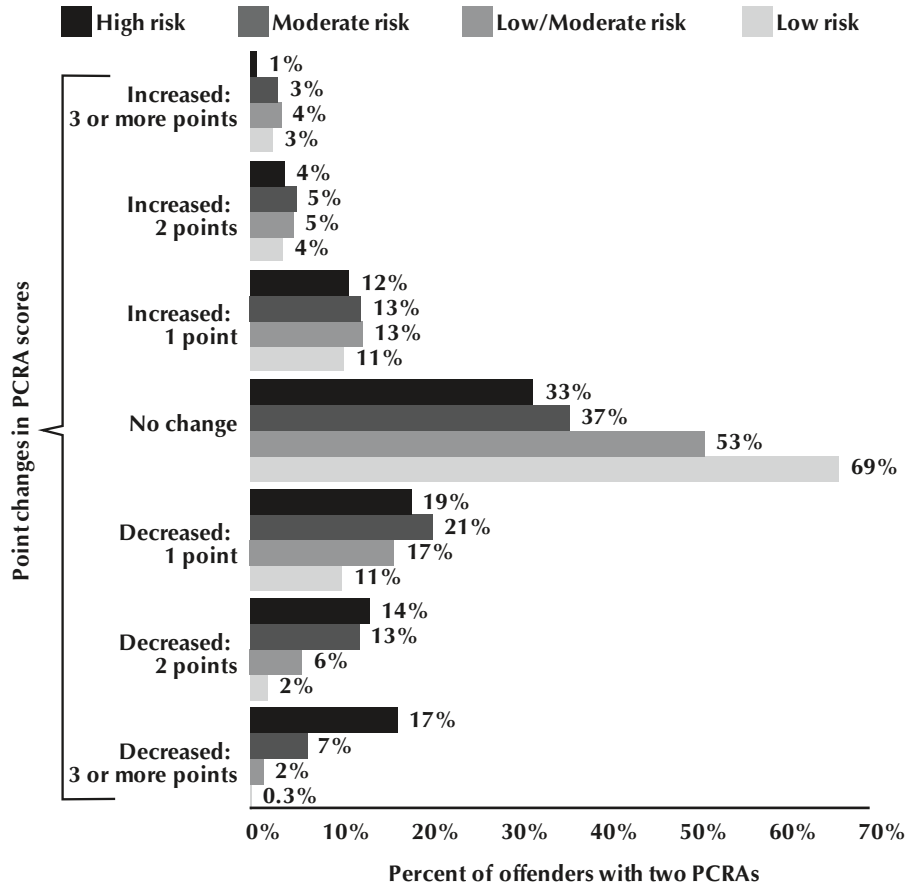
Changes in risk classification levels for offenders with at least two PCRAs, by initial risk classification



Note: *Offenders with the lowest PCRA risk classification cannot receive a decrease in their PCRA risk level and offenders in the highest risk classification cannot receive an increase in their risk level.

FIGURE 2.

Point changes in PCRA scores for offenders, by initial risk classification



moderate-risk offenders witnessed the most change in their education/employment scores. Thirty percent of moderate-risk offenders recorded improvement (decreases) in the education/employment score; in comparison, the percentage of moderate-risk offenders with improvements in any of the other domains did not exceed 15 percent.

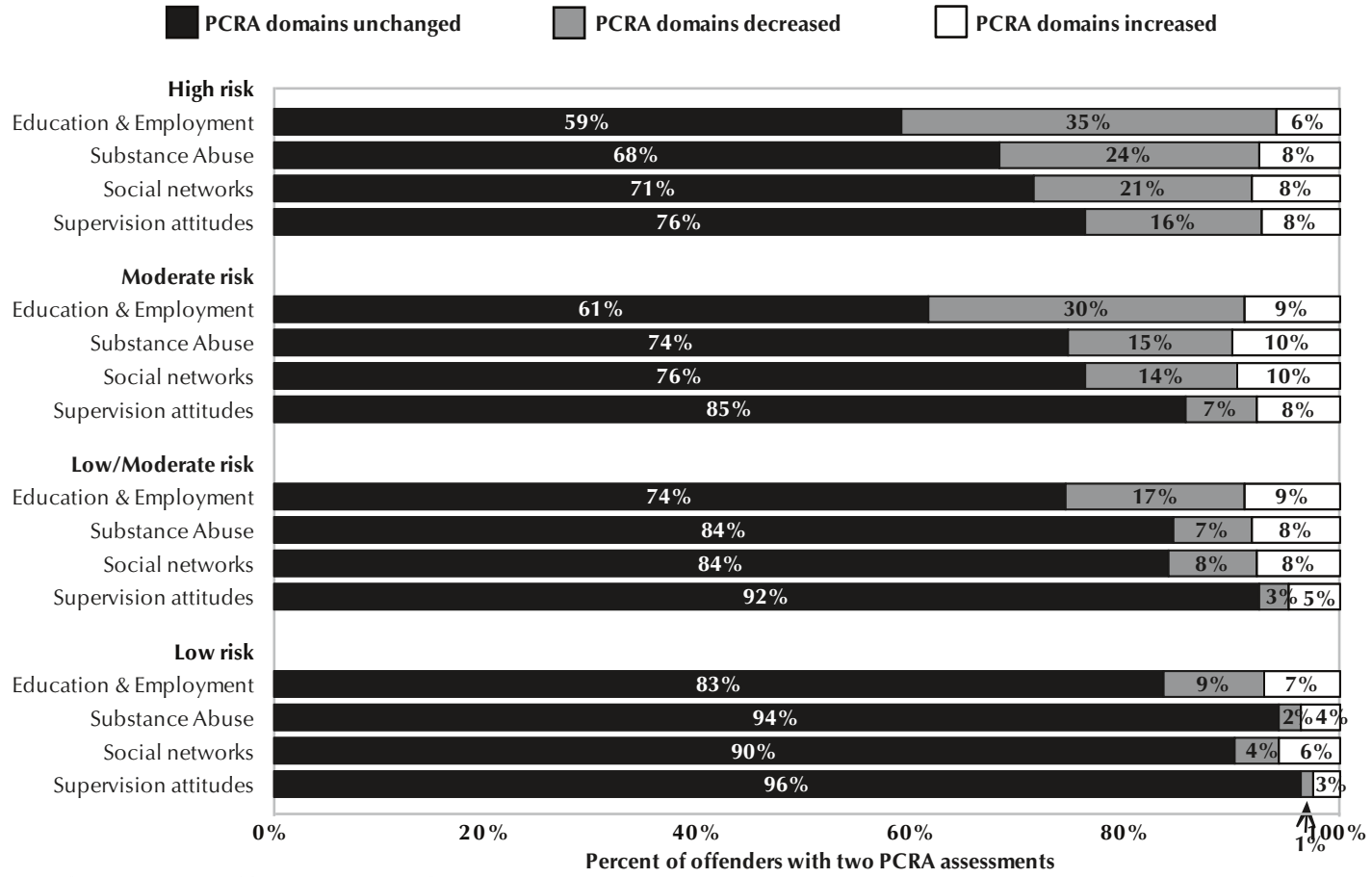
Relationship between changes in risk classification and recidivism

Figure 4 examines the relationship between changes in risk classification and arrest outcomes. Offenders with reduced risk levels were less likely to be arrested compared to offenders whose risk classifications remained unchanged or increased.[8] High-risk offenders who remained in the same risk category, for example, were one and a half times more likely to be arrested for felony or misdemeanor offenses (49 percent) compared to high-risk offenders with lowered risk classifications (33 percent). Among moderate-risk offenders, 49 percent were arrested if their risk classification increased and 30 percent had an arrest if their risk classification remained unchanged; however, for those moderate-risk offenders with a decrease in their risk levels, 18 percent were arrested for a new offense. The same pattern of reduced risk levels being associated with lower arrest rates and increasing risk classifications being associated with higher arrest rates also held for low-moderate and low-risk offenders.

The relationship between changes in the total scores—intra-risk category—and arrest outcomes is investigated in Figure 5. One major finding for high- and moderate-risk offenders is that larger decreases in risk scores were associated with more substantial declines in the likelihood of arrest compared to smaller decreases. For example, high-risk offenders with a reduction in risk of 3 or more points had a lower arrest rate (28 percent arrested) than high-risk offenders with a 1 point reduction in their total risk score (44 percent arrested). In fact, moderate- and high-risk offenders with 1 point reductions in their total scores were arrested at rates that were relatively similar to their counterparts whose scores were unchanged between the assessment periods. Another finding involves the interplay between reduced scores and arrest rates for low-moderate and low-risk offenders. Reductions in the risk score

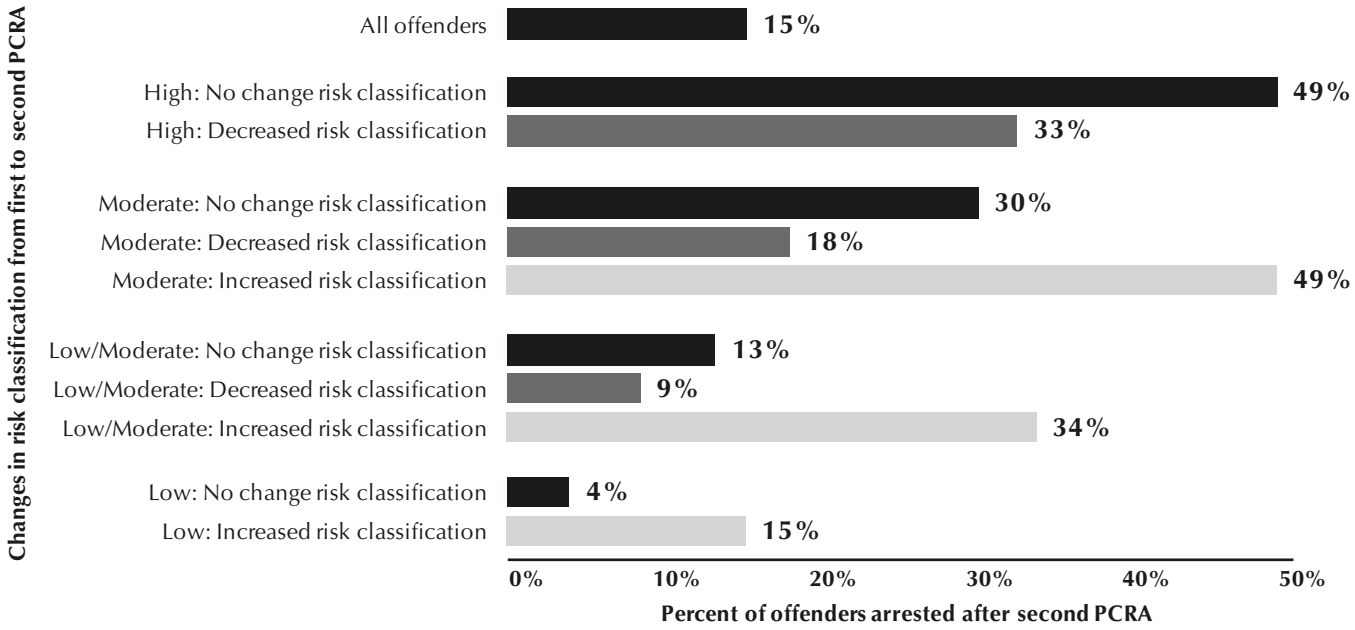
[8] For the recidivism section of this paper (Figures 4, 5, and 6), offenders were counted as arrested if they received new arrests for felony or misdemeanor offenses within 12 months of the second PCRA assessment.

FIGURE 3.
Changes in individual PCRA domains for offenders between first and second assessments, by initial risk classification



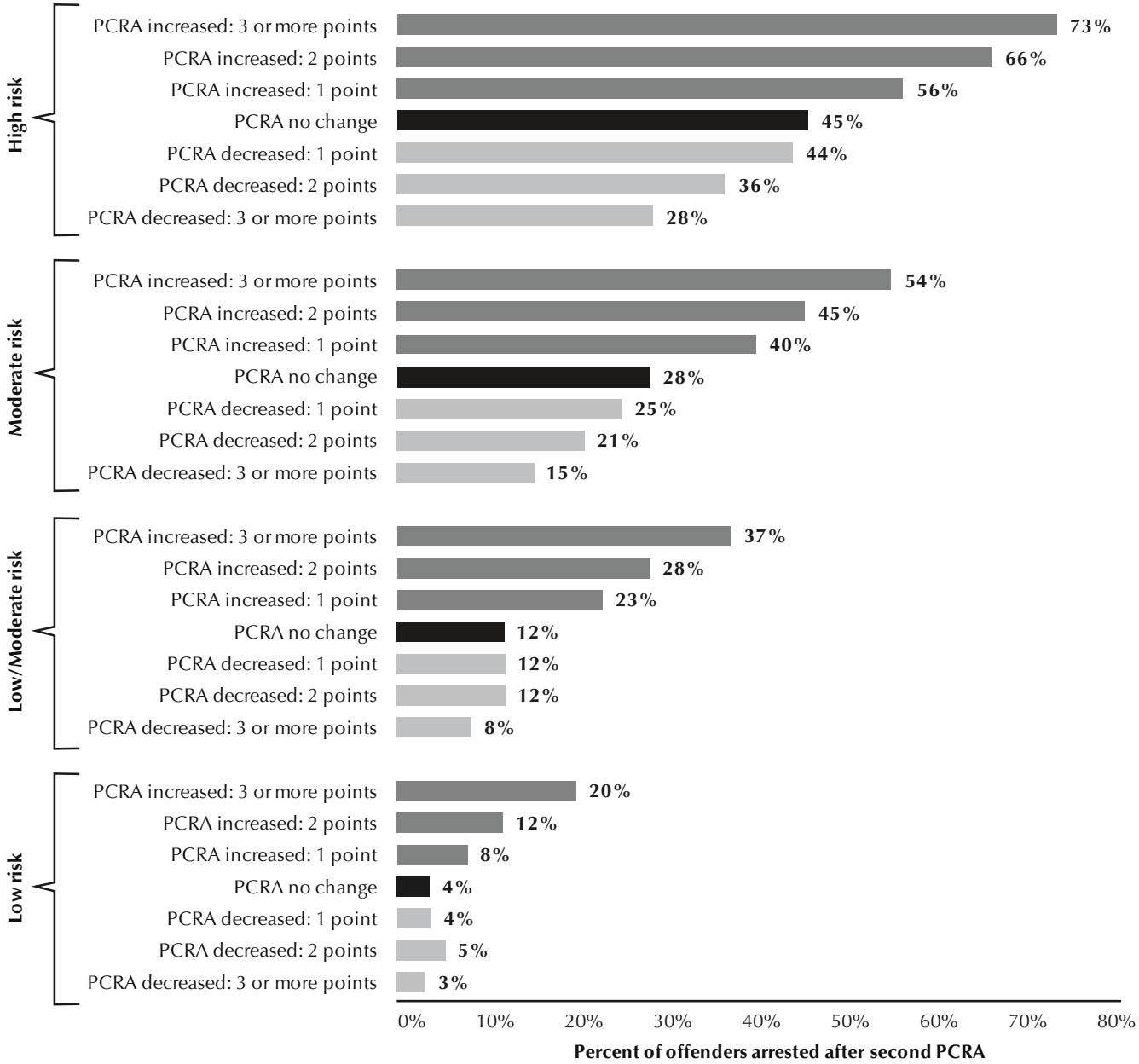
Note: Changes in criminal history scores not shown.

FIGURE 4.
Relationship between changes in PCRA categories and offender arrest outcomes, by initial risk classification



Note: Figure tracks a subset of offenders followed for at least one year after their second PCRA.
Changes represent re-classification of offenders into different risk categories.

FIGURE 5.
Relationship between changes in PCRA scores and arrest outcomes, by initial risk classification



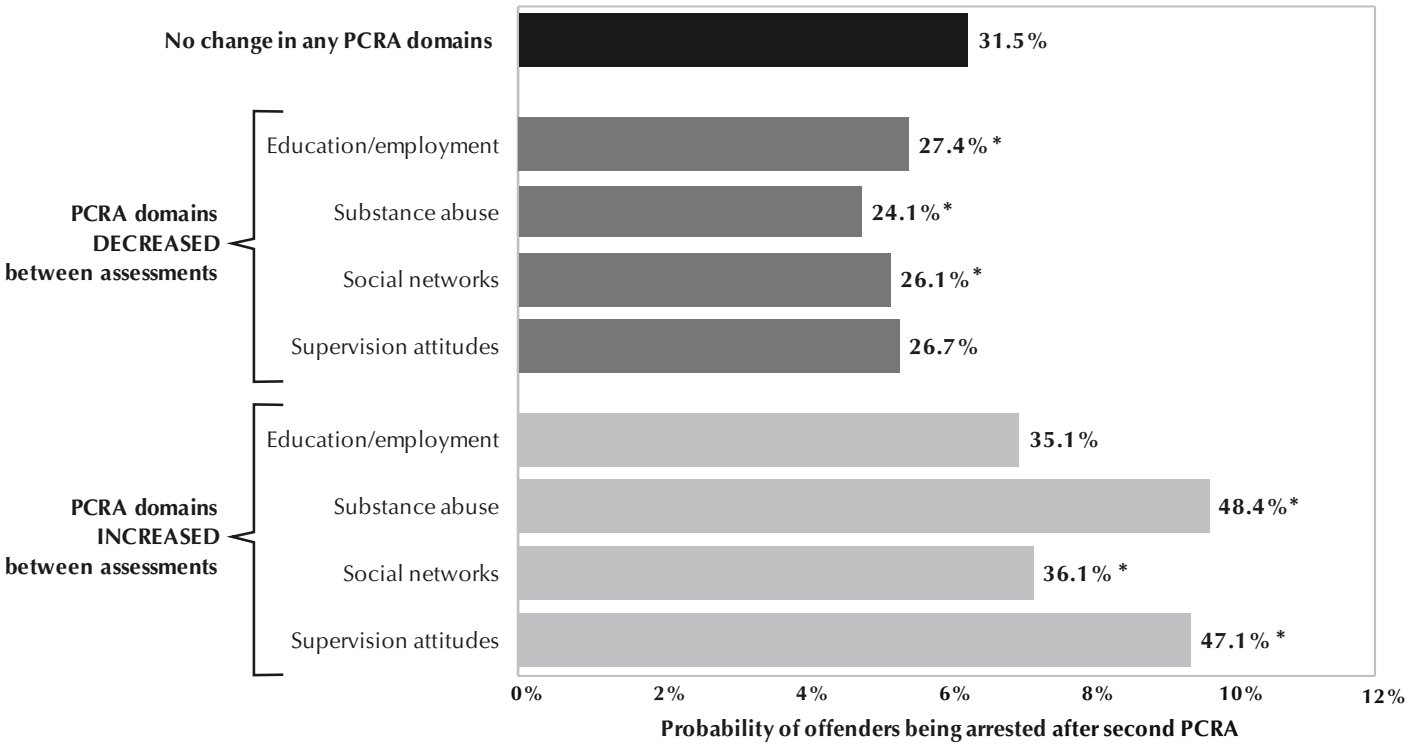
for low and low-moderate risk offenders were not consistently associated with appreciable reductions in arrest rates. This was especially the case for low-risk offenders, whose arrest rates were essentially the same regardless of whether the overall PCRA score improved by 1, 2, or 3 or more points.[9]

Increasing risk scores were associated with higher arrest rates across risk categories. For example, low-risk offenders with a 3 or more point increase in their score had an arrest rate that was almost double that of low-risk offenders with a two-point increase in risk. Finally, it is important to acknowledge that even a one-point increase of the PCRA score was associated with substantial increases in the likelihood of arrest throughout the risk continuum.

A final component of this analysis examines the relationship between offenders with increasing or decreasing PCRA domain scores and rearrests. We examine this by calculating the predicted probabilities of arrest within 12 months after the second assessment for male offenders in the combined high/moderate-risk categories (see Figure 6) and in the low-risk category (see Figure 7). These predicted probabilities were generated through a statistical technique (logistic regression) that allows us to examine the relationship between changes in the individual PCRA domains and recidivism while holding constant other factors that might be correlated with arrest outcomes. For example, we can use this approach to explore the individual contribution of decreased substance abuse scores to recidivism reduction while keeping the other domains unchanged and controlling for other factors such as initial PCRA baseline scores and race/ethnicity. In the predicted probability analysis, we compare arrest probabilities for offenders with increased or decreased scores to

[9] Subsequent regression analyses showed no statistically significant differences between the odds of arrest for high- and moderate-risk offenders with unchanging vs. one-point reductions in their PCRA scores. Offenders with improving PCRA scores of two or more points, however, were significantly less likely to be arrested compared to offenders with no changes in their PCRA scores.

FIGURE 6.
Predicted probability of arrest for all male high and moderate risk offenders with increased or decreased PCRA domain scores



Significant differences are noted by an asterisk.
Note: Figure only shows variation in predicted probability of arrest by changes in the PCRA domain scores. Other variables in model not shown.
* $p < .05$

offenders with no changes in their scores.

Figure 6 shows that 32 percent of high/moderate-risk male offenders with no changes in their PCRA domains were predicted to have an arrest within 12 months of their PCRA re-assessment. In comparison, high/moderate-risk offenders with decreased domain scores, for the most part, were significantly less likely have a new arrest. For example, high/moderate-risk male offenders with decreased education/employment, substance abuse, and social network scores had an arrest likelihood ranging from 24 percent to 27 percent.[10] Since the predicted arrest probabilities associated with improvement in education/employment, substance abuse, and social networks were relatively similar, one cannot discern that decreases in one domain resulted in greater reductions in the likelihood of arrest than decreases in another domain.

Increased substance abuse and supervision attitude scores were more closely related to an offender's arrest probability than increased education/employment and social network scores. For instance, nearly half of high/moderate-risk offenders with worsening substance abuse (48 percent arrest probability) or supervision attitude (47 percent arrest probability) scores were predicted to be arrested within 12 months after the second PCRA assessment. Among high/moderate-risk offenders with job losses or weakening social networks, arrest probabilities were 35 percent and 36 percent, respectively. [11]

Figure 7 shows the predicted probabilities of arrest for low-risk male offenders. Unlike higher-risk offenders, low-risk offenders with improving PCRA scores did not witness significant reductions in their arrest probabilities. For example, the predicted probability of low-risk male offenders with decreased domain scores being rearrested was about 3 percent. Low-risk male offenders with no changes in their PCRA domains, in comparison, had a predicted arrest probability of 4 percent. For low-risk offenders with worsening PCRA domain scores, deteriorations in substance abuse or supervision attitudes resulted in higher arrest probabilities than those of offenders with increasing education/employment and social network scores.

Policy Implications

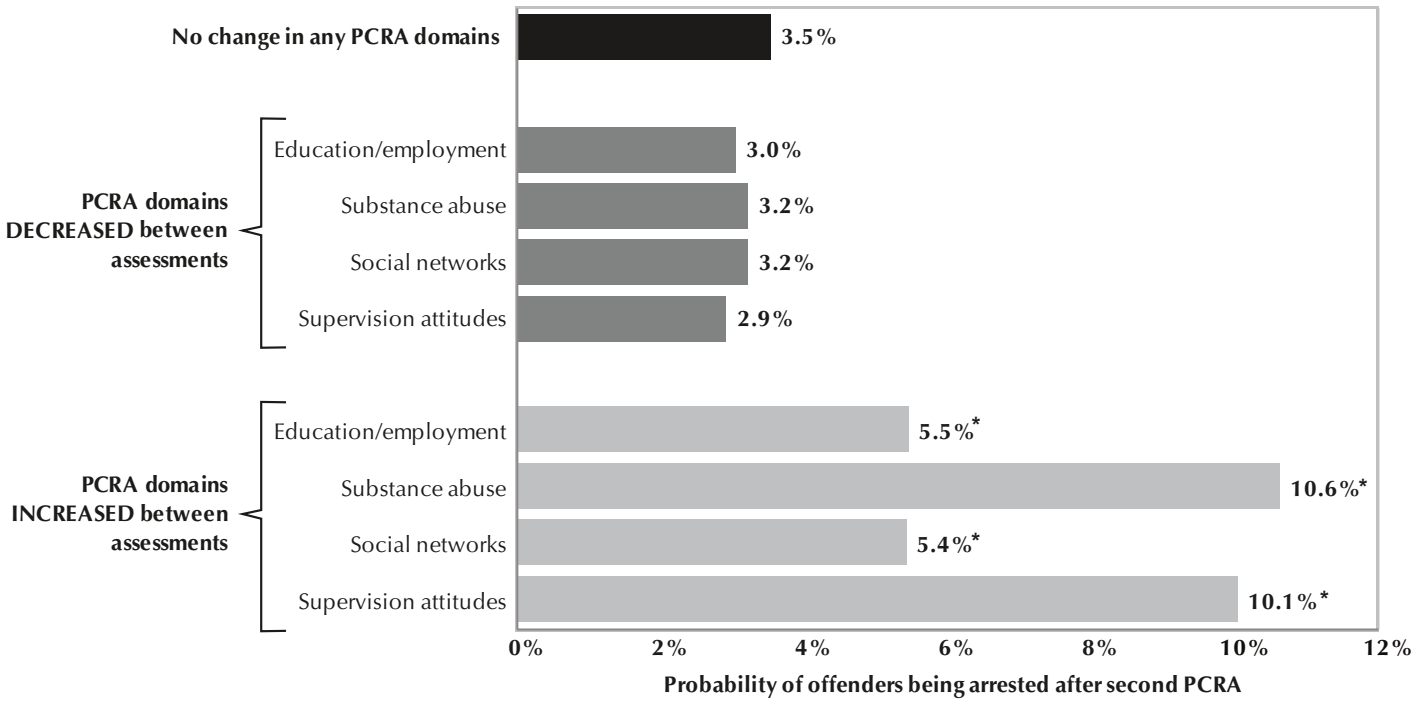
This analysis provides officers with information about how changes in offender risk levels can influence the likelihood of arrest. It clearly shows that low-moderate, moderate-, and high-risk offenders on federal supervision with decreased risk classifications were less likely to recidivate compared to their counterparts whose risk level either remained unchanged or increased. Conversely, higher recidivism rates were associated with increases in offender risk across all risk categories. These findings are consistent with the risk principle of the risk, needs, and responsivity (RNR) model that suggests officers reduce the intensity of supervision services to offenders with decreasing risk levels once those decreases have stabilized (Andrews & Bonta, 2010). Alternatively, probation officers should pay closer attention and intensify supervision

[10] While improving supervision attitude scores were also associated with reduced arrest probabilities, the effect was not significantly different compared to offenders with no changes in their PCRA domain scores.

[11] Although not shown, we found somewhat similar patterns between improving and worsening PCRA domain scores and recidivism outcomes for low-moderate risk offenders. The only notable differences were that improving education/employment scores had no significant relationship to arrest, while improving supervision attitude scores were significantly related to arrest outcomes for these offenders.

FIGURE 7.

Predicted probability of arrest for all male low risk offenders under federal supervision with increased or decreased PCRA domain scores



Significant differences are noted by an asterisk.
Note: Figure only shows variation in predicted probability of arrest by changes in the PCRA domain scores. Other variables in model not shown.
* $p < .05$

services for those offenders reclassified into higher risk levels.

We also show that offenders in the high- and moderate-risk categories were less likely to be rearrested if they demonstrated improvements in their substance abuse, social networks, or education/employment domains, while offenders in the low-moderate risk category were arrested less frequently when their substance abuse, social networks, or supervision attitude scores improved. Based on these findings, we cannot make any recommendations on which PCRA domain to target first for intervention. Our research suggests that ameliorating any existing domain should reduce recidivism and that decisions about what should be targeted first should be individualized to the offender. Our findings also suggest that the lowering of an offender's overall PCRA score by several points reduces the likelihood of recidivism to a greater extent than a one-point reduction.

For offenders with increasing PCRA scores, we show that increasing risk scores of any magnitude were related to higher arrest likelihoods. Moreover, the most significant increases in recidivism occurred for offenders with higher substance abuse and supervision attitude scores. These findings suggest that probation officers consider paying close attention to offenders with any increases in their overall PCRA scores, with particular emphasis on those whose substance abuse or supervision attitudes showed signs of worsening.

Finally, the lowest-risk offenders did not benefit from reductions in their domain scores. To reiterate, decreasing PCRA domain scores were not associated with reduced arrest probabilities for offenders in the lowest risk category. This finding is highly consistent with the risk principle, which advocates expending time and resources on the highest-risk offenders (Andrews, Bonta, & Hoge, 1990). Specifically, probation officers should carefully consider whether to provide resources and services to low-risk offenders who do not seem to benefit from efforts aimed at reducing their criminal risk factors (Vose, Smith, & Cullen, 2013). At the same time, these findings indicate that officers should monitor low-risk offenders and respond accordingly if increases in risk are seen.

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APPENDIX TABLE 1.
Comparing scored PCRA characteristics and case outcomes for offenders placed on federal supervision with one vs. multiple PCRAs, by initial risk classification

	High risk		Moderate risk		Low/Moderate risk		Low risk	
Descriptive statistics	**Two PCRAs**	**One PCRA**	**Two PCRAs**	**One PCRA**	**Two PCRAs**	**One PCRA**	**Two PCRAs**	**One PCRA**
Disposition after first PCRA								
Case still open	50%	22%	62%	29%	66%	31%	65%	37%
Successful termination	11%	18%	16%	34%	24%	56%	31%	61%
Revocation	39%	60%	22%	38%	10%	13%	3%	2%
Mean initial PCRA scores								
Criminal History	7.33	7.32	6.55	6.50*	5.02	5.01	1.81	1.74*
Education & Employment	2.52	2.52	1.87	1.84*	1.06	1.03*	0.55	0.50*
Substance Abuse	1.11	1.05*	0.56	0.54*	0.22	0.19*	0.07	0.04*
Social networks	2.24	2.34*	1.58	1.66*	1.10	1.10	0.72	0.66*
Supervision attitudes	0.52	0.63*	0.21	0.28*	0.08	0.09*	0.04	0.03*
Number of offenders	3,048	2,066	11,594	5,955	28,342	14,887	21,732	20,130

Note: *T-test of mean differences denotes significant difference at the .05 level.