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Citation

Verweij, S., Beijersbergen, K. A., Weijters, G., Wermink, H. T., & Blokland, A. A. J. (2024). Supervision following release from prison and reoffending during and after the supervision period. *Crime & Delinquency*. doi:10.1177/00111287241277767

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Supervision Following Release From Prison and Reoffending During and After the Supervision Period

Crime & Delinquency

1–30

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DOI: 10.1177/0011287241277767

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Abstract

The current study examined whether supervision following release from a Dutch prison in 2012 or 2013 relates to reoffending both during and after the supervision period. A combination of matching by variable and Mahalanobis distance matching was used to match supervised persons to persons who were not supervised after release. Multi-state survival models and zero-truncated negative binomial regressions were used to study the risk and frequency of reoffending. The results suggest that being under supervision following release from prison in the Netherlands is not related to the risk and frequency of reoffending either during or after the supervision period. Possible explanations are discussed and directions for future research are explored.

Keywords

community supervision, prison leave, recidivism, deterrence, rehabilitation

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Introduction

Globally, criminal justice supervision impacts a large number of individuals under supervision, their families and communities, and the criminal justice system responsible for the supervision of such individuals. In the United States alone in 2018, more than 4 million persons were being supervised (Kaeble & Alper, 2020), while in Europe, roughly 1.8 million persons were under supervision during that same year (Aebi & Hashimoto, 2019). A substantial part of criminal justice supervision takes place after release from prison, for example, parole, split probation, partly suspended prison sentence with probation; conditional release (Rhodes et al., 2013).

Despite variations between countries or jurisdictions in the way supervision after release from prison is configured, there are some common characteristics of post-prison supervision. For one, in many jurisdictions, post-prison supervision involves individuals adhering to specific conditions (e.g., an obligation to report, treatment, a location ban, a curfew) during the time that they are supervised by probation or parole services (Ostermann, 2013). A second common characteristic is that failure to comply with these conditions leads to increasingly negative consequences for the person under supervision and can eventually result in a return to prison. Finally, different configurations of supervision share the same take on the mechanisms by which post-prison supervision is supposed to reduce reoffending. Supervision officers typically surveil compliance to conditions, or provide support with reintegration or rehabilitation, or engage in a combination of the two to prevent persons who were formerly imprisoned from reoffending both during and after the period of supervision (Klingele, 2014).

Whether being under supervision following release from prison is actually related to fewer crimes committed either during or after the supervision period however remains an open question, as most prior studies do not pay attention to the timing of reoffending (Ostermann, 2013). This poses a significant gap in the research literature given that this distinction is needed to reveal whether supervision has a deterrent effect only *during* the supervision period—for example through deterrence by the increased likelihood of detection of offending and the increased certainty of being sent to prison—or whether it is likely that supervision also has a longer lasting rehabilitative effect. In the latter case, the effect of supervision would still be visible after the period of supervision itself has ended and its main deterrent effect has disappeared. Addressing this blind spot is also critical considering that, across all sentencing contexts, virtually all supervision periods end after a specified period of time.

In this article, we address this issue using unique data from all persons sentenced to imprisonment in the Netherlands who were released from prison

in 2012 or 2013 with linked data regarding supervision participation from the Dutch Probation and Parole Services. To our knowledge, this study is among the first-to distinguish the influence of post-prison supervision on recidivism during and after the supervision period using full population data combined with quasi-experimental techniques. Advanced matching procedures were used to control for selection processes that may lead to pre-existing differences between supervised and unsupervised persons. We used multi-state survival models and zero-truncated negative binomial regressions to study the risk and frequency of reoffending during and after the supervision period.

Criminal Justice Supervision in the Netherlands

Like other Western countries, the Netherlands has seen an unparalleled growth in the use of supervision over the past decades. In 1995 around 6,000 persons were supervised on a daily basis, after which this number climbed from 18,000 in 2010 to almost 30,000 in 2020 (Boone, 2015; Sturm, 2022). A substantial part of supervision in the Netherlands takes place after imprisonment; 45% of the persons whose supervision started in 2013 were also sentenced to prison (Verweij & Weijters, 2020). Over time, the content of supervision also changed in many countries, including in the Netherlands. For instance, elements of the Risk-Need-Responsivity (RNR) model were implemented resulting in the development of standardized risk assessments and (cognitive) behavioral interventions (Menger & Donker, 2012). Since 2010, supervision in the Netherlands has focused on two main tasks: surveillance (monitoring conditions) and support. However, in the first years after 2010 (which corresponds to the start of the supervision period of the persons studied in this paper) the predominant focus seemed to be on surveillance with less attention paid to support (Boone, 2015; Plaisier & Pennekamp, 2009). In addition, the professionalism of the supervision worker and their relationship with the supervised person became more important over time (Menger, 2017).

The execution of criminal justice supervision in the Netherlands is organized by three independent organizations: the Dutch Probation Service (RN), the Salvation Army Probation Service (LJ&R), and the Institute for Social Rehabilitation of Addicted Offenders (SVG). These three organizations work together on topics such as the primary process, education of employees, quality monitoring, information management and ICT (De Kok et al., 2020). The main problem of a person is decisive for allocation: persons with a substance problem are referred to the SVG, persons without (stable) housing are referred to the LJ&R, and all other persons are referred to the RN. More than half of the supervisions is executed by the RN (Verweij & Weijters, 2020).

In Dutch supervision practice the supervision officer starts with formulating a supervision plan, which is (mostly) based on the risk assessment tool (in most cases the RISC or the Quick Scan) that was used to advise whether supervision should be assigned or not (Bosker & Witteman, 2016). A supervision plan usually contains information on several domains: the criminogenic needs (such as unemployment, homelessness, debts, psychological problems, alcohol, or drugs use), a description of the targets for change, advice about interventions including conditions, control measures, and the level of supervision. If no (recent) RISC-assessment is available at the start of the supervision period, a RISC-assessment will be completed as soon as possible.

There are three levels of increasingly intensive supervision in the Netherlands, with level 1 being the least intensive and level 3 being the most intensive. The main difference between the supervision levels is the amount of contact between the supervised individual and the supervision officer. On average, a person has monthly, bi-monthly or weekly face-to-face meetings with his supervision officer in level 1, 2, 3, respectively. The level of supervision generally becomes less intensive over time. During the face-to-face meetings, the supervision officer stimulates and motivates commitment to the supervision plan, reviews the individual's adherence to the conditions, and provides practical help.

Around 75% of the persons who started with supervision in 2013 face additional conditions besides attending the mandatory face-to-face meetings (Verweij & Weijters, 2020).¹ Of those with at least one additional condition, 72% had to follow ambulant treatment, 20% had to participate in a behavioral intervention, 17% had a contact ban, and 15% was given a drugs or alcohol ban. Less than 15% had to deal with other conditions such as a location ban, home confinement, paying restitution, or residential treatment.

In many countries, including the Netherlands, violations of supervision conditions lead to increasingly negative consequences. Although not much is known about how Dutch supervision officers deal with supervision breaches in daily practice, they do seem to write reports with the aim of ending the supervision period or a recall to prison only as a last resort (Boone & Beckmann, 2018; Doekhie et al., 2018). In 2017, 16% of the supervised persons terminated their supervision period prematurely due to a violation of the conditions (Verweij et al., 2021).

Theories of Supervision Effects on Reoffending During and After Supervision

Criminological theories provide contradicting expectations about the effect of supervision (including surveillance and support) on reoffending during

and after the supervision period. During the supervision period, individuals may remain crime free because they are *deterred* from committing new crimes. Surveillance may increase the real or perceived probability that offenses or other violations of conditions are discovered (Maxwell & Gray, 2000). Furthermore, supervised individuals who engage in criminal behavior can be punished with an immediate return to prison, on top of the penalty for the new offense, thereby also increasing the severity of punishment. Given the real or perceived increase in certainty, swiftness, and severity of punishment, supervised individuals are expected to commit fewer crimes as long as the supervision period lasts (Klinge, 2014).

Other theoretical perspectives predict that a crime-reducing effect of supervision may also last after the supervision period. Though rehabilitation theories (e.g., the risk-need-responsivity model or good lives model) differ in their emphasis on reoffending risk, contextual factors, or personal goals, they all assume that it is important to teach formerly imprisoned individuals how to manage those aspects of their lives that elevate the risk of reoffending (Bonta & Andrews, 2010; Ward & Brown, 2004; Ziv, 2017). By identifying and addressing supervised individuals' needs and problems, reoffending may be prevented. This rehabilitative effect may either stabilize when individuals are no longer actively supported, or continue to increase as a result of the continued accumulation of advantage in individuals' lives.

It is important to note, however, that a comparison of registered crimes committed by supervised and unsupervised individuals may be complicated by so-called "net-widening" (Tonry & Lynch, 1996). When persons are under supervision, their actions are scrutinized more frequently and to a greater degree, and this may provide authorities with more opportunities to observe (minor) offenses (Phelps, 2013). Furthermore, persons under supervision have an increased risk of reimprisonment compared to persons released without supervision, because not only new crimes, but also technical violations of their supervision conditions may lead to reimprisonment (Harding et al., 2017; Spivak & Damphousse, 2006). However, as supervision officers aim to end supervision and recall to prison only as a last resort, it remains unclear if and how much this influences a comparison of reoffending between supervised and unsupervised individuals.

In sum, during the supervision period, a crime-reducing effect of supervision may be a consequence of both deterrence and rehabilitation, although it is expected that a possible rehabilitative effect of supervision increases over time while this is not the case for a deterrent effect. This crime-reducing effect may be diminished, nullified, or even outweighed because of net-widening. After the supervision period, any crime-reducing effect of supervision can be assigned to rehabilitation.

Prior Research on Post-prison Supervision Effects

The results of studies that compared release from prison without supervision with imprisonment followed by any form of post-prison supervision (e.g., (split) probation, parole or conditional release) are mixed. Whereas various studies indicated that persons released under supervision reoffended less than persons released without supervision (Banan, 2023; Clark et al., 2015; Gottfredson et al., 1982; Jones & Rogers, 2014; Lai, 2013; Miller et al., 2019; Ostermann, 2013, 2015; The PEW Charitable Trusts, 2013; Schlager & Robbins, 2008; Vito et al., 2017; Wan et al., 2016) a substantial amount of studies did not find a crime-reducing effect of supervision following release (Drake & Barnoski, 2006; Green & Winik, 2010; Horney et al., 1995; Jackson, 1983; Sacks & Logan, 1980; Solomon et al., 2005). Moreover, some prior studies even reported an adverse effect of post-release supervision, with technical violations of conditions attached to the period of supervision leading to increased prison return (Harding et al., 2017; Spivak & Damphousse, 2006).

These studies, however, vary considerably in outcome measures, the research design, the individuals supervised (e.g., the amount of time they served in prison, the types of offenses they committed, their predetermined risk of reoffending), and (probably) the execution of supervision. These factors may, to some extent, explain the mixed findings, however, it is difficult to pinpoint if and how (much) they influence the results. With regard to different outcome measures, previous studies on supervision have operationalized recidivism as either re-arrest, reconviction, or re-imprisonment. If anything, it seems that especially studies concerning reimprisonment or studies concerning a reoffending measure that included technical violations showed no or adverse effects of post-release supervision (Ostermann et al., 2015). Furthermore, some study designs may have failed to account adequately for selection effects. Of the studies with the most rigorous designs, such as natural experiments or instrumental variable analyses, the majority did not show a crime-reducing effect of supervision following release (Drake & Barnoski, 2006; Green & Winik, 2010; Jackson, 1983). With regard to length of imprisonment, type of offense, and the predetermined risk of reoffending we found no unambiguous direction in the results of prior research.

Finally, the execution of supervision may differ between and within countries or jurisdictions (Wan et al., 2016). Prior research on the effectiveness of supervision in general has found its effectiveness to be conditional on the nature of the supervision offered. For instance, supervision in which surveillance and support were combined was more effective in reducing reoffending compared with supervision that focused solely on either surveillance or

support (Aarten et al., 2015; Kennealy et al., 2012; Lowenkamp et al., 2010; Paparozzi & Gendreau, 2005). Spending a lot of time only on monitoring compliance with conditions may even be counterproductive. A study by Bonta et al. (2008) showed that the clients of supervision officers who spend 15 min or more of their face-to-face time with clients solely on discussing the conditions of release had a higher recidivism rate compared with clients of supervision officers who spent less than 15 min discussing the conditions of release. Intensive supervision (e.g., frequent contact with the supervision officers, electronic monitoring, frequent alcohol or drug testing) was only found to be more effective in reducing reoffending than regular supervision when it was combined with a treatment component (Drake et al., 2009; Gendreau et al., 2001; Gill & Hyatt in Hyatt & Barnes, 2017). Supervision-based programs that adhered to the RNR principles were also more effective in reducing reoffending than programs that did not (Lowenkamp et al., 2006). Two other meta-analysis showed that individuals who were supervised by officers who received training in core correctional practices demonstrated a reduction in recidivism compared to those supervised by officers who did not receive such training (Chadwick et al., 2015; Labrecque et al., 2023).

Few prior studies comparing release from prison with and without supervision, however, provide a clear description of what the supervision exactly entailed, and only two studies made a distinction between the effect of post-prison supervision on reoffending during and after the supervision period. In a regression-based study on data from a U.S. state's parole board system, Ostermann (2013) found that recidivism rates differed for parolees and unsupervised former inmates only for the period that parolees were still under supervision. No long-lasting effects of supervision were found. In a natural experiment following the implementation of the North Carolina Justice Reinvestment Act that changed policy to require 9 months of post-release supervision for those that were sentenced to imprisonment for minor offenses, Banan (2023), using regression discontinuity design, was able to show that those receiving supervision committed fewer violent and property crimes during their supervision period, which was only partly due to their incapacitation following technical violations. No crime decreasing effects were found for the period after supervision.

Current Study

This study expands previous research on supervision following release from prison and reoffending by examining both recidivism during post-prison supervision and recidivism after post-prison supervision. If post-release supervision *only* has an effect during the period when one is

actually supervised this effect may be difficult to assess when recidivism of individuals who are currently being supervised and those whose supervision period has already ended is studied together. In that case, it might appear that supervision does not have a crime-reducing effect, while instead it has an effect during the time when one is actively supervised, but not thereafter. Thus, it is important to make a distinction between recidivism during and after the supervision period. Few prior studies, however, did make this distinction and both prior studies that did (Banan, 2023; Ostermann, 2013) have been conducted in the United States, leaving the question of generalizability of their findings to other jurisdictions unaddressed. Conducting such research in other sentencing contexts is of major importance given arguments that most progress is expected from a comparative, international approach to crime and justice (Ulmer, 2012).

For the current study on reoffending during and after the supervision period, we concentrated on three legal grounds for supervision used in the Netherlands: supervision as part of a partially suspended prison sentence (which is similar to split probation in the sense that the imposed prison sentence consists of both an unsuspended and a suspended part with supervision as one of the conditions), supervision as part of a penitentiary program, and supervision during conditional release (which are both similar to parole in the sense that persons are released early from prison and are supervised instead). Furthermore, as 90% of all custodial sentences in the Netherlands is shorter than 1 year (Vink & Diephuis, 2021), we focused on supervision following release from prison after maximally 1 year. In several other Western European countries (e.g., Germany, France, Norway, Switzerland, and Denmark) a substantial share of those imprisoned serve prison sentences up to 1 year (Aebi & Delgrande, 2014). Although in the United States (US) prison sentences are considerably longer than in Western European countries, research showed that 42% of the persons leaving a state prison actually stayed in prison for less than 1 year (Kaeble, 2021). Hence, short prison stays appear common practice across Europe and elsewhere, making the relationship between supervision after a short prison stay and recidivism either during or after the supervision period an important topic of study.

More generally, the current study builds on previous research in three other ways. First, compared to the majority of prior studies which used regression models and propensity score matching (PSM) to account for differences between supervised and not supervised persons, we used a stricter matching procedure, namely a combination of matching by variable and Mahalanobis distance matching (MDM; King & Nielsen, 2019). Matching by variable typically ensures that matches are similar with regard to particular variables (e.g., females are compared with females), and MDM-paired units

will have close values on all or most covariates (which is not the case in for example PSM). Second, while most prior research focused exclusively on the *first* occurrence of reoffending after release from prison (i.e., prevalence), we also include offending *frequency* because transitioning from a life in which crime is common to a life without committing crimes usually occurs gradually (Bushway et al., 2001; Maruna, 2001). Third, several prior studies do not account for the increased probability that supervised individuals are imprisoned again because of technical violations of supervision conditions while it is likely that this impacts the time that persons are at risk for reoffending (Ostermann, 2015). In the current study, we used advanced research methods (e.g., multi-state survival models) which can take into account other events such as new periods of imprisonment.

Method

Data and Sample

To answer our research questions, we combined three different data sources at the individual level. First, information about prison admission and release dates of detainees was extracted from the Dutch prison registration system. Second, data about the start and end date of supervision assignments were supplied by the Dutch Probation and Parole Services. Third, conviction data were gathered from the Judicial Information System. The latter database contains information on all criminal cases for persons prosecuted in the Netherlands (Wartna et al., 2011). The Judicial Information System contains the complete history of criminal cases for everyone born after 1964. We were able to link 99% of all persons in the prison registration system to the Judicial Information System resulting in a rich linked dataset that includes detailed defendant and case characteristics, full criminal histories, the offense(s) on the indictment, and the sentence and supervision period for a full national population.

From the combined data, we selected all adults who were staying in a Dutch prison as a result of an unconditional or partly conditional custodial sentence and who were released from prison in 2012 or 2013 ($n=25,316$).² When a person was released multiple times between 2012 and 2013, the first period of imprisonment was selected as the index prison sentence. As supervision becomes increasingly standard for longer prison sentences, we exclude persons who stayed in prison for more than 1 year because we could not obtain a credible counterfactual for those with supervision after release from prison ($n=2,813$). Furthermore, we removed persons without a social security number ($n=2,802$), as it is likely that these persons do not have Dutch

nationality. As a substantial part of the non-Dutch persons leaving prison is expected to leave the Netherlands after release from prison (Light & Wermink, 2021), including this group would probably have biased our results, as we only have access to data about reconvictions in the Netherlands. We also removed a small group of persons with missing values on age, offense type, or country of birth ($n=86$). Altogether, the foregoing restrictions resulted in an analysis sample of 19,615 persons of Dutch nationality who were imprisoned for up to 1 year.

Of the persons who were imprisoned for up to 1 year, 42% was supervised following release ($n=8,250$). Persons who were supervised after release because of suspension of their pre-trial detention were excluded from the research sample ($n=1,196$). This type of supervision is generally much shorter than the types of post-release supervision studied in this paper. Additionally, we excluded formerly imprisoned persons who did not have initial face-to-face contact with a supervision officer within 18 months upon release ($n=235$).³ Furthermore, it was possible that a person was supervised because of a crime that did not have a connection with the prison period, for example, when multiple criminal cases were tried in quick succession or when the person was already being supervised before the start of the index prison period. We removed these persons from the supervision group as well ($n=2,133$). Moreover, outcome measures can become unstable if they are measured over a very short period of time, and therefore we omitted persons who were supervised for only a limited amount of time (less than 3 months) in the first 2 years after release ($n=264$). Finally, we omitted persons from the supervision group for whom the registered combination of type(s) of post-release supervision and/or the imprisonment length was impossible ($n=48$). This was likely due to administrative errors in the data. The resulting pre-matching supervision group consisted of 4,374 persons who were supervised (for a duration of at least 3 months) following release from prison.

The pre-matching comparison group included all persons who were not assigned to supervision within 6 months after release from prison ($n=11,365$). We removed persons who could not have been supervised for at least 3 months in the first 2 years after release due to death or new detention periods from this group ($n=194$). The resulting pre-matching comparison group consisted of 11,171 persons who were released without supervision.

Assignment of Post-prison Supervision in the Netherlands

Supervision was not assigned randomly across all formerly imprisoned persons in the Netherlands. To determine the association between supervision following release and reoffending, however, we aimed to compare supervised

persons to otherwise similar persons who were not supervised (i.e., we were trying to achieve “ignorable treatment assignment”). So, before going into the matching procedure, the assignment of supervision following release is discussed.

In the Netherlands, the assignment procedure of post-prison supervision differs according to its legal ground (i.e., partially suspended prison sentence, penitentiary program, conditional release). First, whether a partially suspended prison sentence with supervision is imposed, and which conditions are applied, is decided by the (sentencing) judge(s). Prior research indicates that the type of offense and criminal history are relevant for the probability that a partially suspended prison sentence (including supervision) is imposed by the judge (Harte et al., 2014; Van Wingerden et al., 2013).

Second, persons who serve an unconditional prison sentence of at least 6 months and with a remaining detention period of 4 weeks qualify for early release in the form of a penitentiary program (i.e., staying outside of prison while having daily activities of at least 26 hr a week). A penitentiary program always contains supervision. A selection officer of the Dutch Ministry of Justice and Security decides who is allowed to participate in a penitentiary program and which conditions are set (Boone et al., 2016). For participation in a penitentiary program the nature and gravity of the committed offense, the individual’s behavior during imprisonment, and the predetermined reoffending risk are decisive factors.

Third, conditional release is available for those who serve a fully unconditional prison sentence of more than 1 year (please note that these persons are still relevant for this study because following conditional release they actually stay <12 months in prison). The Central Facility Conditional Release decides whether a person is conditional released and which conditions are set (Boone et al., 2016). However, at the time that this research was conducted conditional release was almost always granted, save for a few exceptions such as persons who misbehaved during prison or those with a very high risk of reoffending. Around 75% of all conditional releases include supervision (Uit Beijerse et al., 2018). It is important to note that it is possible that for the same criminal case, a person is supervised on more than one legal ground, as participation in a penitentiary program is also possible for persons with a partly suspended sentence or can take place before conditional release.

Although the deciding actor for supervision differs according to the legal ground, in most cases the 3RO advised about the assignment of supervision, specific conditions (e.g., behavioral interventions, treatment, complying with a court-imposed curfew), and measures to monitor conditions (e.g., electronic monitoring, alcohol, and drug tests). This advice is—at least during those years this research focused on—frequently based on standardized risk

assessment tools such as the Quick Scan (a short checklist of mostly static and some dynamic risk factors) or the RISc (a comprehensive inventory of criminogenic needs; Bosker & Witteman, 2016).

Matching Procedure

To determine the association between supervision following release and reoffending, we aimed to compare supervised persons to otherwise similar persons who were not supervised by using various matching techniques. To satisfy the ignorable treatment assignment assumption, the matching procedure should include variables known to be related to treatment assignment and the outcome (Glazerman et al., 2003; Rubin & Thomas, 1996). The assignment of supervision appears to be influenced by the outcome of risk-assessments (Quick Scan and RISc), the type of offense, and in case of participation in a penitentiary program or conditional release: the behavior in prison and the length of the prison sentence. For this study we do not have access to information about individuals' conduct in prison nor to the risk-assessments. We do, however, have access to information about the offense committed, the prison length and a range of (static) variables that are important for the prediction of the reoffending risk and (possibly) the assignment of supervision. Appendix A of the supplementary material contains an exploration of the relationship between these variables and the likelihood of supervision assignment and reoffending. The analyses showed that, together, the available variables predict both supervision assignment and reoffending fairly well.

In the first step of our matching procedure we used a matching-by-variable approach. A matching by variable procedure results in exact matches on categorical variables and avoids the pairing of treated subjects with comparison subjects outside the predefined categories of continuous variables. A major drawback of applying by-variable matching, however, is that the number of combinations by which to match on grows exponentially as the number of variables increases. This, in turn, may result in a limited number of matched individuals per combination. Consequently, the estimated effect can be generalized only to a very specific population, resulting in reduced precision (Greifer, 2020). As a result, we have opted to use a matching-by-variable approach exclusively for select categorical variables and use relatively broad predefined binnings of continuous variables that are crucial for predicting supervision and reoffending post-release: gender (male/female), country of birth (born in or outside the Netherlands), age at release (18–25; 26–49; 50–89), mutually exclusive offense type categories (violent sexual, threatening and stalking, assault, crime against human life, violent theft, theft, other

property offenses, public order, public violence, arson, traffic, opium act, other crimes),⁴ imprisonment length categories (<1 month, 1–3 months, 3–6 months, 6 months–1 year), the total amount of prior convictions (0; 1–19; 20–49; 50–99; 100–287),⁵ the mean number of offenses per year in the 5 years before imprisonment (0; 0.2–0.99; 1–1.99; 2–3.99; 4–9.99; 10–32), being imprisoned before (yes/no), and being supervised in the past (yes/no).

In the second step of the matching procedure, we employed nearest-neighbors matching with Mahalanobis distance to enhance balance in continuous variables that were already used in the matching-by-variable approach. In addition, we included other characteristics known to influence reoffending, that is, age of onset (in years), prior convictions for a serious offense, the criminal case density (the number of criminal cases in the criminal career per unit time, corrected for time spent in prison) and number of prior imprisonment periods. With MDM, the difference between two persons X_i and X_j is measured with the Mahalanobis distance: $M(X_i, X_j) = \sqrt{(X_i - X_j)'S^{-1}(X_i - X_j)}$, where S is the sample covariance matrix of X (King & Nielsen, 2019). Distance is calculated for each treated/control pair. From those pairs that match exactly on the variables used in the matching by variable approach, the pair with the lowest distance is chosen. Persons in the comparison group can be used more than once, and are pruned if they are not used. We executed the matching procedure with Stata 15 (StataCorp, College Station, TX) using the KMATCH program (Jann, 2017).

Following the matching procedure, we evaluated covariate balance in the overall sample of treated and control subjects, in the matched treated and control subjects, and in the matched and overall sample of treated subjects. We assessed differences in means by using the standardized difference statistic in percentages. According to Rosenbaum and Rubin (1985), a characteristic is out of balance when the absolute value of the standardized difference D is greater than 20. Furthermore, we assessed the covariance balance of continuous variables by using the variance ratio (VR). Rubin (2001) suggests that variables are out of balance if the VR is greater than 2.0 or less than 0.5.

Outcome Variables and Analyses

For the current study, we used post-release crimes committed during and after the supervision period as outcome measures. To estimate the risk and frequency of crimes for which persons were ultimately convicted, we used conviction data from the criminal justice system. We defined a conviction as a valid judgment by the court or penalty order issued by the public prosecutor (i.e., decisions that found the defendant guilty, including policy waivers). Acquittals and technical dismissals were excluded, as well as subdistrict

court cases (i.e., minor offenses). We counted crimes ultimately ending in a reconviction that were committed during the supervision period as crimes committed during the period of supervision. Vice versa, we counted crimes ending in a reconviction that were committed after the supervision period as crimes committed after the period of supervision. We used information about convictions committed until the end of 2019. This means that there is a total follow-up period of at least 6 years. The observation period of crime during the supervision period lasts as long as the supervision period takes (the median time is 2 years). For persons in the comparison group, it lasts as long as their supervised counterpart is supervised. If a person in either the supervision or comparison group is supervised (again) for a new crime or dies, the observation period is ended.

Multi-state survival models take into account that several relevant other events (besides crimes) can take place during the follow-up period, such as imprisonment, death, and the start of (new) supervision periods. In addition, we used a Cox proportional hazards regression with a variance estimator proposed by Austin and Cafri (2020) to take into account the fact that some control units were used multiple times, which may otherwise cause artificially small confidence intervals. The analyses were executed with R using the packages *Mstate* (De Wreede et al., 2011) and *survival* (Therneau, 2020).

To analyze recidivism frequency during and after the supervision period, we applied zero-truncated negative binomial regressions. Negative binomial regressions have shown good performance in modeling count data characterized by overdispersion (i.e., a variance that is larger than the mean) resulting from high outliers (Payne et al., 2017). Moreover, these models allowed us to account for exposure time (i.e., time during or after the supervision period minus periods in which a person is imprisoned; the time at risk is ended when a person dies or when a new or different supervision assignment starts). The analyses were executed in Stata 15 using the *tnbreg* package (Therneau, 2020). Appendix B of the supplementary material provides additional information about multi-state models, Cox proportional hazards regression and zero-truncated negative binomial regressions.

Results

Matching Procedure

Before matching, the supervision group ($n=4,374$) and comparison group ($n=11,171$) differed on several covariates (see the balance diagnostics of group 1 vs. group 2 in Table 1), which underlined the need for matching. For example, a relatively small part of the supervision group consisted of persons

Table 1. Assessment of Balance of Characteristics Matched.

	Full sample			Matched sample			Balance diagnostics (1 vs 2)		Balance diagnostics (3 vs 4)		Balance diagnostics (1 vs 3)	
	Mean supervision group (1)	Mean comparison group (2)	Mean comparison group (4)	Mean supervision group (3)	Mean comparison group (4)	StdDif (in %)	VR	StdDif (in %)	VR	StdDif (in %)	VR	
												n = 4,374
Demographic characteristics												
Male (%)	90.8	92.1	94.4	94.4	94.4	-4.7		0.0		12.4		
Non-native (%)	29.2	46.2	29.0	29.0	29.0	-35.6		0.0		-0.4		
Age at release	32.7	34.7	31.8	31.8	31.4	-17.3	0.998	3.0	1.055	-8.6	0.855	
Characteristics of index case												
Violent sexual (%)	3.7	1.1	2.4	2.4	2.4	16.7		0.0		-6.6		
Threatening and stalking (%)	6.2	3.4	4.7	4.7	4.7	12.9		0.0		-6.3		
Assault (%)	17.0	8.3	18.4	18.4	18.4	26.3		0.0		3.8		
Crime against human life (%)	3.9	1.3	3.0	3.0	3.0	16.6		0.0		-4.4		
Extortion (%)	1.6	0.5	0.7	0.7	0.7	11.2		0.0		-6.8		
Violent theft (%)	14.8	5.8	15.3	15.3	15.3	29.9		0.0		1.3		
Theft (%)	26.1	38.6	30.3	30.3	30.3	-27.0		0.0		9.7		
Other property offenses (%)	2.6	7.6	2.2	2.2	2.2	-22.8		0.0		-2.5		
Public order (%)	2.7	4.2	2.2	2.2	2.2	-8.7		0.0		-2.6		
Public violence (%)	1.0	1.4	0.5	0.5	0.5	-3.4		0.0		-5.1		
Arson (%)	2.9	0.5	0.9	0.9	0.9	19.0		0.0		-12.2		
Traffic (%)	0.2	7.3	0.1	0.1	0.1	-38.1		0.0		0.0		

(continued)

Table 1. (continued)

	Full sample		Matched sample		Balance diagnostics (1 vs 2)		Balance diagnostics (3 vs 4)		Balance diagnostics (1 vs 3)	
	Mean supervision group (1) n=4,374	Mean comparison group (2) n=11,171	Mean supervision group (3) n=3,353	Mean comparison group (4) n=2,238	StdDif (in %)	VR	StdDif (in %)	VR	StdDif (in %)	VR
Opium act (%)	15.1	16.2	17.0	17.0	-3.1		0.0		5.5	
Other crimes (%)	2.4	3.9	2.3	2.3	-8.3		0.0		-0.8	
Imprisonment length (months)	3.6	2.2	3.4	3.4	46.9		0.0		0.0	
Criminal career characteristics										
Age of onset	20.1	21.4	19.5	19.3	-14.5	0.961	2.1	1.016	-7.1	0.774
Prior convictions	12.8	13.0	11.5	11.4	-1.5	1.139	0.7	1.062	-6.2	0.658
Prior serious convictions	1.0	1.0	1.0	0.9	-1.2	0.962	0.5	1.117	-2.9	0.840
Density of prior convictions	0.8	0.8	0.8	0.8	-0.1	0.962	0.7	1.037	-2.1	0.879
Mean number of prior offenses per year	1.7	1.4	1.6	1.6	15.7	1.223	1.6	0.971	-3.9	0.882
Prior imprisonments	3.0	3.3	2.9	3.0	-7.7	0.940	-1.8	1.064	-1.6	0.925
Supervision in past (%)	41.3	25.3	37.2	37.2	34.5		0.0		-8.4	

Note. StdDif = standardized difference; VR = variance ratio. Bold entries indicate standardized differences >20%.

who were born outside the Netherlands compared with the comparison group (standardized difference: 35.6%). Furthermore, a relatively large part of the supervision group was convicted for assault (standardized difference: 26.3%) or violent theft (standardized difference 29.9%), compared with the comparison group. The largest difference between the supervision and comparison group was the imprisonment length, persons from the supervision group were on average imprisoned for almost 4 months and the comparison group for 2 months (standardized difference: 46.9%).

After the matching procedure, 77% of the supervision group ($n=3,353$) was matched to an unsupervised person from the comparison group. Of the 2,238 matched comparison subjects, the number of treated subjects to which a comparison was matched ranged from 1 to 12, with a median of 1 (75th and 90th percentile: 2 and 3, respectively). The matched treated subjects did not appear to be very different from the total treatment group (most standardized differences were below 10%; see the balance diagnostics of group 1 vs group 3 in Table 1). Moreover, following matching, the means of every covariate were balanced across the treatment and comparison group, which is shown by standardized differences below 10% (see the balance diagnostics of group 3 vs. group 4 in Table 1). All variance ratios varied between 0.5 and 2.0. We therefore conclude that the supervision and comparison group are comparable with regard to the observed variables after matching.

Supervision Following Release and Reoffending During the Supervision Period

Table 2 provides results of Cox proportional hazards regressions and zero-truncated negative binomial regressions, which were executed to compare the risk and frequency of reoffending during and after the supervision period of supervised and unsupervised persons. Overall, our estimation results for the risk of reoffending *during* the supervision period suggest that recidivism prevalence did not differ significantly between individuals released under supervision and those released without supervision. The results with regard to the frequency of reoffending during the supervision period also showed no statistically significant differences between supervised persons (who committed at least one crime) unsupervised persons (who committed at least one crime). Furthermore, additional analyses focusing on the first and second year of the supervision period respectively, showed that supervision also did not have a significant association with the frequency of crimes committed.

Table 2. Comparison of the Risk and Frequency of Proven Crime(s) Committed During and After the Supervision Period Between the Supervision Group and the Comparison Group.

Outcome variables	HR/IRR	Robust CI	<i>p</i>
During supervision period			
Risk			
Supervision (comparison = ref)	0.984	[0.947, 1.023]	.675
Frequency			
Supervision (comparison = ref)	0.878	[0.753, 1.023]	.095
After supervision period ^a			
Risk			
Supervision: overall (comparison = ref)	1.007	[0.964, 1.051]	.879
Supervision: 0–6 months from start observation period	0.874	[0.811, 0.941]	.068
Supervision: >6 months from start observation period	1.065	[0.999, 1.136]	.326
Frequency			
Supervision (comparison = ref)	1.036	[0.904, 1.188]	.612

Note. HR = hazard ratio; IRR = incidence rate ratio; CI = confidence interval.

^aIn the models for the risk and frequency of proven crime(s) committed after supervision control variables (gender, country of birth, age at release, crime type, imprisonment length, age of onset, prior serious convictions, density of prior convictions, mean number of prior offenses per year, prior imprisonments, supervision in past, mean number of crimes committed during supervision period per year, mean number of imprisonments during supervision period per year) were included, but are not shown to conserve space (results from the full models are available from the authors upon request).

In practice, those under supervision may not have contact with their supervisory officer directly upon release, rendering their situation *de facto* not very different from those unsupervised. To test the robustness of our results for the timing of first contact with the supervision officer we conducted a series of sensitivity analyses limiting the analysis to those who had the first contact with the supervision officer within 12, 9, 6 or 3 months after their release from prison respectively and their unsupervised counterparts.⁶ The Results show that this hardly influenced the parameter estimates. Thus, the timing of first face-to-face contact with a supervision officer does not seem to affect the association between supervision and reoffending during the supervision period.

Supervision Following Release and Reoffending After the Supervision Period

We also analyzed the risk and frequency of reoffending committed *after* the supervision period.⁷ In these analyses, we controlled for all variables used in

the matching procedure, and for prison spells and crimes committed during the supervision period. Overall, the risk of reoffending was the same for persons who were supervised and those who were not supervised ($HR = 1.007$, see Table 2). The Schoenfeld residuals, however, revealed that the association between supervision and the risk of reoffending after supervision varied over time (i.e., the hazard ratio was not proportional over time). Consequently, we added an interaction with time to the model (0–6 months; 6 months or longer). The results show, however, that even though the association varied over time, the differences in risk of reoffending are not statistically significant. The difference in frequency of crimes committed by supervised persons and unsupervised was also not statistically significant. Additional analyses focusing on the first, second, and third year after the supervision period respectively, showed that being supervised was never significantly related with offending frequency.

Discussion

In many Western countries, supervision is considered an important tool to prevent future crime after release from prison, either through deterrence or rehabilitation of formerly imprisoned persons, or both. In the current study, we used a quasi-experimental approach to minimize selection effects and compare individuals released in 2012 or 2013 under supervision with those who were released from prison in 2012 or 2013 without supervision. Such estimates of the association between post-prison supervision and reoffending are pivotal for shaping penal policy.

Compared to being released without supervision, we find that in the Netherlands post-prison supervision is not related to reoffending *during* the supervision period. This conclusion holds across various measures of registered recidivism, that is, prevalence, and frequency of reoffending. Our analyses further reveal that post-supervision in the Netherlands is also not related to reoffending *after* the supervision period. Again, we find this to be the case for both the prevalence and frequency of recidivism. While several prior international studies found that supervision following release succeeded in reducing recidivism, our results are in line with the majority of prior studies with the most rigorous study designs, which also indicated that supervision following release was unrelated to recidivism (Drake & Barnoski, 2006; Green & Winik, 2010; Jackson, 1983).

There are several possible explanations for not finding a relationship between supervision following release and recidivism. For one, prior research suggested that supervision programs that are solely based on surveillance do not reduce crime (Lowenkamp et al., 2010), and that a combination of surveillance and support is the most effective in terms of recidivism reduction

(Aarten et al., 2015; Kennealy et al., 2012; Paparozzi & Gendreau, 2005). So, if the emphasis of supervision is too much on surveillance this might decrease its crime reducing effect. Although in the Netherlands supervision was supposed to be focused on both surveillance and support, the emphasis, during the time of this study, might have been too much on surveillance. Interviews with supervised formerly imprisoned persons in the Netherlands indeed revealed that most of them perceived supervision as predominately aimed at monitoring, while in their view little effort was given to offer assistance (Doekhie et al., 2018).

Another possible explanation is that the RNR principles were not (always) fully applied. Prior research showed that supervision-based programs that adhered to the RNR principles were more effective in reducing reoffending than programs that did not (Lowenkamp et al., 2006). In the Dutch supervision practice the risk principle seemed to be met (standardized risk assessments were used during the assignment phase), but some issues regarding the need and responsivity principle can be identified. For one, some risk assessment tools used during the supervision assignment phase, provide limited information about the criminogenic needs (i.e., decisions to assign supervision, including the supervision conditions, were made with limited knowledge of needs). However, if such a risk assessment tool was used during the assignment phase, additional risk assessments tools were carried out somewhere around the start of supervision to ensure that the supervision plan (which contains the goals of supervision, the intensity level, use of behavioral interventions) could be adapted to the criminogenic needs. Furthermore, research has shown that in breach with the responsivity principle, the goals set in supervision do not always match with what the supervised individual considered to be important objectives (Bosker & Witteman, 2016).

Also, as prior research showed that training supervision officers in core correctional practices resulted in lower recidivism rates (Chadwick et al., 2015; Labrecque et al., 2023), not paying enough attention to the core correctional practices of supervision might influence the effect of supervision. Prior work in the Netherlands suggested that during the time of our study some core correctional practices indeed were receiving too little attention, e.g., the relationship between the supervision officer and client (e.g., Menger, 2017; Menger & Donker, 2012).

Strengths and Limitations

A strength of the current study is that it examined the relation between supervision following release and reoffending both during and after the period of supervision. Furthermore, compared to many prior studies, the current study

used a stricter matching procedure to create pairs of supervised and unsupervised persons who were similar on a large range of variables important for the (prediction of) reoffending and the assignment of supervision.

There are, however, also some limitations to take into consideration. First, although the current study used a strict matching procedure, we can only control for differences between supervised and unsupervised persons on observed factors. We lack access to information regarding individuals' conduct in prison and risk-assessments, while both may be important for the decision to supervise. Consequently, we do not have data on important (dynamic) risk variables, such as accommodation, substance use, or mental health problems. The omission of these factors from the matching procedure might have led to unobserved differences between the supervision and comparison group, potentially biasing our results as dynamic risk factors are known to have an impact on recidivism (e.g., Brennan et al., 2009; Lloyd et al., 2020). For that reason, caution is still warranted in making causal inferences. Given that including dynamic variables remains challenging for future (Dutch) research on the effectiveness of supervision, it is important to explore research designs beyond matching (e.g., randomized controlled trial, instrumental variable analysis, fixed effects analysis) to assess the effectiveness of supervision on reoffending as these research designs are better able to deal with unobserved differences.

Second, we only used official measures of reoffending. Although official measures by definition underestimate actual criminal behavior, the use of registered crimes may in particular bias the comparison of reoffending *during* the supervision period, as the higher level of surveillance during supervision might provide authorities with more opportunities to observe (minor) offenses committed by supervised persons. An important direction for future research therefore, is to study the risk and frequency of reoffending during the supervision period by using self-report data.

Third, for the current study, we only examined the effect of supervision following relatively short prison terms (a maximum of 1 year). We cannot readily assume that the effect of supervision is the same after prison spells exceeding 1 year. Still, prior research tends to find that the reoffending risk is not significantly related to the length of imprisonment (e.g., Green & Winik, 2010; Stam et al., 2023), and that persons with prison spells of varying lengths deal with quite similar problems (such as problems with income, debts and housing) both before and after release from prison (e.g., Brand et al., 2020; Weijters et al., 2010), suggesting that similar mechanisms might underlie the effects of supervision in those with lengthier prison spells. In any case, given the high prevalence of short-term imprisonment in the Netherlands, other Western European countries, and even in the US—where 42% leaving

state prison in 2018 served less than 1 year (Kaeble, 2021)—our findings are relevant for a substantial group of formerly imprisoned persons.

Fourth, it remains unclear whether the findings could also apply to jurisdictions in which post-prison supervision is implemented differently than in the Netherlands. Although supervision has some distinct characteristics that are common among many countries (e.g., the mechanisms by which supervision is supposed to reduce reoffending), there may be differences in, for instance, the assignment procedure, the appliance of RNR principles, or the prevailing approach of supervision (surveillance and/or support). That being said, even though results from other jurisdictions might not be one-to-one applicable, findings about the effectiveness of supervision in other jurisdictions—including a detailed description of what that supervision entailed—may help to contemplate the supervision practice in one's own country or state.

Conclusion

Every year, millions of individuals all over the world are placed under supervision following release from prison under the assumption that supervision contributes to preventing future crimes either through deterrence, rehabilitation, or both. A solid empirical foundation for this assumption however is lacking, and the results from the current study (again) implicate that post-prison supervision (as a general approach) is not related to fewer offending either during or after the supervision period. As how supervision works out in practice differs both between jurisdictions, and between individuals within jurisdictions, future research should focus on these differences (e.g., the frequency and quality of contact, the conditions involved, and the use of additional surveillance measures such as electronic monitoring), and aim to assess potential heterogeneity in supervision effects across different groups of persons released from prison.

Authors' Note

The current paper does not necessarily reflect any views, opinions or policies of either the Research and Data Centre (WODC) or the Dutch Ministry of Justice and Security. The authors are solely responsible for the contents of the current paper.

Author Contributions

All authors contributed to the study conception and design. Data editing and analysis were performed by Suzan Verweij. The first draft of the manuscript was written by Suzan Verweij and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Financial support for the contribution of Hilde Wermink was provided by The Netherlands Organization for Scientific Research (451-17-018).

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. The vast majority of persons who are facing additional conditions are under supervision in the Netherlands. This supervision is necessary to verify their adherence to the imposed conditions. Consequently, it is unlikely that individuals released without supervision would be required to adhere to additional conditions.
2. For the current study, we selected only persons sentenced to prison. In the Netherlands, persons can be detained not only as a result of a prison sentence, but also because of a revocation of a suspended sentence, for non-payment of fines, or as a component of a criminal measure for high frequency offenders. Furthermore, a person may stay in pre-trial detention, but in the end is not sentenced to prison.
3. Although the first face-to-face contact between a supervision officer and formerly imprisoned person mostly takes place within the first month(s) after release from prison (88% had a first face-to-face contact within 3 months), it may take several months before a supervision officer is able to establish face-to-face contact with a formerly imprisoned person. For that reason, we did not only select persons who had their first face-to-face contact immediately after release, but selected all persons who had face-to-face contact with a supervision officer within 18 months after release. By way of sensitivity analyses we analyze whether limiting the time that is allowed between release and a first face-to-face contact to respectively 12, 9, 6, or 3 months influences the results on reoffending during supervision.
4. The used offense type categories are based on the standard classification of crimes by Statistics Netherlands. These categories are mutually exclusive. Each criminal act is classified into one of the offense type categories. This classification is

- as specific as possible. For instance, street robbery is classified as violent theft, rather than being grouped under theft.
5. In the binning of prior convictions we wanted to create a division between persons with and without prior convictions. Furthermore, we wanted to separate persons with multiple convictions and those with exceptional numbers of crimes.
 6. For these truncated groups, we conducted the same balance assessments as we did for the full groups. These balance tests showed that the truncated supervision and comparison groups are comparable on the variables used in the matching procedure (i.e., the standardized differences are below 5%; results from the additional balance assessments are available from the authors upon request).
 7. It was not possible to examine crimes committed after the supervision period for everyone in the supervision and comparison group, as persons started a new or different supervision assignment in the meantime, died while being supervised, were imprisoned again until the end of the observation period, were supervised the entire observation period, or were not at risk for at least 90 days in the period after the supervision period. We were only able to include 2,518 persons from the matched supervision group (75%), and 2,660 persons from the matched comparison group (79%). See Appendix C in the supplementary materials for an additional balance assessment for the adjusted supervision and comparison group, along with an explanation of how we handle these groups in the analyses.

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