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# Is There a Relationship Between Prison Conditions and Recidivism?

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## ABSTRACT

Recidivism rates after release from prison are high worldwide. While research has not shown much promise in the ability of incarceration to reduce the risk of reoffending, little attention has been paid to the variation in prison experiences. This article examines if a relationship exists between prison conditions (unit characteristics and prison climate) and recidivism, and if any such relationship can be attributed to contextual or selection effects. A combination of survey and administrative data were used from 2,366 individuals incarcerated in the Netherlands. Findings showed significant bivariate relationships between prison conditions at the unit level and reconviction within two years after release. Multivariate analyses indicated that these relationships could be explained by differences in unit composition in terms of criminal history variables. These results demonstrate the importance of considering the prison unit in analyses of prison effects, and controlling for non-random assignment of individuals to units.

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## KEYWORDS

Prison social climate; prison culture; prison conditions; incarceration; recidivism

It is well established that many individuals who are released from prison commit new offenses. In the US, 60% of 404,638 state prisoners released in 2005 in 30 states were rearrested within two years, and 36% were reconvicted (Durose et al., 2014). In the Netherlands, 47% of 29,329 prisoners released in 2015 were reconvicted within two years (Weijters et al., 2019). Worldwide, two-year reconviction rates vary between 20% and 63%, but comparisons are difficult due to inconsistency in reporting and calculations (Yukhnenko et al., 2019). Overall, imprisonment does not appear very effective at reducing crime and decreasing the risk of reoffending; it may even have an opposite effect (Bales & Piquero, 2012; Durlauf & Nagin, 2011; Loeffler & Nagin, 2021; Nagin et al., 2009).

Little is known, however, about the contribution of specific prison conditions to the risk of recidivism. There are important differences between prisons in terms of regime, activities offered, and social climate. These differences may be linked to security

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classification, individual background factors, or they may be related to organizational qualities. More information about prison conditions that are associated with recidivism (if any) could improve correctional effectiveness, and inform theory development on the impact of imprisonment and the process of desistance. At the heart of this is also a question about fairness: does it matter in which prison (unit) you are incarcerated for your chances of success after release?

## **Prison Experiences and Recidivism: Theory and Prior Research**

A prison spell is a significant life event, and there are various mechanisms through which imprisonment may have an effect on the future life course, including offending behavior. There are mechanisms that may reduce future offending, and those that may increase offending. A reducing effect may result from aging out of offending during incarceration, deterrence, and rehabilitation. An increasing effect may result from damage to social control, defiance, and social learning.

Previous research on the relationship between imprisonment and reoffending has generated mixed evidence, including studies that found no effect, criminogenic effects, and reducing effects (for a review of the literature, see Nagin et al. (2009)). Yet, much of this research is characterized by methodological limitations, including selection bias. With this in mind, more rigorous studies, for example with propensity-score matching, tend to find a criminogenic effect of imprisonment (Bales & Piquero, 2012; Cochran et al., 2014; Nagin et al., 2009; Nieuwbeerta et al., 2009; Wermink et al., 2018). Studies capitalizing on random judge assignment to address the problem of selection bias (judge instrumental-variable studies) offer further evidence that incarceration does not appear to reduce the risk of reoffending (Green & Winik, 2010; Harding et al., 2017; Loeffler, 2013; Nagin & Snodgrass, 2013). There is some evidence that a longer duration of imprisonment is associated with lower rates of recidivism, but this effect does not appear linear, nor consistent over time (Loughran et al., 2009; Meade et al., 2013; Mears et al., 2016; Rhodes et al., 2018; Rydberg & Clark, 2016). A study conducted in the Netherlands, where prison sentences are short compared to the US, found no effect of time served on recidivism (Wermink et al., 2018). Previous research found contradictory results regarding gender differences in the effect of imprisonment on recidivism: Mitchell et al. (2017) found that imprisonment had a criminogenic effect for men only, while Mears et al. (2012) found that imprisonment had a similar criminogenic effect for men and women.

This existing body of research has mostly treated imprisonment as a uniform experience, with variation only in time served. Less attention has been paid to differences in prison experiences. Prisons have some inalienable characteristics, including the deprivation of liberty that is considered the quintessential feature of incarceration as punishment. Yet, there are also small and large differences among prisons, within and between countries. These differences can have a large impact on how imprisonment is experienced, and they may also affect the risk of recidivism. To illustrate this point, consider that Bhuller et al. (2020) found that imprisonment in Norway was associated with a reduction in future offending, which was explained as a result of participation in job training and a subsequent increase in employment for previously

unemployed incarcerated individuals. This finding is in contrast with US-based studies using the same judge instrumental-variable approach that did not identify a crime-reductive effect of incarceration (Loeffler & Nagin, 2021). Arguably, the greater emphasis on rehabilitative programming and more selective use of imprisonment in Norway compared to the US can account for this discrepancy. Attention to the heterogeneity of prison experiences could help us better understand the mixed evidence on the effects of imprisonment on recidivism (Mears et al., 2015). In the current study, we focus on the contribution of objective (administrative) characteristics of imprisonment on the one hand and shared subjective experiences of prison conditions (prison climate) on the other hand.

### ***Objective Characteristics of Imprisonment***

Surprisingly little is known about the association between objective characteristics of imprisonment and recidivism, apart from some relevant studies in which strain and deprivation are operationalized using objective characteristics, and research on differences between public and private prisons. There is no empirical support for the idea that tougher prison conditions would deter people from reoffending after release. In fact, there is some evidence for an opposite effect, namely that harsher conditions increase the risk of reoffending when operationalized in terms of security level or crowding. With an analysis of data from a unique experiment, Gaes and Camp (2009) demonstrated that individuals with a similar security classification (level III) were more likely to recidivate when released from a higher security prison (level III) than a lower security prison (level I) in California. Similar results were found by Chen and Shapiro (2007), who used a regression-discontinuity approach to analyze three-year recidivism rates for people released from federal prisons in the US. They showed that people released from higher security prisons did not have a lower risk of recidivism than people released from lower security prisons, with some indications that people released from lower security prisons had more favorable prospects. Overcrowding, another operationalization of harsh prison conditions, has also been associated with greater odds of reoffending in England and Wales (Farrington & Nuttall, 1980) and Italy (Drago et al., 2011); although this finding has not been replicated in a study using a US-based sample (Clayton & Carr, 1987).

The results on the effects on recidivism of incarceration in public versus private prisons are mixed. This is not surprising, given the likely variation in how private prisons are managed. Multiple studies have been conducted comparing outcomes for private and public prisons in the US. Most of these studies – conducted in different states – found either no significant difference in recidivism rates between private and public prisons (Bales et al., 2005; Mukherjee, 2021), or higher recidivism rates after incarceration in a private facility (Duwe & Clark, 2013; Spivak & Sharp, 2008), when controlling for relevant individual risk factors. The only study showing superior outcomes for people released from private facilities, used a very small sample (Lanza-Kaduce et al., 1999). There is insufficient research into the explanatory mechanisms behind these results, but a possible explanation could be that public prisons offer more opportunities for rehabilitation through programming and education (Duwe & Clark, 2013).

Overall, there is some evidence that objective prison characteristics are related to recidivism, independent of individual characteristics that may influence assignment to specific prisons. It is likely that this depends partly on a country's organization and management of its prisons: some countries likely have greater variation in prison conditions between prisons than other countries. This shows that it is important to take these differences into account when explaining recidivism.

### ***Prison Climate***

Prison conditions may also differ based on less tangible characteristics, including atmosphere, perceptions of deprivation, treatment by staff, and peer relationships. Although these experiences are subjective and can vary between individuals in the same environment, it is likely that this variation is greater for individuals across different prison units than for individuals within the same unit, meaning that there is clustered variance (Van Ginneken & Nieuwebeerta, 2020). In the current study, we are especially interested in this shared subjective experience of prison conditions, which we refer to as prison climate. While harsh prison conditions apparently fail to deter future offending, there is slightly more support for the idea that positive experiences may have a rehabilitative effect (Auty & Liebling, 2020). This effect may result from positive interactions with staff and peers triggering cognitive changes, as well as from meaningful activities, which may additionally equip individuals with helpful skills.

Various dimensions of prison climate have been separately studied in relation to recidivism. Most of this research, however, has only looked at the relationship between individual experiences and recidivism, rather than shared experiences. First, lower subjective safety during imprisonment has been linked to higher rates of recidivism (Listwan et al., 2013; Windzio, 2006). Second, greater perceived procedural justice was associated with lower rates of recidivism in a study with Dutch prisoners, although this effect was small (Beijersbergen et al., 2016). This effect was not mediated by legitimacy (operationalized as support for criminal justice authorities and obligation to obey the law). Possibly, it reflected a relational component of the prison experience; that is, individuals perceived higher procedural justice when treated kindly by staff. It was not ruled out that this was due to personal characteristics and behavior of prisoners (for example, prisoners who behaved better were treated better). Third, subjective severity of the prison experience was not associated with recidivism in a study with the same sample of Dutch prisoners, when controlling for criminal history variables and socio-economic status (Raaijmakers et al., 2017). This demonstrates the need to correct for individual characteristics that may affect both the prison experience and recidivism. Differences in activities offered in prisons may also be related to recidivism, although it is difficult to separate these from individual characteristics that may affect participation. Prior research suggests that there is a positive effect of post-secondary education in prison, even after controlling for self-selection bias (Kim & Clark, 2013). Possibly, prison education may reduce recidivism through increasing employment prospects (Duwe & Clark, 2014). These prior studies may tell us more about unique experiences than about prison conditions because they have measured aspects of prison climate on an individual level.

The term 'climate' suggests that it says something about the environment (shared experiences) and not just about individual experiences. Yet, there has been very limited research that has considered the influence of shared perceptions of prison climate. This could be achieved by aggregating individual perceptions on a higher level (e.g., prison unit or prison), provided that there is sufficient perceptual agreement among respondents (Van Ginneken & Nieuwbeerta, 2020). One prior study analyzed the relationship between scores on different prison climate dimensions and reoffending rates at the prison level, with data from England and Wales (Auty & Liebling, 2020). They found evidence that prisons with higher scores on prison climate (related to relationships, security and organization) had lower recidivism rates than would be expected. Since the analysis was conducted entirely on the prison level, they were unable to control for individual-level risk factors of recidivism, and did not establish the degree of perceptual agreement in relation to prison climate. This makes it difficult to separate the effects of climate from selection or population composition effects; for example, prisons with a similar security classification incarcerate individuals with different criminal histories and other risk factors for reoffending. Clayton and Carr (1987) illustrated this methodological problem in the analysis of the relationship between prison density and recidivism: while density was positively related to recidivism, density was also (more strongly) negatively related to average cohort age. When average age was controlled for, the relationship between density and recidivism was no longer significant.

Overall, the research on experiences of imprisonment has not been able to distinguish contextual effects of prison conditions from the clustering effects of individuals with certain risk factors. A contextual effect means that the prison conditions themselves alter the risk of recidivism, while a selection or clustering effect means that both the prison conditions and the risk of recidivism are related to other factors. In other words, this would mean that prison unit conditions are associated with clustering effects of individual-level risk factors due to non-random assignment to prison units. Prior studies that found effects of prison characteristics either did not sufficiently account for possible selection effects due to non-random assignment to prisons (Auty & Liebling, 2020), or were unable to pinpoint what aspects of the prison experience could account for the effects on recidivism (Bales et al., 2005; Duwe & Clark, 2013; Spivak & Sharp, 2008). Other studies that considered subjective prison experiences only looked at associations on the individual level (Beijersbergen et al., 2016; Listwan et al., 2013; Raaijmakers et al., 2017; Windzio, 2006), without considering contextual effects that could result from positive or negative relational or organizational aspects of incarceration in a specific unit or prison.

In order to properly study the implications of the heterogeneity of prison experiences on recidivism, it is necessary to account for shared objective and subjective differences in prison conditions, and consider the contribution of selection and contextual effects. This study will address these limitations using multi-level analysis with a combination of survey and administrative data on people incarcerated in Dutch prisons. The following research question will be answered: Are prison (unit) conditions related to risk of recidivism, and if so, is this due to contextual or selection effects? We include two main types of prison (unit) conditions in our study: prison climate and

administrative characteristics. The selection of variables included in the study follows, on the one hand, from recent insights and available data on prison climate, and on the other hand, from the organization of prisons in the Netherlands. Regarding prison climate, we chose to focus on dimensions that capture differences in the shared experienced deprivation of liberty ('autonomy') and security ('safety'), relational experiences ('peer relationships' and 'staff-prisoner relationships'), and the perceived availability of activities ('meaningful activities'). This is in line with prior research that focused on the relationship between perceptions of prison conditions and recidivism, pointing to the importance of staff-prisoner relationships (Beijersbergen et al., 2016), and safety, peer relationships, and autonomy (Auty & Liebling, 2020). The rating of meaningful activities was included as the best possible measure of availability of activities such as education, which was also found related to recidivism in prior research (Kim & Clark, 2013).

### **Imprisonment in the Netherlands**

Prison conditions differ within and between countries, so it is important to consider what may distinguish imprisonment in the Netherlands from imprisonment elsewhere. Overall, the Netherlands has a comparatively low incarceration rate, at 49.6 per 100,000 inhabitants (Aebi & Tiago, 2021). There are no problems with overcrowding. Incarceration conditions are considered relatively favorable and less restrictive in comparison with England and Wales (Kruttschnitt & Dirkzwager, 2011) and the US (Kruttschnitt et al., 2013), although this latter international comparison drew attention to the lack of meaningful activities in Dutch prisons.

In terms of sentencing, it is noteworthy that a relatively large proportion of people incarcerated in the Netherlands serve short sentences: half of all individuals released from prison in 2017 had a maximum stay of 27 days (Dienst Justitiële Inrichtingen, 2018). Compared to other countries, the Netherlands also has a relatively large population of pre-trial detainees. Carceral facilities (28 in total at the time of the data collection for this study) house a mixed population of individuals, with separate units for pre-trial detainees and convicted prisoners. This means, in contrast with some other countries, that a prison in the Netherlands can have units with different regimes and types of populations. There are also other specialized units, which differ in terms of security, programming, staff assignment, hours out of cell, and privileges. Prisons are not classified in terms of security level in the same way as prisons in some other countries. The main regimes at the time of the data collection were regular prison regimes, pre-trial regimes, short-stay custody, minimum security, extra care, and persistent offenders. Extra-care units are smaller in size and suited for persons who are considered vulnerable due to mental health problems or the nature of their offense. So called 'persistent-offender units' are reserved for persons who received a 'correctional measure' of two years' custody for repeated offending that does not normally warrant such a long sentence ('Inrichting Stelselmatige Daders, ISD'). Apart from these regime differences, conditions are fairly uniform in the Netherlands: there are no private prisons, and daily programming is fairly similar across prisons (e.g., every individual can receive one or two hours of visits, depending on their privilege level). Reintegration

activities and support are mainly targeted at addressing problems with housing, employment and income, debt and financial management, identification documents, and health care. There is also attention to motivation to change, and a person's social network (Dienst Justitiële Inrichtingen, 2020).

Based on the organization of imprisonment in the Netherlands, the most important administrative characteristic related to prison (unit) conditions is regime. This variable captures much of the variation in day-to-day programming and restrictions. Additional variables included in this study are unit capacity (size), unit occupancy rate, and staff-to-prisoners ratio, because these characteristics may vary between units with the same regime.

## Methodology

### *Data*

We use data from the Life in Custody Study, which is a periodic national survey among all persons incarcerated in the Netherlands (Van Ginneken et al., 2018). All persons who could be approached were invited to participate by researchers. The study was explained in person and participants were handed paper questionnaires (available in Dutch, English and Spanish) to complete in private, or offered the opportunity to complete the survey with researcher assistance. The questionnaires were collected again in the same week by the researchers. Participants were asked explicit consent for research participation and the linking of their survey data to administrative information, including criminal records.

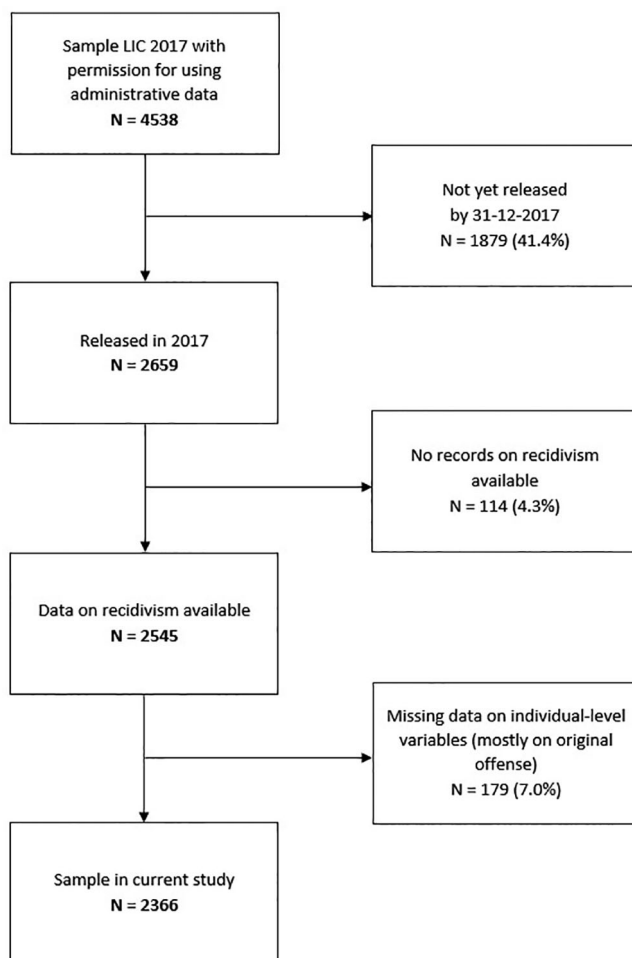
The sample of the current study consists of participants in the 2017 survey who were released in 2017. Out of 4,938 participants (response rate 81%), 4,538 gave permission for obtaining administrative data, and 2,545 were released in 2017 and could be linked with data on recidivism. The original survey sample was representative of the population in terms of age, sex and time served. After deletion of cases with missing information on individual-level variables, the final sample consists of 2,366 participants, incarcerated in 215 units in 28 carceral facilities (see Figure 1 for more details on the sample-selection process).

### *Measures*

#### *Recidivism*

Data on recidivism was available for participants released in 2017, and until 31 December 2019. This data was provided by the Research and Documentation Centre (WODC) of the Dutch Ministry of Justice and Security. Various measures of recidivism were created, to account for the complexity of reoffending trajectories; we chose to include measures of short-term recidivism, longer-term recidivism, and account for level of seriousness in longer-term recidivism. Short-term recidivism was measured based on whether a participant was reconvicted within six months after release (1 = yes, 0 = no). Long-term recidivism was measured based on whether a participant was reconvicted within two years after release (1 = yes, 0 = no). Additionally, separate measures were created for reconviction for a serious offense within two years after





**Figure 1.** Flowchart displaying the sample selection process.

release (1 = yes, 0 = no), and reconviction for a very serious offense within two years after release (1 = yes, 0 = no). Serious offenses include any offense with a maximum sentence of four years' incarceration and higher, or any offense that allows for the imposition of pre-trial detention. Very serious offenses include any offense with a maximum sentence of eight years' incarceration and higher. All participants had an equal time at risk using these recidivism measures.

### ***Prison Unit Conditions***

With prison (unit) conditions we refer to objective characteristics and prison climate. We measured objective unit characteristics using administrative data made available by the Dutch Custodial Institutions Agency. We included information on unit capacity, unit occupancy rate, and staff-to-prisoners ratio (FTE). For the four units with missing information on staff-to-prisoners ratio and two units with missing information on unit capacity and occupancy rates, mean scores were imputed. Dummy variables were

included to account for regime (regular prison regime, pre-trial regime, minimum security, short-stay custody, persistent offenders, and extra care).<sup>1</sup> Additionally, we calculated variables for unit composition in terms of individual risk factors: mean and median age of first court case, mean and median number of prior convictions, and proportion of individuals with different index offenses. These variables were all related to the unit level. No variables were included on the prison level, because – as was discussed in more detail in the section ‘Imprisonment in the Netherlands’ – notable differences in terms of regime and population are related to units rather than prisons.

Prison climate was measured using a validated instrument, the Prison Climate Questionnaire (Bosma, Van Ginneken, Palmen, et al., 2020). Five scales were included based on theoretical relevance: autonomy was measured using four items (e.g., ‘I can decide for myself on matters that are important to me’) and has a Cronbach’s alpha of 0.86. Peer relationships were measured using five items (e.g., ‘The prisoners treat each other respectfully here’) and has a Cronbach’s alpha of 0.86. Staff-prisoners relationships were measured using eight items on the quality of contact with staff and procedural justice (e.g., ‘Staff members in this unit treat me fairly’) and has a Cronbach’s alpha of 0.94. Safety was measured using five items (e.g., ‘There are places in this institution where I feel unsafe’) and recoded so that a higher score reflected greater subjective safety ( $\alpha = 0.89$ ). Meaningful activities were measured using four items (e.g., ‘During the daily program I learn useful skills’) and has a Cronbach’s alpha of 0.91. Each item was rated by participants on a five-point scale from totally disagree to totally agree. An average scale score was only calculated if participants had given a rating on more than half of the scale’s items. Unit scores on prison climate were calculated by aggregating the means of ratings of individuals on the same unit. This was justified based on significant clustered variance on the unit level in prison climate, as demonstrated by intraclass correlations between 0.03 (safety) and 0.13 (autonomy).

### ***Control Variables***

Relevant individual characteristics were included as control variables and individual-level risk factors for recidivism. From administrative data, variables were included on age (in years), sex (1 = female, 0 = male), index offense (violent offense, sex offense, property offense without violence, drugs offense, other offense [e.g., traffic], or acquittal), incarceration length (in days, standardized), time served in the current unit (1 = a month or longer, 0 = less than a month), time to release after survey date (in days), prior convictions in the past five years, age at first court case (in years), and nationality (1 = Dutch, 0 = non-Dutch).

### ***Analytical Strategy***

We used SPSS (version 25) for data preparation and one-level analyses, and Stata (version SE 15) for multi-level analyses. We conducted the analyses in four steps: Step one was the estimation of variance at the unit and prison level, with an empty model without predictors. This gives an indication of the degree of variance in our dependent variable that is clustered on the unit and prison level, rather than the individual

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<sup>1</sup>Seven participants had a special security classification (related to [suspicion of] a terrorist index offense or severe behavioral problems), but because this was such a small number, they were included in the regular prison regime.

level – and may therefore be attributed to differences between units or prisons. We calculated the intraclass correlations for recidivism using the postestimation command `estat icc`. Step two was the estimation of zero-order effects of prison unit conditions on recidivism using `xtmelogit`. This answers the first part of the research question, whether prison unit conditions are associated with recidivism. Step three was a multi-level logistic regression using `xtmelogit`, to control for individual-level characteristics. This answers the second part of the research question, if associations between prison unit conditions can be explained by contextual or selection effects. Intercepts were the only random parameters in these models. All continuous predictors were grand-mean centered. The likelihood ratio test (`lrtest`) was used to check whether the nested and less restrictive model (model 2) had a significantly improved fit compared to the more restrictive model (model 1). VIF statistics were calculated based on simple logistic regression models (`regress` and `vif`). They were not considered problematic (O'Brien, 2007). Step four was the estimation of bivariate relationships between prison conditions and unit composition at the unit level using Pearson's correlation and a Welch's ANOVA (unequal variances), with Games-Howell post-hoc comparisons. This step allows for the further exploration of selection effects. These bivariate analyses can show us how effects of individual-level variables can also be related to clustering effects at the unit level. For this purpose, we created a dataset with relevant control variables aggregated at the unit level.

We wanted to account for the potential methodological flaw in our design that we did not know if respondents had been incarcerated in other units after they completed the survey and prior to release. Therefore, we performed robustness checks by running the models (1) for respondents who had spent at least one month in the current unit at the time of the survey ( $n = 1,143$ ); (2) for respondents who were released within two months after completing the survey ( $n = 1,200$ ); and (3) for units with five or more respondents ( $n = 2,256$ ). To account for the possibility that contextual effects only materialize after longer-term incarceration, we also performed the logistic regression for participants who had served at least half a year ( $n = 1,077$ ). The full results of these analyses are included as [supplementary material](#) (Supplementary Tables S2–S7). We chose to report the results for the full sample in the paper to minimize the loss of respondents and associated analytical power, and because the robustness checks did not indicate any problems.

## Results

Table 1 shows the descriptive statistics for all variables at the individual and unit level. It shows that over a quarter of all participants were reconvicted within six months after release, and half within two years. Forty-three percent of all participants are reconvicted for a serious offense, and 10% for a very serious offense. In terms of prison climate, it is shown that the average unit scores on meaningful activities ( $M = 2.29$ ,  $SD = 0.47$ ) and autonomy ( $M = 2.73$ ,  $SD = 0.52$ ) are below neutral (3). The other prison climate dimensions are rated more positively, with safety receiving the highest average unit score ( $M = 4.02$ ,  $SD = 0.34$ ).

**Table 1.** Descriptive statistics.

Variables	N	Min	Max	M	SD
Level 1 variables					
<b>Dependent variables</b>					
Reoffending within 6 months after release (1 = yes)	2366	0	1	0.26	0.44
Reoffending within 2 years after release (1 = yes)	2366	0	1	0.49	0.50
Serious reoffending within 2 years after release (1 = yes)	2366	0	1	0.43	0.50
Very serious reoffending within 2 years after release (1 = yes)	2366	0	1	0.10	0.30
<b>Control variables</b>					
Age	2366	18	81	35.80	11.59
Sex (1 = female)	2366	0	1	0.06	0.23
Index offense					
Violence	2366	0	1	0.29	0.45
Sex	2366	0	1	0.03	0.18
Property	2366	0	1	0.35	0.48
Drugs	2366	0	1	0.17	0.37
Other (e.g., traffic)	2366	0	1	0.12	0.33
Acquittal	2366	0	1	0.04	0.20
Incarceration length (days)	2366	3	5451	276.87	382.46
Time served in current unit (1 = a month or longer)	2366	0	1	0.48	0.50
Time to release after survey date	2366	1	332	88.33	84.77
Prior convictions past 5 years	2366	0	23	2.95	3.20
Age at first court case	2366	12	73	20.65	9.30
Nationality (1 = Dutch)	2366	0	1	0.86	0.35
Level 2 variables (prison-unit conditions)					
<b>Prison climate (unit aggregate)</b>					
Autonomy	215	1.50	5.00	2.73	0.52
Peer relationships	215	2.64	5.00	3.47	0.33
Staff-prisoner relationships	215	2.29	5.00	3.37	0.45
Safety	215	2.70	4.93	4.02	0.34
Meaningful activities	215	1.00	3.83	2.29	0.47
<b>Prison unit characteristics</b>					
Unit capacity	215	7.00	98.00	34.90	17.90
Unit occupancy rate	215	0.38	1.00	0.89	0.15
Staff to prisoners ratio (FTE)	215	0.11	3.06	0.30	0.25
Regime					
Regular prison	215	0	1	0.31	0.46
Pre-trial	215	0	1	0.37	0.48
Minimum security	215	0	1	0.05	0.22
Short-stay custody	215	0	1	0.08	0.27
Persistent offenders	215	0	1	0.07	0.26
Extra care	215	0	1	0.12	0.32

As a first step, we check whether variation in recidivism is clustered at the unit and prison levels; in other words, whether part of the variance in risk of recidivism is associated with the unit or prison where a person was incarcerated (at the time of the survey). The intraclass correlations are highest at the unit level, between .04 and .07 for all reoffending and serious reoffending, dependent on the sample (see [Supplementary Table S1](#)). At the prison level, the intraclass correlations are lower, with a maximum of .03. Considering the entire sample, 7% of variance in the risk of recidivism is clustered at the unit level and 3% at the prison level for two-year recidivism, which confirms our expectation that the prison unit is a more relevant unit of analysis than the prison in the Netherlands. The LR tests indicate that the variance at the unit level is significantly different from zero for all dependent variables apart from very serious reoffending. For most variables, the variance on the prison level is not significantly different from zero, apart from all two-year reoffending considering the entire sample. Multi-

**Table 2.** Zero-order relations between prison-unit conditions and reoffending ( $N = 2,366$ ).

Level 2 variables (prison-unit conditions)	Six-month reoffending		Two-year reoffending			
	All		All		Serious	
	OR	95% CI	OR	95% CI	OR	95% CI
Prison climate (unit aggregate)						
Autonomy	0.90	[0.70-1.16]	0.69 ***	[0.54-0.89]	0.76 *	[0.60-0.97]
Peer relationships	0.66 *	[0.45-0.98]	0.54 ***	[0.37-0.79]	0.56 ***	[0.38-0.81]
Staff-prisoner relationships	0.99	[0.75-1.31]	0.72 *	[0.54-0.94]	0.84	[0.65-1.11]
Safety	0.88	[0.60-1.29]	0.86	[0.59-1.25]	0.87	[0.60-1.25]
Meaningful activities	0.88	[0.68-1.16]	0.67 ***	[0.52-0.87]	0.75 *	[0.58-0.97]
Objective prison unit characteristics						
Unit capacity	1.00	[0.99-1.00]	1.00	[1.00-1.01]	1.00	[0.99-1.01]
Unit occupancy rate	0.72	[0.33-1.59]	1.00	[0.44-2.24]	0.74	[0.34-1.61]
Staff to prisoners ratio (FTE)	1.03	[0.57-1.87]	0.71	[0.39-1.31]	0.98	[0.56-1.74]
Regime						
Regular prison	<i>ref</i>		<i>ref</i>		<i>ref</i>	
Pre-trial	1.56 ***	[1.22-2.00]	1.50 ***	[1.18-1.89]	1.57 ***	[1.26-1.95]
Minimum security	0.49 *	[0.27-0.91]	0.32 ***	[0.19-0.54]	0.25 ***	[0.14-0.45]
Short-stay custody	1.43 *	[1.04-1.96]	1.34	[0.97-1.84]	1.39 *	[1.04-1.84]
Persistent offenders	3.09 ***	[1.87-5.11]	2.79 ***	[1.62-4.81]	3.46 ***	[2.06-5.79]
Extra care	1.11	[0.69-1.78]	0.72	[0.46-1.11]	1.05	[0.69-1.58]

Note.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

level analyses reported below include a random intercept for the unit level.<sup>2</sup> Considering these results, it is meaningful to test whether prison unit conditions are significantly related to an individual's risk of recidivism.

As a second step, we check zero-order correlations between prison unit conditions and recidivism. Very serious offending as a separate category is omitted because it does not have significant variance at the unit level, which means that very serious reoffending in our sample can be best explained by individual characteristics rather than prison unit conditions. Table 2 shows that the risk of reoffending within two years after release is higher for persons incarcerated in pre-trial units ( $OR = 1.50$ ,  $CI [1.18-1.89]$ ) and units for persistent offenders ( $OR = 2.79$ ,  $CI [1.62-4.81]$ ), compared to regular prison units. Persons incarcerated in minimum-security units have a lower risk of recidivism ( $OR = 0.32$ ,  $CI [0.19-0.54]$ ); these effects are also significant six months after release. Significant relationships between prison climate and recidivism risk are found for two-year reoffending: more positive average unit scores on autonomy ( $OR = 0.69$ ,  $CI [0.54-0.89]$ ), peer relationships ( $OR = 0.54$ ,  $CI [0.37-0.79]$ ), and meaningful activities ( $OR = 0.67$ ,  $CI [0.52-0.87]$ ) are associated with a lower risk of recidivism for all reoffending (reported in text) and serious reoffending (see Table 2). A more positive score on staff-prisoner relationship is only associated with a lower risk of recidivism when considering all reoffending ( $OR = 0.72$ ,  $CI [0.54-0.94]$ ). Effects for six-month reoffending point in the same direction, but only reach significance for peer relationships;

<sup>2</sup>A random intercept for 'prison' was not included because no explanatory variables were added at this level, the intraclass correlation was lower than for units, and models with a random intercept for 'prison' did not converge. We re-estimated our logistic regression models using prison fixed effects, but this did not alter our results, apart from the effect of 'sex', due to the existence of separate prisons for men and women. The table with these results can be requested from the first author.

**Table 3.** Multi-level logistic regression results ( $N = 2,366$ ).

Level 1 variables	Six-month reoffending		Two-year reoffending			
	All		All		Serious	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>Control variables</b>						
Age	1.00	[0.99-1.01]	0.99	[0.98-1.00]	1.00	[0.99-1.01]
Sex (1 = female)	0.71	[0.41-1.22]	0.51 **	[0.31-0.83]	0.61	[0.38-1.00]
Index offence						
Property	<i>ref</i>		<i>ref</i>		<i>ref</i>	
Sex	0.29 *	[0.11-0.77]	0.22 ***	[0.10-0.48]	0.30 ***	[0.15-0.62]
Violence	0.80	[0.63-1.03]	0.83	[0.65-1.06]	0.73 **	[0.58-0.92]
Drugs	0.36 ***	[0.25-0.52]	0.43 ***	[0.32-0.57]	0.34 ***	[0.25-0.46]
Other (e.g., traffic)	0.49 ***	[0.35-0.70]	0.59 **	[0.43-0.80]	0.42 ***	[0.30-0.57]
Acquittal	0.55 *	[0.32-0.95]	0.60 *	[0.37-0.97]	0.44 ***	[0.27-0.72]
Incarceration length	0.99	[0.86-1.15]	0.89	[0.77-1.03]	0.97	[0.85-1.10]
Time served in current unit	0.77 *	[0.61-0.96]	0.82	[0.66-1.00]	0.88	[0.72-1.08]
Time to release after survey date	1.00 *	[1.00-1.00]	1.00	[1.00-1.00]	1.00	[1.00-1.00]
Prior convictions past 5 years	1.24 ***	[1.20-1.28]	1.33 ***	[1.27-1.38]	1.27 ***	[1.22-1.32]
Age at first court case	0.97 ***	[0.95-0.98]	0.95 ***	[0.94-0.97]	0.95 ***	[0.94-0.97]
Nationality (1 = Dutch)	0.78	[0.57-1.07]	1.07	[0.80-1.44]	0.96	[0.72-1.29]
Level 2 variables (prison-unit conditions)						
<b>Prison climate (unit aggregate)</b>						
Autonomy	1.28	[0.81-2.03]	1.02	[0.67-1.57]	1.16	[0.76-1.76]
Peer relationships	0.81	[0.50-1.31]	0.71	[0.45-1.11]	0.77	[0.49-1.20]
Staff-prisoner relationships	1.03	[0.67-1.59]	1.18	[0.78-1.78]	1.15	[0.77-1.71]
Safety	0.81	[0.53-1.23]	0.88	[0.59-1.31]	0.99	[0.67-1.45]
Meaningful activities	1.07	[0.69-1.66]	1.05	[0.69-1.60]	1.07	[0.71-1.60]
<b>Objective prison (unit) characteristics</b>						
Unit capacity	1.00	[0.99-1.01]	1.00	[0.99-1.01]	1.00	[0.99-1.01]
Unit occupancy rate	0.92	[0.35-2.45]	0.92	[0.37-2.32]	0.69	[0.28-1.67]
Staff to prisoners ratio (FTE)	0.89	[0.34-2.34]	0.71	[0.31-1.62]	0.92	[0.41-2.05]
Regime						
Regular prison	<i>ref</i>		<i>ref</i>		<i>ref</i>	
Pre-trial	1.18	[0.87-1.59]	0.99	[0.75-1.30]	1.16	[0.89-1.52]
Minimum security	0.93	[0.47-1.84]	0.61	[0.34-1.10]	0.38 ***	[0.20-0.72]
Short-stay custody	1.10	[0.72-1.68]	0.86	[0.58-1.28]	1.00	[0.68-1.47]
Persistent offenders	0.94	[0.51-1.73]	0.77	[0.41-1.47]	1.05	[0.57-1.95]
Extra care	1.01	[0.58-1.43]	0.67	[0.40-1.12]	1.02	[0.62-1.67]

Note.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

the other prison climate dimensions could not be precisely estimated. These results mean that, in answer to the first part of the research question, prison conditions are associated with risk of recidivism. This association can be explained by two possible mechanisms: first, it can be a contextual effect meaning that these prison unit conditions have a direct impact on recidivism risk; second, it can be a selection effect meaning that it is related to the clustering of individual risk factors due to non-random assignment to units.

As a third step, we, therefore, report the results from the multi-level logistic analyses, in which we control for individual characteristics (see Table 3). These results show that the significant zero-order correlations for the individual prison climate variables largely disappear when other variables are added. Additionally, the results from the LR test show that the addition of random intercept for units does not significantly improve the model compared to a simple logistic model ( $\chi^2[1] = 0.69$ ,  $p = 0.202$ ; for

Table 4. One-way ANOVA results for relationship between regime and unit composition ( $N = 178$  units).

Unit composition	Prison <sup>a</sup> ( $n = 56$ )		Pre-trial <sup>b</sup> ( $n = 78$ )		Minimum security ( $n = 10$ )		Short-stay custody <sup>d</sup> ( $n = 16$ )		Persistent offenders <sup>e</sup> ( $n = 7$ )		Extra-care <sup>f</sup> ( $n = 11$ )		$p$
	$M$	$SD$	$M$	$SD$	$M$	$SD$	$M$	$SD$	$M$	$SD$	$M$	$SD$	
Mean number prior convictions	2.28 <sup>bcd</sup>	0.93	3.35 <sup>ac</sup>	1.15	1.05 <sup>abdef</sup>	0.61	2.85 <sup>c</sup>	0.75	7.13 <sup>ac</sup>	3.10	2.65 <sup>c</sup>	1.34	21.99
Median number prior convictions	1.65 <sup>bce</sup>	0.97	2.61 <sup>ace</sup>	1.31	0.55 <sup>abdef</sup>	0.69	2.06 <sup>ce</sup>	0.68	6.86 <sup>abcdf</sup>	2.66	2.09 <sup>ce</sup>	1.32	16.67
Mean age at first court case	21.91 <sup>e</sup>	5.04	19.80 <sup>c</sup>	3.33	24.84 <sup>bde</sup>	3.10	20.58 <sup>ce</sup>	1.35	17.47 <sup>acdf</sup>	1.75	22.63 <sup>e</sup>	4.34	9.40
Median age at first court case	19.21 <sup>e</sup>	5.25	17.68 <sup>e</sup>	3.06	20.40 <sup>e</sup>	3.37	17.75 <sup>e</sup>	1.70	15.43 <sup>abcdf</sup>	1.02	19.18 <sup>e</sup>	3.10	8.50
Proportion index offense: violence	0.34 <sup>d</sup>	0.16	0.27 <sup>d</sup>	0.14	0.25	0.13	0.18 <sup>abf</sup>	0.07	0.30	0.17	0.47 <sup>d</sup>	0.23	8.48
Proportion index offense: drugs	0.21 <sup>cdef</sup>	0.13	0.15 <sup>cde</sup>	0.13	0.40 <sup>abdef</sup>	0.15	0.09 <sup>abc</sup>	0.06	0.05 <sup>abc</sup>	0.06	0.08 <sup>ac</sup>	0.10	14.37
Proportion index offense: property	0.26 <sup>bde</sup>	0.14	0.40 <sup>acf</sup>	0.17	0.20 <sup>bde</sup>	0.09	0.41 <sup>acf</sup>	0.11	0.59 <sup>acf</sup>	0.19	0.19 <sup>bde</sup>	0.15	14.19
Proportion index offense: sex	0.05 <sup>e</sup>	0.10	0.02 <sup>ef</sup>	0.06	0.07	0.11	0.02 <sup>f</sup>	0.03	0.00 <sup>abf</sup>	0.00	0.18 <sup>bde</sup>	0.14	<sup>z</sup>
Proportion index offense: other	0.10 <sup>d</sup>	0.09	0.08 <sup>d</sup>	0.09	0.08 <sup>d</sup>	0.09	0.29 <sup>abcef</sup>	0.09	0.05 <sup>d</sup>	0.06	0.06 <sup>d</sup>	0.11	14.79

Note. Only includes units with at least five respondents. Equal variances not assumed. Games-Howell post-hoc tests are reported ( $\alpha = .05$ ). <sup>z</sup>Welch's test cannot be performed because at least one group has 0 variance.

two-year recidivism), and the full model with unit-level variables does not significantly improve the fit of the models compared to models with only individual-level variables ( $\chi^2[13] = 12.18$ ,  $p = 0.513$ ; for two-year recidivism). In other words, prison-unit conditions do not explain variation in risk of recidivism above and beyond individual characteristics. This suggests that the zero-order associations between prison-unit conditions and recidivism are due to selection effects: they can be explained by other individual characteristics that are also related to recidivism risk. The analyses conducted as robustness checks generated very similar results, with no changes in the significance or direction of effects (see [Supplementary Tables S5–S7](#)).

As a final step, we explore which selection effects may account for the relationship between prison unit conditions and recidivism, by testing bivariate relationships between composition variables and prison unit conditions (regime and prison climate, given that these had significant zero-order correlations with recidivism). [Table 4](#) shows the results from a Welch's ANOVA for regime and unit composition. This shows that units with different regimes also differ in the composition of individuals in terms of the number of prior convictions, age at the first court case, and index offense. For example, minimum-security units house individuals with a lower mean and median number of prior convictions than units with other regimes, which is associated with lower recidivism (see [Table 4](#)). Persistent-offender units house individuals with a lower mean and median age at their first court case, which is a strong risk factor for recidivism. Another noteworthy finding is that there are higher proportions of individuals convicted for property offenses in pre-trial units, and units for short-stay custody and persistent offenders. A conviction for a property offense is associated with a significantly higher risk of recidivism than convictions for most other offenses (see [Table 3](#)).

There are also significant correlations between prison climate and unit composition (see [Table 5](#)). In particular, the mean and median number of convictions of individuals on a unit are negatively associated with autonomy, peer relationships, and meaningful activities. Additionally, the mean and median age at the first court case of individuals on a unit are positively associated with autonomy, staff-prisoner relationships, and meaningful activities. Units with a higher proportion of individuals convicted of drugs or sex offenses have a more positive prison climate on various dimensions, while units with a higher proportion of persons convicted of property offenses have a less positive prison climate. Overall, this shows that individuals are not randomly assigned to units with specific regimes, and that prison climate is associated with unit composition in terms of criminogenic factors.

## Discussion

This study used survey and administrative data from Dutch incarcerated individuals to examine the relationship between prison (unit) conditions and different measures of recidivism. In answer to the research question, regime and prison climate at the unit level were associated with recidivism, but these relationships could be explained by non-random assignment of individuals with specific risk factors to units. Unit size, occupancy rate, and staff-to-prisoner ratio were not associated with recidivism. Below, we discuss these findings in more detail.



**Table 5.** Correlations (Pearson's  $r$ ) between prison unit climate and unit composition ( $N = 178$  units).

Variable	Autonomy		Peer relationships		Staff-prisoner relationships		Safety	Meaningful activities	
Mean number prior convictions	-.15	*	-.16	*	-.02		-.01	-.20	**
Median number prior convictions	-.17	*	-.17	*	-.03		-.01	-.23	**
Mean age at first court case	.23	**	.07		.28	***	-.09	.27	***
Median age at first court case	.23	**	.03		.27	***	-.15	.26	***
Proportion index offense: violence	-.03		-.04		-.07		-.05	-.01	
Proportion index offense: drugs	.27	***	.23	**	.07		.22	.19	*
Proportion index offense: property	-.19	*	-.20	**	-.06		-.06	-.18	*
Proportion index offense: sex	.21	**	.11		.22	**	-.11	.24	**
Proportion index offense: other	-.04		.00		.02		.03	-.09	

Note. Only includes units with at least five respondents.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

Our findings support the value of considering the heterogeneity of the prison experience: differences in shared experiences of prison climate were, bivariate, associated with recidivism. More specifically, more positive experiences of autonomy, peer relationships and meaningful activities were consistently associated with lower reconviction rates two years after release from prison. This is largely in line with findings from a study conducted in England and Wales, in which more positive scores on prison climate at the prison level were associated with lower reconviction rates (Auty & Liebling, 2020). Different from previous research, we did not find a significant relationship between subjective safety (security) and recidivism (Auty & Liebling, 2020; Listwan et al., 2013; Windzio, 2006). A possible explanation may be that the scores on safety were high with little variance compared to other dimensions in our study. There was some evidence that good staff-prisoner relationships (including experienced procedural justice) on units were associated with lower recidivism, in line with previous research in the Netherlands (Beijersbergen et al., 2016). However, similar to the other prison climate dimensions, these results did not remain significant when controlling for individual risk factors.

In our study, prison unit conditions were not related to risk of reoffending independent of individual risk factors. This finding is in contrast with US-based studies that found that individuals incarcerated in higher-security facilities had a higher risk of reoffending, compared to individuals with a similar risk profile incarcerated in lower-security facilities (Chen & Shapiro, 2007; Gaes & Camp, 2009); although a recent study using a regression-discontinuity approach shows the importance of revisiting the literature on the effects of security classification (in this case, on misconduct), because different methods and consideration of rule violation types may yield different outcomes (Tahamont, 2019). Regardless, it is possible that unit and prison conditions in the Netherlands are overall more homogeneous and more favorable than in the US (see also Kruttschnitt et al. (2013)); apart from regime differences, there is little variation in security level. The Netherlands has no equivalent of maximum-security prisons apart from a few units with higher security measures. This lack of distinction in security levels may also explain why we found no clustered variation in recidivism risk for very serious reoffending. Greater variation in security levels exists in the US, and the impact

may be more pronounced with lengthier sentences. Individuals incarcerated in the Netherlands serve relatively short sentences; the average time served in the current study was less than ten months, compared to over sixteen months in the lower-security prisons in the study by Gaes and Camp (2009). However, even when we limited our sample to individuals who had been incarcerated for at least six months, we found no contextual effects (see [Supplementary Tables, S5–S7](#)). Moving forward, studies could include more detailed information on the manifestation of differences in regime and security level, such as time out of cell, engagement in activities, and contact with peers, staff, and visitors.

There were no significant relationships between unit size, occupancy rate, and staff-prisoner ratio on the one hand, and recidivism on the other hand. This means that crowding was not related to recidivism, in line with findings from earlier research in the US (Clayton & Carr, 1987), but in contrast with studies conducted in England and Wales (Farrington & Nuttall, 1980) and Italy (Drago et al., 2011). However, these findings should not be extrapolated to other contexts, as Dutch prisons do not experience overcrowding, so differences between prison units in this respect are minimal. More generally, we can only draw conclusions in regard to the heterogeneity of the Dutch prison experience: it may well be that an international comparison of prison experience would substantially increase the proportion of clustered variance at the prison (unit) level in reoffending risk, given that there is more variation in prison management and daily programming within and between other countries. Such a study would be interesting to uncover differences in the effectiveness of reintegration support: if we find that certain prison (unit) conditions in other countries are associated with lower recidivism risk net of individual risk factors, then this could point us towards good practices (see for example Bhuller (2020)).

An important addition of our study was the inclusion of individual-level variables to examine if the association between prison conditions and recidivism was a contextual effect, or due to selection (i.e., non-random assignment to units). The significant effects of prison climate and regime all but disappeared when individual-level characteristics were controlled for. Further examination revealed that individual risk factors for reoffending were indeed associated with regime and prison climate. While regimes are intended to differentiate between individuals in terms of risk profiles (especially the so-called ‘persistent-offender units’), the association with prison climate deserves further attention. These results mean that the composition of individuals on a unit in terms of criminal history is related to experienced prison climate. This may be partly explained by the daily program and time out-of-cell on a unit, but the significant correlations with peer relationships and staff-prisoner relationships are telling: this indicates that composition apparently affects the atmosphere and social relations. This effect may be due to behavior of individuals on a unit, but may also be related to levels of turnover: if turnover is high and the population is transient, the opportunities for a stable social climate to emerge are probably more limited (Kreager et al., 2016). Recall the low average time served in Dutch prisons: half of people exiting prison were incarcerated for less than a month. This is likely disruptive to peer and staff-prisoner relationships. Further research should examine the contributing factors to different aspects of prison climate, especially on the unit and prison level, because these are potential avenues for intervention.

In the current study, prison units were a more meaningful unit of analysis for investigating the relationship between prison conditions and recidivisms than prisons; they had more clustered variance in terms of recidivism and prison climate. This is not surprising, considering that Dutch prisons house a mix of populations (convicted and pre-trial) in units with different regimes, which has implications for staff assignment and daily programming. It is also intuitively convincing that the immediate environment, including daily interactions with peers and staff, are the most important determinants of prison climate. In countries with more pronounced differences between prisons – for example, in terms of security level, private or public management, and type of population – prison-level characteristics may be more influential than in the Netherlands. These findings highlight the importance of carefully checking the appropriate level of analysis; theoretically, as well as methodologically by calculating intra-class correlations. This also showed that unit (and prison) effects in the current study should not be overstated: by far the most variance in recidivism was located at the individual level. This brings us to an important methodological implication, namely that the examination of effects of aggregated variables should be accompanied by a careful examination of variance and the influence of confounding factors. Others have given similar warnings about the risk of overestimation of relationships using aggregate variables, for example in the analysis of the effects of overcrowding (Clayton & Carr, 1987; Wooldredge & Steiner, 2009).

A few limitations should be noted. First, reconviction rates remain a crude measure of change in people: desistance is a complex process that can involve setbacks. In an attempt to account for nuances, we created a measure for short-term recidivism, and also for different levels of seriousness in offending. This showed that unit-level variance in recidivism was observed for all operationalizations, except for very serious offending, which included offenses with maximum sentences of at least eight years' imprisonment. This suggests that individual differences are fully responsible for differences in reconviction for the most serious offenses. In terms of the effects of prison conditions, we found significant differences in risk of reconviction in relation to differences in prison unit climate within two years after release, but not within six months. Apparently, noticeable differences only materialize when considering a longer time at risk in the community, rather than shortly after release. It is not possible to say whether this reflects actual differences in behavior, or whether a longer observation period is more likely to rule out any bias in criminal justice processing; that is, short-term measures of recidivism may be more likely to reflect differences in who gets caught reoffending than long-term measures. Regardless, our findings also support previous research that showed the importance of considering multiple operationalizations of recidivism, because they can yield different results (Bales & Piquero, 2012; Moore & Eikenberry, 2021; Ostermann et al., 2015).

Second, prison conditions were measured at one point in time – namely the date of survey administration – while they are not necessarily static. Individuals may be transferred to other units, for example when their sentence status changes from pre-trial to convicted. In the Netherlands, however, the sentence duration often does not exceed the time spent in pre-trial detention, which means that many people are released from pre-trial units; this applied to more than a quarter of all individuals

released in 2017 (Dienst Justitiële Inrichtingen, 2018). It was therefore meaningful to also consider the association between prison conditions in pre-trial units and recidivism. To check the stability of unit-level effects, we performed robustness checks on three sub-samples: (1) individuals who had been released within two months after the survey date, (2) individuals who had been incarcerated in the same unit for at least one month at the time of the survey, and (3) units with at least five respondents. Findings were highly similar across these analyses (see [Supplementary Tables S2–S7](#)), which indicates that our findings were not likely influenced by transfers across units. Nonetheless, it would be a worthwhile addition to take shifts in composition over time, and individual's transfers across prisons and prison units into account in future research.

Some policy implications deserve attention, even though we are unable to draw conclusions about causality on the basis of the current study. The findings demonstrate that units composed of individuals with greater risk factors have lower average scores on various prison climate dimensions. Such effects could potentially be counteracted, for example, by introducing more meaningful activities and actively investing in social relationships. In general, the low average ratings on meaningful activities are reasons for concern, because other research has linked this to misconduct (Bosma, Van Ginneken, Sentse, et al., 2020). A lack of meaningful occupation of time may upset order in prisons, because boredom may be a catalyst for incidents (Rocheleau, 2013). Interestingly, current policy acts in the opposite direction: a privilege program in regimes for convicted persons makes certain meaningful activities and time out-of-cell contingent on good behavior (this could also be an explanation of the effect found by Bosma et al. (2020)). To be able to make evidence-based policy, it would be necessary to conduct experimental research that involves the random assignment to units with different programming and different composition. This would also allow more sophisticated analysis of the effects of unit composition on prison climate; this could eventually lead to insight in the potential of using unit composition as a tool for creating an optimal prison climate.

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