# The Effects of the Timing and Dosage of Correctional Programming on Recidivism

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## Research Summary

This study examined the effects of program timing and duration on recidivism outcomes among 1,879 offenders released from Minnesota prisons in 2005. The point at which prisoners entered programming did not have a significant effect on recidivism. Earlier involvement in interventions, however, significantly increased programming dosage, which was, in turn, associated with better recidivism outcomes. Significant findings were observed for the point at which prisoners exited programming, particularly in relation to the overall length of their imprisonment. In general, recidivism was significantly lower when prisoners exited programming closer to their release from prison.

## INTRODUCTION

In the wake of the infamous conclusion drawn in the 1970s that "nothing works" (Martinson, 1974), a sizeable body of research emerged to show there are correctional interventions that are effective in reducing recidivism. Now known as the "what works" literature, the accumulating evidence on the effectiveness of correctional programming led to the development of the principles of effective correctional intervention and, more narrowly, the risk-needs-responsivity (RNR) model. The RNR model, which has been increasingly embraced by correctional systems within the U.S., identifies who should be treated (risk), what areas should be treated (needs), and how treatment should be delivered (responsivity) (Andrews, Bonta, and Wormith, 2006).

Because correctional resources are often scarce, the risk principle suggests we can get the most bang for our treatment buck by focusing on higher-risk offenders. While the needs principle holds that interventions which target criminogenic needs (dynamic risk factors) are more likely to decrease recidivism because changes can be made in these factors, the responsivity principle proposes that programming should be tailored to the learning styles, abilities, and strengths of offenders (Andrews, Bonta, and Wormith, 2006). One of the main goals, then, under the RNR model is to direct offenders to effective programming based on assessments of their recidivism risk and criminogenic needs (Andrews and Bonta, 2010). By providing offenders with evidence-based interventions that addresses their criminogenic needs, correctional agencies can presumably help increase public safety through a reduction in recidivism.

Yet, amid the growing consensus that there are correctional programs that "work", more specific, higher-level questions have arisen—what works best for whom? And under

what circumstances are interventions more effective? Indeed, the literature suggests the timing and duration of correctional interventions may have important implications for the effectiveness of programming. For example, the timing concept implies the effectiveness of an intervention hinges, at least in part, on when it is delivered to offenders. The prisoner reentry literature has maintained the reentry process should begin as soon as individuals enter prison (Duwe, 2012; La Vigne, Davies, Palmer, and Halberstadt, 2008), which would entail early involvement in programming. Still, some research suggests that programming may be more beneficial if individuals participate in an intervention toward the end of their confinement period, as opposed to the beginning of their incarceration (Bales and Mears, 2008; Duwe and Clark, 2013; Scaggs, Bales, Clark, Ensley, Coltharp, and Blomberg, 2016).

The findings from existing research posit that the duration of treatment should be calibrated to an individual's recidivism risk. More specifically, the literature indicates longer, more intensive interventions should be reserved for higher-risk offenders (Lowenkamp, Latessa, and Holsinger, 2006; Sperber, Latessa, and Makarios, 2013). Nevertheless, prior research also shows that more programming does not always lead to better outcomes, for there is a point at which longer durations of treatment can produce diminishing returns (Duwe, 2010; Wexler, Falkin, and Lipton, 1990).

The present study explores the importance of the timing and duration of correctional programming on recidivism outcomes among a sample of Minnesota prisoners released in 2005. The sample for this study is derived from a larger recidivism study carried out by the Bureau of Justice Statistics (BJS) on a sample of 68,597 released prisoners selected to represent the 404,638 prisoners released in 2005 from 30 states (Durose, Cooper, and Snyder, 2014). Of the nearly 70,000 sampled prisoners in the BJS dataset, 1,879 were offenders

released from Minnesota prisons. To examine the effects of the timing and duration of correctional programming on recidivism, this study combines the criminal history and recidivism data from the BJS dataset on the 1,879 Minnesota prisoners with correctional programming data on these offenders from the Minnesota Department of Corrections (MnDOC).

## Prior Research on the Timing and Dosage of Correctional Programming

Among the few prior studies that have examined whether timing matters for programming, the results suggest that interventions taking place closer to an individual's release from prison tend to have a greater impact in reducing recidivism. In addition to possibly reflecting the benefits of a continuum of care from prison to the community, shorter intervals between program exits and release dates may help better preserve the positive effects of programming. Although prison visitation is seldom considered a type of correctional programming, it is an intervention that has been associated with reduced recidivism. By providing prisoners with pro-social support, prison visitation presumably addresses anti-social peers—a major criminogenic need. Prior studies from Florida (Bales & Mears, 2008) and Minnesota (Duwe & Clark, 2013) have found that visits closer to prisoners' release dates exerted a greater influence in reducing reoffending.

More recently, in an evaluation of a substance abuse treatment program for Florida prisoners, Scaggs et al. (2016) examined the timing of program completion to release from prison. Overall, Scaggs and colleagues (2016) reported that substance abuse treatment significantly lowered recidivism. Focusing on the length of time between treatment completion and release from prison, Scaggs et al. (2016) found significantly better recidivism

outcomes for one of the treatment modalities they examined when participants completed the program closer to their date of release.

The Scaggs et al. (2016) evaluation also looked at the effects of program duration on recidivism outcomes. In general, they found that the more time prisoners spent in substance abuse treatment did not significantly reduce recidivism. To some extent, this finding dovetails with prior evaluations that have examined the relationship between dosage and recidivism for substance abuse treatment programming. In their evaluation, Wexler, Falkin, and Lipton (1990) reported that as time in a substance abuse treatment program increased, so, too, did the time until rearrest. But treatment participants recidivated more quickly after having been in the program longer than 12 months, which is when, according to Wexler et al. (1990), they may have become disillusioned and reduced their involvement in the program. Consistent with Wexler et al. (1990), Duwe (2010) found that increased treatment time appeared to lower the risk of recidivism, but only up to a point. Although short-term (90 days) and medium-term (180 days) programs had a statistically significant impact on all three recidivism measures, no significant effects were found for long-term (365 days) programming.

Evaluations of cognitive-behavioral therapy (CBT) programs have also examined the relationship between treatment dosage and recidivism. The findings from these evaluations, which have generally examined durations shorter than those for the substance abuse treatment evaluations discussed above, indicate that greater dosages are associated with better recidivism outcomes (Lipsey, Landenberger, & Wilson, 2007). In their study of 620 Canadian offenders, Bourgon and Armstrong (2005) examined recidivism outcomes among four different groups—1) untreated, 2) 5 weeks/100 hours of treatment, 3) 10 weeks/200

hours, and 4) 15 weeks/300 hours—who varied according to the extent to which they participated in. Bourgon and Armstrong (2005) found that as the dosage of CBT increased, recidivism decreased. Similarly, in their study on 13,676 offenders who participated in a variety of treatment programs, Lowenkamp, Latessa, and Holsinger (2006) reported better recidivism outcomes for higher-risk offenders when they received more treatment. More recently, Gentry Sperber, Latessa, and Makarios (2013) examined the relationship between hours of participation in CBT programming and recidivism risk among 689 male offenders from Ohio. For the higher-risk offenders, higher dosages of treatment yielded better recidivism outcomes.

Much of the existing literature on correctional treatment dosage has measured it as the number of hours, days, or weeks that individuals participate in an intervention. In a recent study, Duwe and Clark (2016) explored the dosage-recidivism relationship with another measure—the number of correctional interventions in which prisoners had participated. Examining more than 55,000 offenders released from Minnesota prisons, Duwe and Clark (2016) found that warehousing prisoners significantly increased recidivism. Participation in effective interventions significantly reduced recidivism, and the size of the reduction was greater for individuals who were involved in multiple effective interventions and, thus, presumably had higher dosages of programming.

The present study makes several contributions to the correctional programming literature. First, existing studies on either the timing or duration of programming have focused on participation in a single correctional intervention. Many prisoners, however, participate in more than one intervention while they are incarcerated. As detailed below, this study examines the effects of timing and duration across eleven different correctional

interventions. In doing so, the present study is the first to analyze the collective effects of timing and duration on recidivism outcomes.

Second, because it measures the collective dosage for multiple interventions, this study examines whether the overall amount of time (i.e., number of days in programing) spent in these interventions has an impact on recidivism. Moreover, the present study explores whether the proportion of a prisoner's overall imprisonment spent in correctional programming has an effect on recidivism. As a result, this study is one of the first that not only looks at whether the total number of days spent in programming affects recidivism, but also whether the percentage of confinement time involved in programming has an effect on reoffending.

Finally, prior studies on timing have focused on when prisoners end their participation in programming relative to their release from prison. In addition to investigating this issue, the present study examines when prisoners enter programming, particularly in relation to their overall confinement period. This study thus explores whether the timing for correctional program entry influences recidivism outcomes as well as the extent to which individuals participate in correctional interventions.

## DATA AND METHOD

The sample for this study is derived from a larger dataset compiled by BJS for their most recent recidivism study. As Durose et al. (2014) explain, the BJS study included 404,638 prisoners released from 30 states in 2005. Of these released prisoners, Durose et al. (2014) drew a random sample of 68,597 on whom they collected criminal history records. Of the 4,619 prisoners released from Minnesota in 2005, Durose et al. (2014) randomly selected 1,897. After excluding offenders who died during the follow-up period, national criminal

history record and recidivism information was collected on 1,879 offenders in the sample. The 1,879 offenders included in this study are thus part of the randomly drawn sample of 68,597 released prisoners with criminal history data.

***Dependent Variables***

The BJS dataset contains two criminal history measures—prior arrests and prior convictions—along with four recidivism measures—rearrest, reconviction, resentenced to prison for a felony, and reimprisonment (either for a new felony conviction or a parole revocation for a "technical" violation). The four measures of recidivism were tracked over a period of five years from the time of release for each prisoner, and the specific dates for each recidivism event within the five-year period were recorded. As shown later in Table 2, the five-year recidivism rates for the Minnesota prisoner sample were 76% for rearrest, 63% for reconviction, 42% for resentenced, and 52% for reimprisonment.

***Control Variables and Correctional Programming Data***

Because a common identifier was used for the prisoners in the BJS dataset, it was possible to link the criminal history and recidivism data assembled by BJS with data maintained by the MnDOC data on the 1,879 prisoners. Most of the MnDOC data were obtained from the Correctional Operations Management System (COMS), the database used by the MnDOC.[1] In addition to the programming data described below, the COMS data include information on the following items shown to be predictive of recidivism for Minnesota prisoners: suicidal tendencies, institutional discipline convictions, length of stay (months), active security threat group (STG) (i.e., gang) affiliation, age at release, and the presence/absence of post-release supervision (Duwe, 2014c).

[1] Programming data for the SOAR program were not recorded within COMS. Instead, SOAR program data were maintained by the MnDOC's research and evaluation unit.

**Table 1. Descriptive Statistics for Minnesota Prisoner Sample**

| *Predictors* | *Description* | *Mean* | *SD* |
|---|---|---|---|
| Male | Male = 1; Female = 0 | 0.850 | 0.357 |
| Age at Release | Offender age in years at time of release from prison | 33.901 | 9.409 |
| Race/Ethnicity | Non-Hispanic white = 0; minority = 1 | 0.480 | 0.500 |
| Marital Status | Married = 1; Unmarried = 0 | 0.127 | 0.333 |
| New Court Commitment | New court commit = 1; probation/parole violator = 0 | 0.453 | 0.498 |
| Violent Index Offense | In prison for violent offense | 0.369 | 0.483 |
| County of Commitment | Twin Cities metro area = 1; Greater Minnesota = 0 | 0.541 | 0.499 |
| Suicidal Tendencies | Suicidal history = 1; no suicidal history = 0 | 0.112 | 0.316 |
| Security Threat Group (STG) Involvement | Level of STG involvement in prison (scale = 0 to 10) | 0.907 | 1.735 |
| Discipline Convictions | Number of discipline convictions during confinement | 4.366 | 10.032 |
| Length of Stay (months) | Length of stay in prison (months) | 17.201 | 24.717 |
| Intensive Supervised Release (ISR) | ISR = 1; No ISR = 0 | 0.260 | 0.439 |
| Discharge | Discharge = 1; released to supervision = 0 | 0.158 | 0.365 |
| Number of Prior Arrests | Total # of prior arrests | 9.245 | 7.828 |
| Number of Prior Convictions | Total # of prior convictions | 4.925 | 4.019 |
| Educational Programming | Participation in education programming in prison | 0.586 | 0.493 |
| Any Visit in Prison | Visited in prison = 1; unvisited = 0 | 0.524 | 0.500 |
| Chemical Dependency (CD) Treatment | CD treatment = 1; none = 0 | 0.335 | 0.472 |
| Sex Offender Treatment | Sex offender treatment = 1; none = 0 | 0.027 | 0.163 |
| Work Release | Work release = 1; none= 0 | 0.089 | 0.285 |
| Challenge Incarceration Program (CIP) | CIP = 1; No CIP = 0 | 0.055 | 0.228 |
| Affordable Homes Program (AHP) | AHP = 1; none = 0 | 0.002 | 0.046 |
| Cognitive-Behavioral Therapy | CBT = 1; none = 0 | 0.011 | 0.103 |
| InnerChange Freedom Initiative (IFI) | IFI = 1; none = 0 | 0.004 | 0.061 |
| Serious Offender Acc. Restoration (SOAR) | SOAR = 1; none = 0 | 0.020 | 0.139 |
| Ser. Pers. Mentally Ill (SPMI) Rel. Planning | SPMI release planning = 1; none = 0 | 0.026 | 0.158 |
| Entry Timing Days | Days between prison admission and 1st intervention | 170.480 | 521.493 |
| Entry Timing Percent | Start Timing Days/LOS Days | 0.469 | 4.027 |
| Exit Timing Days | Days between Last Intervention and Release Date | 68.410 | 193.660 |
| Exit Timing Percent | End Timing Days/LOS Days | 0.283 | 0.383 |
| Total Intervention Days | Total Intervention Days | 197.540 | 278.231 |
| Dosage Percent | Dosage Percent | 0.358 | 0.336 |
| N | | 1,879 | |

Since the mid-2000s, nearly 20 MnDOC programs and interventions have been evaluated. However, a number of these interventions, some of which were pilot projects that are no longer operational, were not implemented until after 2005 (the release year for the 1,879 Minnesota prisoners). As shown in Table 1, programming data were available on 11 interventions delivered to male and female prisoners within Minnesota's prison system. The programming data contain entry and exit dates, which enable analyses pertaining to timing and duration. The one type of relevant programming for which data were not available for this time period is prison labor. COMS data reveal whether prisoners had work assignments,

but reliable and valid data were not available for the specific dates when prisoners entered and exited work assignments.

The 11 interventions for which programming data were available include an offender boot camp (Duwe and Kerschner, 2008), sex offender treatment (Duwe and Goldman, 2009), chemical dependency treatment (Duwe, 2010), mental health release planning (Duwe, 2015a); prison visitation (Duwe and Clark, 2013; Duwe and Johnson, 2016), employment programming (Duwe, 2015b, 2014b; Northcutt Bohmert and Duwe, 2012), educational programming (Duwe and Clark, 2014), prisoner reentry (Minnesota Department of Corrections, 2006), faith-based programming (Duwe and King, 2013), and cognitive-behavioral therapy (Duwe and Clark, 2015). Of these interventions, mental health release planning (Duwe, 2015a), one of the employment programs (Northcutt Bohmert and Duwe, 2012), and the prisoner reentry pilot project were unsuccessful in reducing recidivism. The results from the evaluations of the remaining interventions showed they were effective in lowering recidivism.

Based on the programming data for the 11 interventions, a number of aggregate program measures were created. One of these measures was the total number of interventions in which prisoners participated. As shown in Table 2, 345 (18%) of the 1,879 prisoners were warehoused insofar as they did not participate in any interventions while imprisoned. A little more than half the sample (52%) participated in two or more interventions. Consistent with Duwe and Clark (2016), recidivism rates generally declined as the number of interventions increased.

**Table 2. Program Timing and Dosage by Five-Year Recidivism Rates**

| | *Rearrest* | *Reconviction* | *Resentence* | *Reimprison* | *N* |
|---|---|---|---|---|---|
| Number of Interventions | | | | | |
| Warehoused | 0.858 | 0.713 | 0.493 | 0.557 | 345 |
| 1 | 0.814 | 0.694 | 0.488 | 0.587 | 549 |
| 2 | 0.742 | 0.612 | 0.414 | 0.523 | 503 |
| 3 | 0.682 | 0.545 | 0.318 | 0.417 | 336 |
| 4 | 0.554 | 0.403 | 0.194 | 0.345 | 139 |
| 5 | 0.571 | 0.571 | 0.143 | 0.286 | 7 |
| Total | 0.759 | 0.627 | 0.416 | 0.515 | 1,879 |
| | | | | | |
| Intervention Start Categories | | | | | |
| Within first 30 days | 0.731 | 0.613 | 0.396 | 0.472 | 551 |
| 31-60 days | 0.778 | 0.651 | 0.415 | 0.529 | 378 |
| 61-120 days | 0.783 | 0.661 | 0.462 | 0.584 | 286 |
| 121 days or more | 0.655 | 0.498 | 0.326 | 0.464 | 319 |
| Warehoused | 0.858 | 0.713 | 0.493 | 0.557 | 345 |
| Total | 0.759 | 0.627 | 0.416 | 0.515 | 1,879 |
| | | | | | |
| Intervention End Categories | | | | | |
| 0 days | 0.647 | 0.539 | 0.344 | 0.461 | 445 |
| 1-30 days | 0.758 | 0.610 | 0.388 | 0.477 | 549 |
| 31-60 days | 0.798 | 0.671 | 0.423 | 0.516 | 213 |
| 61 days or more | 0.783 | 0.654 | 0.474 | 0.606 | 327 |
| Warehoused | 0.858 | 0.713 | 0.493 | 0.557 | 345 |
| Total | 0.759 | 0.627 | 0.416 | 0.515 | 1,879 |
| | | | | | |
| Dosage Categories | | | | | |
| Warehoused | 0.858 | 0.713 | 0.493 | 0.557 | 345 |
| 1-30 Days | 0.799 | 0.679 | 0.490 | 0.553 | 349 |
| 31-90 Days | 0.824 | 0.721 | 0.480 | 0.570 | 244 |
| 91-180 Days | 0.773 | 0.641 | 0.390 | 0.559 | 295 |
| 181-365 Days | 0.699 | 0.589 | 0.381 | 0.480 | 302 |
| More than a year | 0.613 | 0.442 | 0.270 | 0.387 | 344 |
| Total | 0.759 | 0.627 | 0.416 | 0.515 | 1,879 |

To measure timing, variables were created that looked at when prisoners entered programming and when they exited. Of the two variables created to measure entry timing, the first (Entry Timing Days) quantifies the number of days between prison admission and day of initial program entry. For individuals who did not participate in any programming, their

value for this variable was the entire length of their imprisonment. As shown in Table 1, the average length of time for timing entry was 170 days. The data presented in Table 2 suggest that earlier involvement in programming does not appear to be associated with reduced recidivism.

In an effort to take an individual's entire confinement period into account, a second variable (Entry Timing Percent) was created that divides the day that individuals entered programming by the number of days they were in prison. If, for example, an individual was incarcerated for 180 days and their entry into programming was day 60, then he would have an Entry Timing Percent value of 0.33. The results in Table 1 show the average among the 1,879 prisoners was 0.469.

Two similar variables were created to measure exit timing. The first variable (Exit Timing Days) measures the number of days between the day when prisoners last exited programming and the date they were released from prison. The second variable (Exit Timing Percent) divides Exit Timing Days by the total number of days an individual was in prison. The results in Table 1 show the average number of days between program exit and release was 68. The average Exit Timing Percent, on the other hand, was 0.283. The results in Table 2 also suggest that the point at which individuals exit programming may be associated with recidivism. Lower rates across the four recidivism measures are generally related to shorter intervals between program exit and release.

To measure program dosage, two measures were created. The first variable measures the total number of days individuals were involved in programming, whereas the second variable measures the dosage percent by dividing the total days in programming value by the total number of confinement days. The results in Table 1 show the 1,879 prisoners were in

programming for an average of 198 days, which accounted for 36 percent of their total imprisonment. The results in Table 2 suggest that program dosage is related to recidivism. More specifically, as the amount of time involved in programming increases, recidivism rates generally decrease.

***Analytic Strategy***

The results presented above, particularly in Table 2, suggest that recidivism outcomes may be affected by the timing and duration of programming. To control for the potential confounding effects that variables such as gender, race/ethnicity or criminal history may have on the relationship between recidivism and program timing and dosage, a series of multivariate statistical models were estimated. As noted earlier, this study examines whether program entry timing affects the extent to which prisoners participate in programming overall. To this end, ordinal logistic regression models were estimated in which the dependent variable was the number of interventions in which prisoners were involved while incarcerated. Separate models were estimated for the two timing entry variables—Entry Timing Days and Entry Timing Percent.

Cox regression was used to analyze the effects of program timing and duration on recidivism. Each of the four recidivism measures contained information on the date when the recidivism event occurred, which enabled a determination of the number of days from release to the recidivism event or the end of the follow-up period for those who did not recidivate. A Cox regression model uses both "time" and "status" variables to estimate the impact of the independent variables on recidivism. The "time" variable measured the amount of time from the date of release until the date of first rearrest, reconviction, resentencing, reimprisonment, or the end of the follow-up period for those who did not recidivate. The "status" variable, on

the other hand, measured whether individuals recidivated during the period in which they were at risk to recidivate.

## RESULTS

Two ordinal logistic regression models were estimated, one with Entry Timing Days and the other with Entry Timing Percent. As shown in Table 3, both program entry timing measures had a significant effect on the number of interventions in which prisoners participated. In particular, later involvement in programming was associated with reduced odds in participating in more interventions. For example, the results indicate

**Table 3. Ordinal Regression: Effects of Entry Timing on Program Participation**

| Variables | Estimate | SE | Estimate | SE |
|---|---|---|---|---|
| Program Participation : Number of Interventions | | | | |
| Interventions = 0 | -6.865** | 0.317 | -2.603** | 0.224 |
| Interventions = 1 | -2.878** | 0.241 | -0.697** | 0.215 |
| Interventions = 2 | -0.926** | 0.232 | 1.023** | 0.217 |
| Interventions = 3 | 0.924** | 0.237 | 2.910** | 0.235 |
| Interventions = 4 | 4.262** | 0.429 | 6.450** | 0.437 |
| Entry Timing Days | | | -0.004** | 0.224 |
| Entry Timing Percent | -6.907** | 0.249 | | |
| Male | -0.750** | 0.133 | -1.030** | 0.128 |
| Age at Release | -0.014* | 0.006 | -0.015** | 0.005 |
| Race/Ethnicity | -0.295** | 0.103 | -0.396** | 0.095 |
| Marital Status | 0.032 | 0.139 | 0.067 | 0.131 |
| New Court Commitment | 0.571** | 0.104 | 0.769** | 0.099 |
| Violent Index Offense | -0.493** | 0.106 | -0.356** | 0.097 |
| Metro County of Commit | 0.128 | 0.099 | 0.171 | 0.092 |
| Suicidal Tendencies | -0.111 | 0.150 | 0.105 | 0.139 |
| STG Involvement | -0.114** | 0.030 | -0.107** | 0.027 |
| Discipline Convictions | -0.020** | 0.005 | -0.029** | 0.005 |
| LOS | 0.041** | 0.002 | 0.106** | 0.005 |
| Prior Arrests | -0.006 | 0.011 | -0.005 | 0.010 |
| Prior Convictions | -0.016 | 0.022 | -0.030 | 0.020 |
| Nagelkerke $R^2$ | 0.682 | | 0.431 | |
| -2 Log Likelihood | 3829.838 | | 4180.914 | |
| N | 1,897 | | | |

Notes: STG = Security Threat Group; LOS = Length of Stay; SE = Standard Error

that a one-unit increase in Entry Timing Days (e.g., entering programming at, say, day 50 instead of day 49) lowered the likelihood of participating in another intervention by 0.40 percent. Thus, compared to an individual entering an intervention at day 50, the odds of participating in an additional intervention would be 40 percent lower for a prisoner entering at day 150. The results for the other covariates suggest that prisoners were more likely to participate in more interventions when they were admitted to prison as a new court commitment and had longer lengths of stay. Conversely, participation in more interventions was significantly less likely for males, non-whites, offenders in prison for a violent crime, prisoners with discipline convictions, and those involved in a STG.

**Table 4. Impact of Program Entry Timing on Recidivism**

| | Rearrest | | Reconviction | | Resentenced | | Reimprisoned | |
|---|---|---|---|---|---|---|---|---|
| | HR | SE | HR | SE | HR | SE | HR | SE |
| Entry Timing Percentage | 1.004 | 0.005 | 1.008 | 0.006 | 1.005 | 0.006 | 1.001 | 0.005 |
| Entry Timing Days | 1.000 | 0.000 | 1.000 | 0.000 | 1.000* | 0.000 | 1.000 | 0.000 |
| Male | 1.283** | 0.081 | 1.414** | 0.090 | 1.466** | 0.116 | 1.610** | 0.111 |
| Age at Release | 0.971** | 0.004 | 0.969** | 0.004 | 0.970** | 0.005 | 0.982** | 0.005 |
| Race/Ethnicity | 1.206** | 0.059 | 1.138* | 0.065 | 1.122 | 0.080 | 1.149 | 0.071 |
| Marital Status | 0.843* | 0.085 | 0.789* | 0.096 | 0.875 | 0.118 | 0.750** | 0.107 |
| New Court Commitment | 0.926 | 0.063 | 0.976 | 0.070 | 1.132 | 0.086 | 0.838* | 0.074 |
| Violent Index Offense | 0.833** | 0.064 | 0.821** | 0.070 | 0.804* | 0.087 | 1.202* | 0.075 |
| Metro County of Commit | 1.125* | 0.057 | 0.954 | 0.062 | 0.982 | 0.077 | 1.183* | 0.070 |
| Suicidal Tendencies | 1.445** | 0.081 | 1.603** | 0.086 | 2.009** | 0.096 | 2.060** | 0.086 |
| STG Involvement | 1.106** | 0.016 | 1.108** | 0.017 | 1.160** | 0.020 | 1.118** | 0.018 |
| Discipline | 1.011** | 0.003 | 1.014** | 0.003 | 1.016** | 0.003 | 1.014** | 0.003 |
| LOS | 0.990** | 0.002 | 0.985** | 0.002 | 0.985** | 0.003 | 0.992** | 0.002 |
| ISR | 0.648** | 0.072 | 0.653** | 0.081 | 0.634** | 0.103 | 1.443** | 0.080 |
| Discharge | 1.145 | 0.076 | 1.160 | 0.084 | 1.037 | 0.104 | 0.510** | 0.106 |
| Prior Arrests | 1.029** | 0.006 | 1.009 | 0.006 | 1.015* | 0.008 | 1.019** | 0.007 |
| Prior Convictions | 1.043** | 0.011 | 1.070** | 0.012 | 1.077** | 0.013 | 1.046** | 0.013 |
| N | 1,879 | | 1,879 | | 1,879 | | 1,879 | |

Notes: STG = Security Threat Group; LOS = Length of Stay; ISR = Intensive Supervised Release; HR = hazard ratio; SE = Standard Error

** $p < .01$

* $p < .05$

Earlier involvement in programming, however, did not translate into a recidivism reduction. Cox regression models were estimated for both entry timing measures—Entry Timing Days and Entry Timing Percent. Because the coefficients for the control variables

were similar for both models, only those from the Entry Timing Days model are shown in Table 4. Program entry timing had a significant effect in only one of the eight models estimated. If earlier program entry was associated with less recidivism, we should expect to see a positive hazard ratio. Although the hazard ratio was in the expected direction in all eight models, the results were not, with one exception, statistically significant.

**Table 5. Impact of Program Exit Timing on Recidivism**

| | Rearrest | | Reconviction | | Resentenced | | Reimprisoned | |
|---|---|---|---|---|---|---|---|---|
| | HR | SE | HR | SE | HR | SE | HR | SE |
| Exit Timing Percentage | 1.334** | 0.081 | 1.221* | 0.089 | 1.222 | 0.110 | 1.313** | 0.097 |
| Exit Timing Days | 1.000 | 0.000 | 1.000 | 0.000 | 1.000 | 0.000 | 1.000** | 0.000 |
| Male | 1.259** | 0.081 | 1.397** | 0.090 | 1.445** | 0.116 | 1.577** | 0.111 |
| Age at Release | 0.970** | 0.004 | 0.969** | 0.004 | 0.970** | 0.005 | 0.981** | 0.005 |
| Race/Ethnicity | 1.194** | 0.059 | 1.130 | 0.065 | 1.115 | 0.080 | 1.145 | 0.071 |
| Marital Status | 0.850 | 0.085 | 0.792* | 0.096 | 0.881 | 0.118 | 0.768* | 0.107 |
| New Court Commitment | 0.958 | 0.063 | 0.994 | 0.070 | 1.153 | 0.087 | 0.865 | 0.075 |
| Violent Index Offense | 0.825** | 0.064 | 0.813* | 0.070 | 0.797* | 0.088 | 1.185* | 0.075 |
| Metro County of Commit | 1.140* | 0.057 | 0.962** | 0.063 | 0.991 | 0.077 | 1.189* | 0.070 |
| Suicidal Tendencies | 1.441** | 0.081 | 1.602** | 0.086 | 2.008** | 0.096 | 2.038** | 0.087 |
| STG Involvement | 1.099** | 0.016 | 1.104** | 0.017 | 1.157** | 0.020 | 1.112** | 0.018 |
| Discipline | 1.010** | 0.003 | 1.014** | 0.003 | 1.016** | 0.003 | 1.014** | 0.003 |
| LOS | 0.992** | 0.002 | 0.987** | 0.002 | 0.987** | 0.003 | 0.993** | 0.002 |
| ISR | 0.639** | 0.072 | 0.644** | 0.081 | 0.625** | 0.103 | 1.431** | 0.080 |
| Discharge | 1.032 | 0.082 | 1.075 | 0.091 | 0.958 | 0.113 | 0.460** | 0.112 |
| Prior Arrests | 1.028** | 0.006 | 1.009 | 0.006 | 1.015 | 0.008 | 1.017* | 0.007 |
| Prior Convictions | 1.043** | 0.011 | 1.071** | 0.012 | 1.077* | 0.013 | 1.046** | 0.013 |
| N | 1,879 | | 1,879 | | 1,879 | | 1,879 | |

Notes: STG = Security Threat Group; LOS = Length of Stay; ISR = Intensive Supervised Release; HR = hazard ratio; SE = Standard Error

** $p < .01$

* $p < .05$

The results for the remaining covariates are generally consistent with existing research. Most of the covariates were statistically significant, and the factors that increased recidivism risk were prior criminal history (arrests and convictions), race/ethnicity, younger age at release, metro county of commitment, suicidal tendencies, STG involvement, and prison misconduct. Recidivism risk was significantly lower, however, for married prisoners, violent offenders, and those with longer lengths of stay.

The results for the two program exit timing measures are presented in Table 5, and the hazard ratios for these two measures were statistically significant in four of the eight models that were estimated. The findings indicate that Exit Timing Percent had a greater effect on recidivism than Exit Timing Days. Indeed, Exit Timing Percent had a significant effect on recidivism in three of the Cox regression models, and it nearly achieved statistical significance (p = 0.069) for the resentenced model. For example, a one-unit increase (e.g., 29% to 30%) in Exit Timing Percent was associated with a 33% increase in the hazard of rearrest. Put another way, recidivism outcomes were significantly better when prisoners exited programming closer to their release from prison. The Exit Timing Days measure, on the other hand, was statistically significant in only one of the four Cox regression models. Because the results for the other covariates in Table 5 are similar to those shown earlier in Table 4, they are not repeated here.

**Table 6. Impact of Programming Dosage on Recidivism**

| | Rearrest | | Reconviction | | Resentenced | | Reimprisoned | |
|---|---|---|---|---|---|---|---|---|
| | HR | SE | HR | SE | HR | SE | HR | SE |
| Dosage Percent | 0.779** | 0.088 | 0.779* | 0.098 | 0.709** | 0.124 | 0.629** | 0.108 |
| Total Intervention Days | 0.999* | 0.000 | 0.999** | 0.000 | 0.999** | 0.000 | 0.999** | 0.000 |
| Male | 1.237* | 0.082 | 1.366** | 0.091 | 1.392** | 0.117 | 1.487** | 0.112 |
| Age at Release | 0.970** | 0.004 | 0.969** | 0.004 | 0.970** | 0.005 | 0.981** | 0.005 |
| Race/Ethnicity | 1.211** | 0.059 | 1.144* | 0.064 | 1.139 | 0.080 | 1.180* | 0.071 |
| Marital Status | 0.851 | 0.085 | 0.797* | 0.096 | 0.888 | 0.118 | 0.770* | 0.107 |
| New Court Commitment | 0.939 | 0.063 | 0.988 | 0.070 | 1.155 | 0.086 | 0.870 | 0.074 |
| Violent Index Offense | 0.828** | 0.064 | 0.820** | 0.070 | 0.802* | 0.088 | 1.197* | 0.075 |
| Metro County of Commit | 1.132* | 0.057 | 0.959 | 0.062 | 0.989 | 0.077 | 1.188* | 0.070 |
| Suicidal Tendencies | 1.435** | 0.081 | 1.588** | 0.086 | 1.989** | 0.096 | 2.005** | 0.087 |
| STG Involvement | 1.100** | 0.016 | 1.104** | 0.017 | 1.155** | 0.020 | 1.113** | 0.018 |
| Discipline | 1.010** | 0.003 | 1.014** | 0.003 | 1.015** | 0.003 | 1.013** | 0.003 |
| LOS | 0.990** | 0.002 | 0.986** | 0.002 | 0.986** | 0.003 | 0.992** | 0.002 |
| ISR | 0.650** | 0.072 | 0.651** | 0.081 | 0.630** | 0.104 | 1.456** | 0.080 |
| Discharge | 1.079 | 0.079 | 1.099 | 0.087 | 0.955 | 0.108 | 0.458** | 0.109 |
| Prior Arrests | 1.029** | 0.006 | 1.009 | 0.006 | 1.014 | 0.008 | 1.017* | 0.007 |
| Prior Convictions | 1.041** | 0.011 | 1.069* | 0.012 | 1.076** | 0.013 | 1.045** | 0.013 |
| N | 1,879 | | 1,879 | | 1,879 | | 1,879 | |

Notes: STG = Security Threat Group; LOS = Length of Stay; ISR = Intensive Supervised Release; HR = hazard ratio; SE = Standard Error

** $p < .01$

* $p < .05$

In Table 6, which presents the results for the program duration analyses, the findings indicate that both program dosage variables significantly reduced recidivism. In particular, a one-unit increase in Total Intervention Days (i.e., 179 days to 180 days) was associated with a .001% decrease in the hazard of recidivism for all four measures. Meanwhile, a one-unit increase in Dosage Percent (e.g., from 25% to 26%) was associated with a 22.1% decrease in the hazard for rearrest and reconviction. Larger effect sizes were observed for the resentenced and reimprisoned measures.

## CONCLUSION

The findings presented here indicate that prisoners participate in more programming overall when they enter programming earlier during their imprisonment. While a greater dosage of programming resulted in better recidivism outcomes, the point at which prisoners entered programming did not have a direct, significant effect on reoffending. Instead, the point at which prisoners exited programming, particularly in relation to the overall length of their imprisonment, had a greater impact on recidivism. When prisoners exited programming closer to their release from prison, recidivism outcomes were generally better. Exiting programming closer to the time of release may help prisoners better retain the positive effects that interventions have on their post-release behavior. For this same reason, the absence of a significant association between program entry and recidivism may reflect the possibility that the impact of interventions can fade over time. Accordingly, while earlier involvement in programming may not significantly reduce recidivism, it leads to greater participation in interventions and it could have a significant impact on a more proximate outcome—prison misconduct.

The beneficial effects observed for shorter intervals between program exits and release dates could also reflect the impact a continuum of care may have on programming effectiveness. For example, existing research on Minnesota prisoners has shown positive outcomes for interventions that deliver services or programming to prisoners not only while they are incarcerated but also in the community following their release from prison (Duwe, 2012, 2014a, 2015b; Duwe and King, 2013). However, community-based programming data were not available for the 1,879 Minnesota prisoners, which points to a limitation with this study. Another limitation is that, despite the use of national criminal history and recidivism data, this study focused on prisoners from one state for a single year of releases, which may temper the generalizability of the findings. In addition, the present study did not use an experimental or quasi-experimental design, which is needed to obtain more conclusive estimates of the effects of program timing and duration on recidivism. Finally, this study did not examine whether program timing and duration have an effect on other important outcomes such as employment or prison misconduct.

Yet, even with these shortcomings, the findings have several implications for correctional research, policy, and practice. First, greater participation in interventions would likely yield better recidivism outcomes, and a good way to achieve that is to get prisoners involved in programming shortly after their admission to prison. Even though earlier involvement may not lead directly to less recidivism, it can increase the extent to which prisoners participate in programming, which lowers reoffending. This study did not examine the impact of program entry timing on prison misconduct but, as noted above, earlier involvement may help improve the safety within correctional facilities.

Second, even if prisoners want to participate in interventions, access to programming can be limited due to a scarcity of resources. Nearly one-fifth of the prisoners examined here were warehoused, which is actually a lower warehousing rate than what prior research has observed for Minnesota prisoners (Duwe and Clark, 2016). Moreover, the overall dosage percent was 36 percent, which suggests prisoners are not involved in programming for a substantial portion of their time in prison. Increasing the quantity of programming would raise the overall dosage percent, which would, in turn, likely yield better recidivism outcomes. Absent an increase in the amount of programming, however, the findings from this study suggest that, if recidivism reduction is the goal, then corrections agencies should attempt to backload programming. For example, if prisoners are able to participate in only one intervention due to shorter imprisonment periods or resource limitations, it should be reserved towards the end of confinement to maximize the effect on recidivism. Even among those participating in multiple interventions because they are higher-risk prisoners with longer confinement times, the results suggest that participation in one of the interventions should be set aside toward the end of imprisonment.

Finally, because this study was an exploratory examination of the effects of program timing and duration, more rigorous, future research is needed on other correctional populations. Along with additional research on program timing and dosage, especially in relation to recidivism risk, future studies should examine whether the sequencing of correctional programming can improve recidivism outcomes. For example, some have argued that the order or timing in which offenders participate in interventions may have an impact on the overall effectiveness of programming. Indeed, Mailloux et al. (2003) suggest that, “it may be useful for offenders to complete a program such as cognitive skills (which introduces

basic elements associated with cognitive-behavioral therapy as well as concrete suggestions as to how to apply these principles to everyday situations) prior to completing more intensive therapeutic programs."

Implicit within the sequencing concept is the fact that it applies only to those who participate in multiple interventions, for the scenario proposed by Mailloux et al. (2003) involves offenders completing at least two programs. Still, there is currently no evidence as to whether sequencing may influence the effectiveness of programming. However, by more closely examining the conditions in which interventions work best, future research may be able to further enhance the effectiveness of correctional programming.

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