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Breaking the chains? The effects of training a shelter dog in prison on criminal behavior and recidivism

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ABSTRACT

The effectiveness of Dutch Cell Dogs (DCD), a prison-based dog training program, in reducing criminal behavior and recidivism was assessed in a quasi-experimental study in twelve correctional facilities in the Netherlands ($N = 241$). DCD is a program in which incarcerated offenders train a shelter dog bi-weekly for eight weeks. Results demonstrated that DCD ($n = 121$) did not outperform treatment-as-usual (TAU; $n = 120$) in official recidivism outcomes and self-reported criminal behavior. However, subgroups based on age and detainees' functioning responded differently in self-reported criminal behavior. Positive effects were found on self-reported criminal behavior for DCD participants who were older, had lower callous-unemotional traits, or had higher treatment motivation. In conclusion, findings provided initial evidence that subgroups may respond differently to a dog training program, however, more experimental research with larger sample sizes is needed.

Introduction

Recidivism rates after incarceration are generally high (Yukhnenko et al., 2019). In the Netherlands, for instance, recidivism rates within two years post-detention have been estimated at 47 percent for adults and 63 percent for juveniles (Weijters et al., 2019). In order to reduce recidivism rates, effective interventions during and after incarceration are needed that can address psychosocial developmental needs associated with criminal behavior (Dmitrieva et al., 2012; Monahan et al., 2013). Apart from treatment during incarceration, which is offered in some countries (e.g., Souverein et al., 2019), complimentary programs with different focal points may also be available in prison, varying from skill training and creative arts therapy, to animal-assisted interventions (AAIs) to improve well-being and behavior. One of the AAIs offered in Dutch residential care is the prison-based dog program Dutch Cell Dogs. Although prison-based dog programs are popular in prisons, their potential to facilitate behavioral change has remained relatively understudied in high quality research designs (see e.g., Mulcahy & McLaughlin, 2013). The current study examined the effectiveness of Dutch Cell Dogs in reducing recidivism and self-reported criminal

behavior throughout correctional facilities. Program effects on several aspects of recidivism were examined, including prevalence of reconvictions, number of re-offenses, velocity (time until first offense), and seriousness of reconvictions. In addition, self-reported criminal behavior captured criminal behavior not (yet) reflected in official data, such as property crimes, drug-related crimes and violent crimes.

Desistance from crime: a developmental perspective

In order to prevent and reduce recidivism rates after incarceration, it is important to promote desistance from anti-social behavior. Developmental growth, in the form of becoming more psychosocially mature, has been suggested as an important mechanism through which offenders may desist from future anti-social behavior (Gottfredson & Hirschi, 1990; Monahan et al., 2009).

One important aspect of psychosocial maturity that has been found to foster desistance is the regulation of impulses and aggression (Gottfredson & Hirschi, 1990; Monahan et al., 2009). Improvements in this area are related to reduced anti-social behavior over time, whereas developmental delays are found in those

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who persist in crime (Cauffman & Steinberg, 2000; Monahan et al., 2009). Other psychosocial aspects, such as perspective taking (i.e., the ability to consider others and the future) and taking responsibility for one's own behavior (while resisting peer influence), have also been shown to be developmental milestones important for the desistance of crime (Cauffman & Steinberg, 2000; Monahan et al., 2013). Overall, deficiencies in these aspects of psychosocial maturity are related to more chronic patterns of anti-social behavior (Monahan et al., 2013).

A focus on stimulating psychosocial maturation to foster desistance may seem most fitting for juvenile offenders, given the developmental theories stating that in juveniles, offending behaviors may be the result of a “maturity gap” and therefore a stage that passes (e.g., Jennings & Reingle, 2012; Steinberg et al., 2015). At the same time, research does suggest that psychosocial maturing deficiencies are found in offenders until at least the midtwenties (e.g., Monahan et al., 2013) and sociological models on the desistance from crime also stress the importance of maturity in the cessation of criminal behavior in adulthood (e.g., Laub & Sampson, 2001). Therefore, addressing psychosocial developmental needs seems helpful for both incarcerated juveniles and adults. Accordingly, research confirms that positive, skill-building interventions can foster rehabilitation in both juvenile and adult offenders (Lipsey, 2009, 2019).

Stimulating positive development during incarceration

The above evidence suggests that stimulating offenders' positive psychosocial development during incarceration could help foster desistance from crime. One type of intervention that may stimulate positive psychosocial development is the AAI. AAIs have been developed based on the evidence that human-animal interaction can stimulate positive development and wellbeing over the life-course (e.g., Bures & Gee, 2021; Mueller, 2014). In prison, a wide range of AAIs exist; for example, incarcerated people may be asked to socialize and take care of horses or cats, or they may be enrolled in more structured Animal Assisted Therapy (i.e., AAT) programs in order to achieve specific therapeutic benefits, through interaction with the animals (Cooke, 2019). The dog training program (DTP) is the most common type of prison-based AAI and is most frequently offered in the form of the community-service model in which incarcerated people are asked to train shelter dogs basic obedience skills to increase their adoption chances (Cooke, 2019; Furst, 2006).

DTPs and psychosocial development

Even though currently no established theoretical framework exists for AAIs, in general, or for DTPs, in particular (Beetz, 2017; Furst, 2019), DTPs may target several of the previously mentioned psychosocial developmental needs (e.g., emotion regulation skills, future perspective taking, and self-responsibility) of incarcerated juveniles and adults that are related to the desistance of crime (e.g., Beetz, 2017; Furst, 2019; Hill, 2020; Kruger et al., 2004; Leonardi et al., 2017; Wells, 2009). One important need in both juvenile and adult offenders is the development of skills to help regulate impulses and aggressive behavior. It has been suggested that participation in a DTP may improve emotion regulation due to the instant behavioral feedback that dogs provide by “mirroring” humans' emotions and behavior, which may foster participants' self-awareness and regulation skills (Kruger et al., 2004). Perspective taking toward others may be another developmental need fostered by DTP participation (Monahan et al., 2009; Seivert et al., 2018), as incarcerated people are training to take the dogs' perspective while in the program (Seivert et al., 2018). This important social skill may generalize toward interactions with humans, although more research is needed on the extent to which human-animal skills transfer to the human-human domain (Mueller, 2014).

It has also been suggested that DTPs help human participants develop a more prosocial perspective toward the future (Hill, 2020). Training a shelter dog could provide inmates with a unique, altruistic, experience during incarceration that allows them to feel the benefits of engaging in prosocial behavior in line with societal expectations (Cooke & Farrington, 2014; Grommon et al., 2020; Hill, 2020). This experience may thereby help instill a sense of purpose for their time served, and may ultimately help promote a more prosocial, “anti-criminal” identity that further fosters connection with prosocial peers (Furst, 2019; Hill, 2020). Taking responsibility is another psychosocial developmental need that may be fostered by DTP participation, as participants are each responsible for training their own dog and readying them for adoption (e.g., Fournier, 2016; Furst, 2006). In a DTP, participants do not just talk – or receive information – about taking responsibility but they practice being responsible and caring each time they interact with their dog (Furst, 2019).

Finally, it is important to note that incarceration itself can have a negative impact on developmental processes for offenders who may already suffer from

chronic deficits in their development (e.g., Dmitrieva et al., 2012). Therefore, prison intervention efforts that try to make the development of offenders more “normal” have been recommended (Dmitrieva et al., 2012). DTPs may have a normalizing effort on the criminogenic prison environment by creating an accepting, caring, and open environment that is humanizing, rather than criminalizing, which may positively impact desistance from crime (Hill, 2020).

The evidence on prison-based DTPs

Although it is too early to draw definitive conclusions about the effectiveness of prison-based dog programs, previous studies have provided some support for their effectiveness. A recent meta-analysis on prison-based dog programs found a small overall effect on inmates’ socioemotional functioning, which was largely driven by a small-to-medium effect of these programs on criminal recidivism (Duindam et al., 2020). However, this meta-analytic finding was based on only three studies that included recidivism outcomes (i.e., Chianese, 2009; Cooke, 2014; Hill, 2020), making its results less robust. Hill (2020) concluded that participation in a DTP (for a minimum of 31 days) reduced recidivism for adult inmates in the US, by reducing the likelihood of re-arrest for any reason. A trend was found for reducing the likelihood of a new crime and no effects were found on reconviction and reimprisonment one year after release. Chianese (2009) reported that incarcerated adolescent girls who had participated in a DTP recidivated (i.e., received a new referral to a probation officer six-months post release) at only half the rate compared to girls who did not. Finally, Cooke (2014) found a large – yet insignificant – effect of DTP participation on recidivism – as defined by reconviction or reincarceration – in a small group of former adult prisoners who had been released for (on average) nine months.

Limitations of previous research on the effectiveness of DTPs on recidivism

Even though DTPs appear promising in reducing recidivism, limitations of the previous research include that only some aspects of recidivism were taken into account (e.g., rearrest, reconviction or reimprisonment), were based solely on official records, and that most studies were retrospective. Therefore, limited information on participants’ functioning and well-being during incarceration, which may have influenced program effectiveness, was available to include

in the analyses. Another limitation of this previous research was that there was no examination of subgroups for whom DTPs may (not) work. Instead of focusing on overall effectiveness, it is important for intervention studies to consider “what works for whom” and try to identify subgroups that may (not) benefit (see e.g., Conroy et al., 2019; Weisz et al., 2006). The general belief seems to be that everybody can benefit from AAI (Serpell et al., 2017). However, previous research on the effectiveness of DTPs and correctional programming in general suggests that certain characteristics play a role in the extent to which individuals benefit from these interventions. For example, age, cultural background, and detainees’ functioning have been found to play a role in program effectiveness in some studies (see e.g., Duindam et al., 2020; Lipsey, 2009). Therefore, it is important for research on DTPs to disentangle for whom a program may be more (or less) effective (Furst, 2019).

The aims of the present study

The first aim of the present study was to examine the long-term effectiveness of a DTP on recidivism and criminal behavior. Even though no short-term positive program effects were found for DCD on selected behavioral outcomes associated with desistance in incarcerated youth and adults (Duindam et al., 2021a,b), there is evidence to suggest that DTPs have the potential to foster desistance from crime in the long term (Authors own, 2020). To get a better understanding of a DTP’s ability to foster desistance from crime, several aspects of recidivism were assessed, such as prevalence of reconvictions, number of re-offenses, velocity (time until first offense), and seriousness of reconvictions. Moreover, self-reported criminal behavior was also included as an outcome, which may be more likely to reveal offending behavior than official recidivism data because it also captures criminal behavior that has not (yet) led to arrests or convictions (Farrington & Ttofi, 2014). The criminal behavior assessed for the current study focused on violent crime, vandalism, and property crime (Van Der Laan & Blom, 2006), including offenses that ranged in severity: from petty theft to using a weapon to injuring someone. In line with previous research findings of positive effects of prison-based dog programs on recidivism (e.g., Duindam et al., 2020), we hypothesized that participation in the DTP would be linked to reduced criminal behavior and recidivism. To our knowledge, this is the first DTP study conducted on these outcomes outside of the US, which is

important as correctional program effects may not generalize across nations (e.g., Koehler et al., 2013).

The second aim of the current study was to gain insight into the extent to which DTPs may be more (or less) effective for certain subgroups based on their background characteristics (age, cultural background) and detainees' functioning. With regards to age, this study included incarcerated offenders of all ages, as DTPs in the Netherlands are implemented in youth and adult correctional facilities. Despite the developmental differences between juveniles and adults, DCD has been set up to improve psychosocial maturity of participants of all ages. Overall, little is known about the extent to which participants show differential responding to DTPs based on their age. Some evidence suggests that DTPs may have larger effects for older participants (Duindam et al., 2020). However, few randomized controlled trials have been conducted with incarcerated youth (Grommon et al., 2020; Seivert et al., 2018). In addition, DTP effectiveness studies have focused solely on youth (e.g., Chianese, 2009) or on adults (e.g., Hill, 2020), which makes it harder to draw conclusions about the influence of age on study results, as differences in program or study design can also influence findings. To gain more insight into the effectiveness of DTPs on recidivism for different age groups, age was included as a moderator in the current analyses.

Participants' cultural background (native Dutch versus 1st or 2nd generation immigrant) was also examined as a moderator, as previous research on the role of cultural background in correctional program effectiveness has been conflicting (Shearer et al., 2001; Usher & Stewart, 2014). To further examine for whom the DTP may either be more or less effective, detainees' functioning during incarceration (i.e., levels of aggression, callous-unemotional (CU) traits, internalizing behavioral problems, self-control, and treatment motivation) was also included in the analyses. Participants with higher levels of callous-unemotional traits (i.e., impaired empathy, guilt, and remorse) may, for example, be less responsive to programming (Hawes et al., 2009; White et al., 2013), whereas those with more treatment motivation and self-control (Cornet et al., 2015), or less externalizing or internalizing comorbidity problems (e.g., Jaffe et al., 2012), may be more likely to benefit from interventions.

Methods

Participants

Participants were individuals incarcerated for an offense and resided in one of the 12 correctional facilities where DCD was offered between 2016–2019

in the Netherlands. In total, 148 DCD and 139 comparison group participants completed an assessment at baseline, before the start of DCD. Of these 287 participants, recidivism data from four participants and detention dates from 22 other participants were irretrievable due to names and dates of births that did not match across databases. Our request to retrieve recidivism data was denied for another 19 participants, as the waiting period of two years had not yet ceased for this subgroup; one other participant requested their data be deleted, resulting in a final sample of 241 participants. Participants were, on average, 31.2 years-old (range: 14.9–73.2 years-old).

In the current study, most of the participants resided in one of the eight adult correctional facilities (63%). A smaller subgroup resided in one of the four youth correctional facilities (37%)¹. Most were male (93.8%), had a native Dutch background (53.1%), and were often convicted for violent behavior or (attempted) homicide (43.4%). Participants in the DCD group ($n = 121$) were compared to those in the comparison group (TAU; $n = 120$) in terms of demographic variables (e.g., gender, age, ethnicity, incarceration length, educational level, type of facility, treatment enrollment) and baseline functioning during incarceration (internalizing behavioral problems, self-control, aggression, callous-unemotional traits, and treatment motivation). There were two significant differences between the two samples. Educational level was higher in the comparison group than in the DCD group (Table 1). Additionally, participants in the DCD group more often had a native Dutch background (60.3%), compared to TAU who more often had a 1st or 2nd generation immigrant background (54.2%).

Self-reported criminal behavior data at follow-up (i.e., six months post DCD) were only available for a subset of participants ($N = 90$) because this questionnaire was added at a later stage in the research and – despite extensive efforts – some participants had dropped out at follow-up (46%). Participants with self-reported criminal behavior data were compared to participants without these data on the same demographic and baseline characteristics stated above. There was no difference between drop outs and non-drop outs based on baseline functioning and most demographic characteristics, except for age, $F(1, 285) = 6.943$, $p = .009$. Drop outs ($M = 29.5$, $SD = 11.6$)

¹In the Netherlands, judges can decide for placement in a juvenile facility for youth between 18 and 23-years-old, based on their psychosocial maturity level.

Table 1. Participants' functioning during incarceration and demographic characteristics.

	DCD (<i>n</i> = 121)		TAU (<i>n</i> = 120)		<i>F</i>	<i>d</i> (95% CI)
	<i>M</i> (<i>SD</i> ; range)	<i>n</i>	<i>M</i> (<i>SD</i> ; range)	<i>n</i>		
Age (in years) ¹	29.85 (11.79; 15.24–62.52)	121	32.54 (14.14; 14.90–73.19)	120	2.572	
Incarceration functioning at baseline						
Internalizing behavior problems	0.40 (0.41; 0.00–1.92)	121	0.42 (0.38; 0.00–1.61)	120	0.176	0.0506 (–0.202–0.3031)
Aggression	0.37 (0.32; 0.00–1.20)	121	0.30 (0.28; 0.00–1.35)	120	3.381	–0.2328 (–0.4861–0.0206)
Callous-unemotional traits	1.10 (0.36; 0.42–2.42)	97	1.06 (0.34; 0.29–2.00)	103	0.588	–0.1143 (–0.3919–0.1632)
Self-control	3.49 (0.60; 2.12–4.67)	97	3.63 (0.58; 2.00–5.00)	103	2.857	–0.2374 (–0.5157–0.0409)
Treatment motivation	2.04 (0.49; 1.09–3.00)	121	2.10 (0.48; 1.09–2.91)	120	0.643	–0.1237 (–0.3764–0.129)
Incarceration (in years) ²	1.24 (0.95; 0.20–5.07)	79	1.49 (1.46; 0.04–9.87)	76	1.555	–0.2038 (–0.5195–0.1119)
	%	<i>n</i>	%	<i>n</i>	χ^2	
Gender					0.080	0.0364 (–0.2161–0.2890)
Female	5.8	7	6.7	8		
Male	94.2	114	93.3	112		
Cultural background					5.085*	0.2936 (0.0384 – 0.5488)
Native Dutch	60.3	73	45.8	55		
1 st or 2 nd generation immigrant	39.7	48	54.2	65		
Educational level					10.965*	0.4367 (0.1782 – 0.6951)
None or primary education	13.2	16	5.0	6		
Secondary education	38.8	47	38.3	46		
Tertiary education	31.4	38	47.5	57		
Other or unknown	16.5	20	9.2	11		
Type of offense ³					1.416	0.1538 (–0.0995 – 0.407)
(Attempted) homicide	12.4	15	10.8	13		
Violent behavior	28.9	35	35.0	42		
Theft or fraud	7.4	9	6.7	8		
Sexual offenses	9.9	12	7.5	9		
Drug-related crime	3.3	4	2.5	3		
Other & unknown	38.0	46	37.5	45		
Offense category					0.413	0.0829 (–0.1699 – 0.3356)
Single	22.3	27	25.8	31		
Multiple	39.7	48	37.5	45		
Unknown	38.0	46	36.7	44		
Type of facility					.002	0.0058 (–0.2467 – 0.2583)
Youth	36.4	44	36.7	44		
Adult	63.6	77	63.3	76		
Treatment					2.503	0.2049 (–0.0489 – 0.4587)
Yes	50.7	76	61.7	74		
No	15.7	19	22.5	27		
Unknown	21.5	26	15.8	19		

Note. DCD = Dutch Cell Dogs, TAU = treatment-as-usual, *n* = sample size, *M* = mean, *SD* = standard deviation, Age (in years)/Incarceration (in years)¹ = reporting Welch statistics due to violation of homogeneity of variance, Incarceration (in years)² = incarceration length of current sentence (only available for a subset of sample), type of offense³ = some cells had expected count less than 5, therefore Fisher's Exact test results are reported. Type of offense was determined on most severe crime, offense category = specifies how many of the sentences are based on a single or multiple offenses.

**p* < 0.05.

were, on average, younger than non-drop outs (*M* = 33.7, *SD* = 14.8).

Procedure

The recruitment period lasted for three years, between 2016 and 2019. During this time, participants who took part in the DCD program were recruited for the intervention group. Comparison group participants were recruited at the same time by means of word-of-mouth, flyers, and posters distributed across the facilities. All participants gave informed consent before study participation and received a small gift (e.g., shower gel, candy, €5 voucher) for their efforts. Participants were contacted for data collection at four different assessment points: pre-program (baseline/T1), halfway through the program (T2), at the end of

the program (T3), and at six-months post-program (follow-up/T4). For the current study, only baseline (T1) and follow-up (T4) data were analyzed. Results on the short-term effectiveness of DCD for incarcerated youth have been published previously (Authors own, 2021).

Recidivism data were obtained from official records of the Judicial Information Center in the Netherlands (JustID). In July and September 2020, these official records were released, marking the end of the observation period. Permission for this study was received from the Ethical Committee of the Faculty of Social and Behavioral Sciences of the University of Amsterdam (No. 2015-CDE-6363) and Ministry of Security and Justice in the Netherlands. More information about procedures can be found in our study protocol (see Schenk et al., 2018).

Study conditions

Intervention group (Dutch cell dogs)

Participants in the intervention group took part in the prison-based dog training program called DCD on top of their daily regular activities, which can include work, general activities (e.g., sports, workshops, religious groups), education, and/or treatment (e.g., Cognitive-Behavioral Therapy) as provided by the correctional facilities. Participants were recruited for participation in the DCD program by means of word-of-mouth. For example, inmates saw the program in the prison yard, or heard about it from others, and subsequently expressed their interest to the DCD contact person (i.e., a dedicated prison officer who supports implementation of the program) at the respective facility. To be eligible for DCD, participants had to state their motivation in a letter, be physically fit enough to walk a dog, and be present in the correctional facility for at least the duration of the entire training. One week prior to the start of the program, DCD staff met with those inmates interested in participation during an intake meeting during which they explained the program and discussed behavioral expectations (e.g., full attendance is required and a no show can lead to program expulsion). If there were more eligible applicants than program spots, correctional staff decided which inmates could participate in the next program round based on, for example, whom they think will benefit most.

The selected DCD participants were matched with a shelter dog, whom they trained for a period of two months during the dogs' biweekly two hour-long visits to the correctional facilities. Each training group consisted of a maximum of six inmate-dog pairs, who were accompanied by two DCD trainers. For more information about DCD we refer to previous publications on the program (e.g., Schenk et al., 2018).

Comparison group (TAU)

Participants in the TAU group resided in the correctional facilities at the same time as participants in DCD. They had access to the same daily regular activities (i.e., work, general activities, education, treatment) as participants in the DCD group but did not participate in the dog-training program due to various reasons (e.g., no time, no interest). Participants in the TAU group were recruited by means of word-of-mouth and posters about the research, which were distributed throughout the correctional facilities.

Measures

Recidivism

Recidivism records were retrieved from JustID. As participants continuously enrolled in DCD between 2016–2019, the duration of the follow-up period varied. Therefore, recidivism was defined as any convictions within 12 months post-release from detention and any convictions during the whole follow-up period. More specifically, recidivism was measured as the prevalence of convictions (dichotomous variable: at least one conviction versus no convictions), number of offenses (continuous variable), velocity (time in days until first offense), and seriousness of convictions (conviction for at least one violent offense, versus conviction for nonviolent offenses; number of violent offenses) during these two time periods. Recidivism records were coded according to the Recidivism Coding System, developed by the Research and Documentation Center in the Netherlands, which is in charge of conducting nationwide standardized measurements of recidivism to inform policy (Wartna et al., 2011). The recidivism data were coded by two trained research assistants. To assess interrater agreement, 25% of data were randomly selected and coded by both researchers. Interrater agreement was good overall. For the categorical variables, the Kappa ranged from 0.857 for offense type (violent versus nonviolent) to 1.00 for recidivism status (recidivated versus not-recidivated during inclusion period). For total offenses and offense dates, interrater reliability was perfect with intraclass correlations of 1.00.

Self-reported criminal behavior

Self-reported criminal behavior of juvenile and adult participants was assessed using the *Self-report Delinquency Scale* (SRD) at follow-up, six months post-program termination (Van Der Laan & Blom, 2006). The SRD consists of 31 items that each reflect a delinquent behavior (e.g., stealing a car, selling drugs, vandalizing, fighting). Participants reported if they had engaged in the delinquent behavior over the past six months (yes/no). The total score (0–31) of the SRD was calculated by summing up the amount of times that participants had answered “yes” to having engaged in delinquent acts over the past six months.

Moderators

To identify subgroups for whom DCD may (not) be effective, *age* (in years at T1), *cultural background* (native Dutch versus 1st or 2nd generation immigrant), and *detainees' functioning* – based on validated self-

report instruments at T1 – were examined as moderators. As part of *detainees functioning* we included their level of anxiety and depression, as measured by the internalizing behavioral problems scale of the *Youth* (19 items; $\alpha = 0.900$) and *Adult Self Report form* (22 items; $\alpha = 0.908$) (Achenbach & Rescorla, 2001, 2003). The extent to which aggressive feelings and behaviors are present was measured with the aggression subscales of the *Youth* (23 items; $\alpha = 0.883$) and *Adult Self Report form* (15 items; $\alpha = 0.835$) (Achenbach & Rescorla, 2001, 2003). In addition, participants' callous-unemotional traits, defined by impairments in feeling empathy, remorse and guilt, were assessed using the *Inventory of Callous-Unemotional Traits* (24 items; $\alpha = 0.802$) (Frick, 2004). The ability to inhibit undesired behavioral tendencies and exhibit self-control was measured using the *Brief Self Control Scale* (13 items; $\alpha = 0.736$; Tangney et al., 2004). Finally, the motivation to change in treatment was measured using the *Adolescent Treatment Motivation Questionnaire* (11 items; $\alpha = 0.802$; Van Der Helm et al., 2013) before the start of the program as moderators.

Data-analysis

Results of the a priori power analysis demonstrated that a sample of 128 (64 per study condition) was sufficient to detect a medium effect, given an alpha of .05 (Authors own, 2018). To reduce possible influence of treatment motivation as a confounder, all participants were included in the analyses regardless of whether they completed DCD (see intention-to-treat principle; Montori & Guyatt, 2001). Most DCD participants completed the program (71.9%), a smaller group did not finish (10.7%), whereas it was unknown for others (17.4%). First, recidivism at 12-months post-release was assessed ($N = 184$, including $n = 95$ DCD, $n = 89$ TAU). The following tests were conducted: first, a chi-square test was conducted to examine to what extent there was a program effect on reconviction (at least one versus no reconvictions). Then, a negative binomial regression analysis – a suitable type of test for non-normal distributed count data – was conducted to examine the effect of the intervention on number of offenses. To assess the seriousness of recidivism, above analyses were repeated for recidivists' reconvictions based on violent offenses. Subsequently, Analyses of Covariance (ANCOVAs) were conducted to examine the difference between DCD and TAU recidivists in velocity: time (in days) from T1 to (first) reconviction. For all tests, study condition (DCD vs. TAU) was entered as factor, and the outcome measures included as dependent variable.

Second, recidivism over the entire follow-up period was assessed ($N = 241$, including $n = 121$ DCD, $n = 120$ TAU), and cox regression analyses were applied to examine program effects on time to reconviction. Due to variation in T1 times and different release dates, participants' post-release period varied (on average it was 1.7 years, $SD = 1.0$ years). To control for the variation in follow-up time, post-release period (in days) was centered around the mean and entered as step 1. Study condition (DCD vs. TAU) was entered as step 2. Next, moderator analyses were conducted by repeating the above cox regression analysis, while adding the moderators (i.e., age, cultural background, functioning at baseline) and including an interaction term (study condition x moderator).

Finally, to examine the effect of DCD participation on self-reported criminal behavior six-months post-program termination ($N = 90$), negative binomial regression analyses were conducted. The total number of self-reported delinquent acts was added as the dependent variable, whereas study condition (DCD versus TAU) was added as a factor. Next, moderator analyses were conducted by repeating the negative binomial regression analyses, while including the moderator and an interaction term (study condition x moderator).

When significant interaction effects were found, post-hoc analyses were conducted by performing splits on moderators and rerunning negative binomial regressions or cox regressions for various levels of the moderators. Effect sizes (Cohen's d) were calculated using several statistics (chi square, mean, standard deviations).

Results

Follow-up period ranged from 2.00–4.41 years ($M = 2.7$ years, $SD = 0.7$). Most Participants (84.6%) had been released, with an average post release period of 1.7 years ($SD = 1.0$, range: 0.01–4.35). Overall, 28.2% of participants ($n = 68$) in the sample recidivated during the available follow-up period after T1. The majority of recidivists (80%) recidivated (on average) within 0.7 years post-detention ($SD = 0.6$).

Program effects

Recidivism

First, the main effect of DCD on recidivism was examined at 12-months post-detention. Results are reported in Table 2. There was a difference between DCD and TAU in reconvictions (at least one versus none), $\chi^2(1, 184) = 6.540$, $p = .012$, indicating that DCD participants were more likely to recidivate

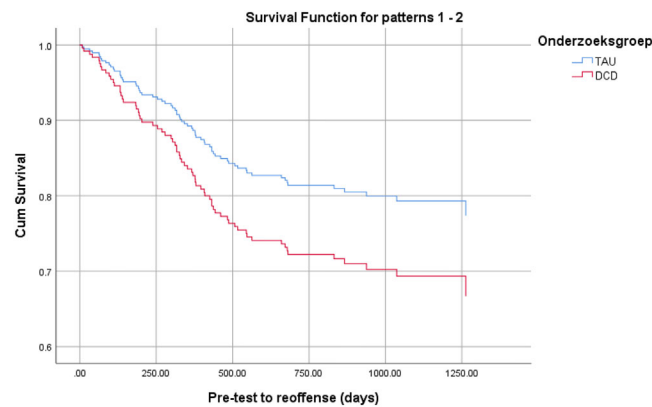
Table 2. Recidivism results within 12-months post-release ($N = 184$).

	DCD ($n = 95$)		TAU ($n = 89$)		χ^2	d (95% CI)
	%	n	%	n		
Recidivism					6.540*	-0.3839 (-0.6782--0.0897)
At least one reconviction	39.9	38	22.5	20		
No reconviction	60.0	57	77.5	69		
Violent recidivism					0.837	-0.1348 (-0.4237-0.1540)
At least one violent offense	52.6	20	40.0	8		
No violent offenses	47.4	18	60.0	12		
	M (SD ; range)	n	M (SD ; range)	n	Wald χ^2	
Number of offenses	1.37 (2.76; 0.00-16.00)	95	0.88 (2.19; 0.00-11.00)	89	1.579	-0.1959 (-0.4858-0.0939)
Number of violent offenses	1.30 (0.47; 1.00-2.00)	20	2.13 (2.03; 1.00-7.00)	8	2.482	
Time to first reconviction (days)	284 (172; 32-681)	38	271 (163; 8-547)	20	F 0.074	0.0769 (-0.4647-0.6186)

Note. DCD = Dutch Cell Dogs, TAU = treatment-as-usual, n = sample size, M = mean, SD = standard deviation.

d = Cohen's d effect size, 95% CI = 95% confidence interval.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

**Figure 1.** Survival curves for recidivism per study condition.

Note. DCD = Dutch Cell Dogs, TAU = treatment-as-usual.

Table 3. Recidivism over the whole follow-up period ($N = 241$).

	DCD ($n = 121$)		TAU ($n = 120$)		HR (95% CI)
	M (SD ; range)	n	M (SD ; range)	n	
Program effects					
Survival time to first reconviction (days)	775 (400.; 32-1610)	121	822 (325; 8-1606)	120	0.633 (0.387-1.036)

Note. DCD = Dutch Cell Dogs, TAU = treatment-as-usual, n = sample size, M = mean, SD = standard deviation, d = Cohen's d effect size, 95% CI = 95% confidence interval.

(39.9%) than TAU participants (22.5%). However, there was no significant difference between conditions in the average number of offenses. There were also no differences between DCD and TAU recidivists in seriousness of reconvictions at 12-months, as there was no difference in violent reconvictions (reconvictions based on at least one violent offense versus nonviolent reconvictions) and number of violent offenses. Finally, regarding velocity of recidivism, there was also no difference, as time to first reconviction (in days) did not differ significantly between DCD and TAU.

Second, recidivism over the entire follow-up period was examined, controlling for post-release period

(time post-detention in days). By the end of the follow-up period, 34.7% of the DCD participants recidivated at least once ($n = 42$), versus 21.7% in the TAU group ($n = 26$; see Figure 1). This difference failed to reach significance, as indicated by the non-significant hazard ratio (HR) for study condition: 0.633, $p = .069$, 95% confidence interval (CI) = [0.387, 1.036]. See Table 3 for the results.

Self-reported criminal behavior

Overall, there was no program effect on self-reported criminal behavior at six months follow-up (see Table 4).

Table 4. Self-reported criminal behavior at 6-months post program termination ($N = 90$).

	DCD ($n = 43$)		TAU ($n = 47$)		Wald χ^2	d (95% CI)
	M (SD ; range)	n	M (SD ; range)	n		
Program effects						
Self-reported delinquent behavior	1.56 (2.88; 0.00–12.00)	43	2.13 (4.06; 0.00–18.00)	47	0.538	0.1551 (–0.2593–0.5695)
Moderator effects						
Age						
Adolescents (≤ 25 -years-old)	2.46 (3.59; 0.00–12.00)	24	3.69 (5.99; 0.00–18.00)	13	6.595*	0.5624 (0.1332–0.9916)
Adults (> 25 -years-old)	0.42 (0.69; 0.00–2.00)	19	1.53 (2.94; 0.00–11.00)	34	4.315*	0.2204 (–0.4279–0.8687)
Callous-unemotional traits						
Low CU	0.40 (1.00; 0.00–4.00)	20	1.83 (4.26; 0.00–18.00)	24	6.912**	0.5768 (0.1468–1.0069)
High CU	2.57 (3.57; 0.00–12.00)	23	2.44 (3.92; 0.00–12.00)	23	4.159*	0.6462 (0.0252–1.2672)
Treatment motivation						
Low motivation	2.84 (3.82; 0.00–12.00)	19	2.50 (4.88; 0.00–18.00)	22	0.011	–0.0309 (–0.6090–0.5471)
High motivation	0.54 (1.14; 0.00–4.00)	24	1.80 (3.25; 0.00–11.00)	25	4.125*	0.4384 (0.0153–0.8613)
					0.052	–0.0713 (–0.6838–0.5413)
					3.983*	0.5949 (0.0107–1.1791)

Note. DCD = Dutch Cell Dogs, TAU = treatment-as-usual, n = sample size, M = mean, SD = standard deviation, d = Cohen's d effect size, 95% CI = 95% confidence interval.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Moderator effects

Moderator analyses were conducted to examine to what extent DCD was more beneficial for certain subgroups.

Recidivism over the entire follow-up period

Background characteristics and functioning at baseline did not moderate program effects: age, $HR = 0.959$, $p = 0.075$, 95% CI [0.916–1.004], cultural background, $HR = 2.714$, $p = 0.061$, 95% CI [0.956–7.708], internalizing behavioral problems, $HR = 0.272$, $p = 0.073$, 95% CI [0.065–1.128], aggression, $HR = 0.359$, $p = .226$, 95% CI [0.068–1.886]; callous-unemotional traits, $HR = 3.996$, $p = 0.084$, 95% CI [0.831–19.222]; self-control, $HR = 0.682$, $p = .420$, 95% CI [0.269–1.729]; and treatment motivation, $HR = 0.402$, $p = .062$, 95% CI [0.155–1.045].

Self-reported criminal behavior

In terms of self-reported criminal behavior at 6-months post program termination, significant moderating effects were found for age; and some parts of detainees functioning during incarceration, such as callous-unemotional traits and treatment motivation. Results of the significant moderator analyses and post-hoc findings are reported in Table 4. For age, results indicated that DCD had a positive effect on self-reported criminal behavior for adults (> 25 -years-old), Wald $\chi^2(1) = 4.315$, $p = .038$, but not for adolescents (≤ 25 -years-old), Wald $\chi^2(1) = 0.444$, $p = .505$. For callous-unemotional traits and treatment motivation, a median split was performed. Moderator results for callous-unemotional traits demonstrated that DCD had a positive effect for participants low on callous-unemotional traits, Wald $\chi^2(1) = 4.159$, $p = .041$, whereas DCD was not effective for participants

high on these traits, Wald $\chi^2(1) = 0.011$, $p = .915$. Further, DCD had a positive effect on self-reported delinquent behavior for DCD participants high on treatment motivation, Wald $\chi^2(1) = 3.983$, $p = .046$. No program effect was found for participants low on treatment motivation, Wald $\chi^2(1) = 0.052$, $p = .819$.

Finally, no moderating effects were found for cultural background, Wald $\chi^2(1) = 0.925$, $p = .336$; and the remaining aspects of detainees functioning at baseline, such as internalizing behavioral problems, Wald $\chi^2(1) = 0.090$, $p = .764$; aggression, Wald $\chi^2(1) = 1.741$, $p = .187$; and self-control, Wald $\chi^2(1) = 3.499$, $p = .061$.

Discussion

The current study examined the long-term effectiveness of DCD in helping to reduce recidivism and self-reported criminal behavior. Overall program effectiveness and the responsiveness of subgroups were assessed. A small-to-moderate negative program effect was found at 12-months post detention, as recidivism was more likely among DCD participants (39.6%), compared to TAU (22.5%). However, this difference disappeared over the entire follow-up period (on average 2.7 years). No program effect for self-reported criminal behavior was found. In sum, results demonstrated that overall, DCD was not more (or less) effective than TAU in reducing self-reported delinquent behavior at follow-up or any of the aspects of recidivism based on official data, including number of offenses, timing, and seriousness of reconvictions.

As stated, little research has been conducted on the effectiveness of DTPs on recidivism. In addition, different definitions and time frames of recidivism have been used, making it difficult to compare and contrast findings. The only other study that also examined

reconviction at one-year post release (Hill, 2020) found no difference between study conditions. Even though we found a small-to-moderate negative program effect at 12-months, there was no difference between DCD and TAU when the whole follow-up period (including the first 12 months post-detention) was considered. Therefore, the conclusion that DCD was no more – or less effective – than TAU in reducing reconvictions is in line with Hill's (2020) findings.

The absence of positive effects of DCD may be understood by comparing the program to other forms of correctional programming. Meta-analytic research in the last decades has demonstrated that the correctional interventions most effective in reducing recidivism embody a “therapeutic” element – such as cognitive behavioral treatment, system-oriented programs – and have high implementation quality (Lipsey, 2009, 2019). DCD is not a treatment method that focuses on direct change of inmates; rather, the rationale is that by helping the shelter dog, inmates' wellbeing and behavior will indirectly also improve. Another consideration is that programs implemented according to the risk-need-responsivity (RNR) model tend to have the strongest effects on recidivism (e.g., Koehler et al., 2013). According to the RNR model, matching offenders to an intervention based on their risk level of reoffending and criminogenic needs is essential. As risk assessments are not used in assigning participants to DCD, perhaps there was a mismatch between DCD participants' criminogenic needs and those that DTPs are expected to address (i.e., emotion regulation, prosocial behavior, and the criminogenic nature of correctional settings). Or the dosage of DCD (i.e., 8 weeks, only part-time access to the dog) may have been too low for these offenders.

Further, although there are currently no instruments to assess the implementation quality of DTPs, informal ratings by DCD trainers (0–10) indicated that only 38.5% of the times they were able to carry out the program well (i.e., score of 8 or higher) and as intended, which may indicate that implementation quality was not high enough to stimulate positive change. Implementing interventions successfully in the repressive, adversarial climate of correctional facilities can be challenging, perhaps especially for DTPs whose “approach” (i.e., humane, respectable, encouraging emotional expression; Furst, 2019) may be more at odds with the prison environment. Future research in this regard is needed.

An alternative explanation may be that DCD did not outperform TAU because there are subgroups who benefited more (or less) from the program. Some

potential moderators (i.e., age, cultural background, and detainees' functioning) were examined and results confirmed that certain subgroups of DCD participants responded differently to the intervention. First, self-reported criminal behavior was lower for adult DCD participants (> 25-years-old). In comparison to official judicial data, self-reported criminal behavior data are generally believed to give a more accurate estimate of offenses (higher than official data), also including minor forms of delinquent behavior that do not necessarily lead to reconviction (e.g., Farrington et al., 2017). This finding may indicate that DCD may reduce criminal behavior among adult participants; a recent meta-analysis also found more favorable outcomes for older prison-based dog program participants (Duindam et al., 2020). Little is known about differential responsivity to dog training programs based on age. Some dog training programs in prison have suggested that working with the dogs may be particularly helpful for adolescents because they tend to be “harder to reach” through regular approaches, whereas others have mentioned preferring the adult participants because of their maturity level (Wright et al., 2019). Some evidence suggests that incarceration may be more harmful to juveniles, particularly because juveniles are more sensitive to coercive pressure from peers, provocation, and stressful situations (e.g., Lambie & Randell, 2013). Also, some have reported that mental health difficulties, substance abuse issues and cognitive disability are higher among juvenile offenders than adult offenders; that these issues may be further intensified by juveniles' psychosocial immaturity (Richards, 2011). Therefore, positive DCD program effects may have been mitigated due to juveniles' sensitivity to negative influences of the prison surroundings and the complexity of their needs. The DCD program is the same for juvenile and adult offenders, perhaps more adjustments are needed to meet the needs of juvenile offenders in particular. However, future research in this area is needed.

Self-reported criminal behavior was also lower six months after program completion for DCD participants with lower levels of CU traits and for DCD participants with higher levels of treatment motivation at baseline. This finding is in line with other research that suggests that offenders who are high on CU traits (e.g., White et al., 2013), or lack treatment motivation (e.g., Cornet et al., 2015), are less likely to benefit from treatment programs. In sum, these moderator findings provide initial evidence that subgroups may respond differently to DTPs in terms of delinquent behavior. However, results should not be

overinterpreted because they were only found for some outcomes and sample sizes of subgroups were small (especially for self-reported criminal behavior; Asscher et al., 2014), therefore future research is needed.

Some limitations of the current study should be considered. Due to the relatively low number of participants applying to DCD, randomization was not possible, which increases the chance of internal validity threats (Farrington & Welsh, 2005). Even though the participants in the two study conditions did not differ significantly in baseline functioning, DCD participants were on average less educated. As previous research demonstrated a link between low educational achievement and recidivism (e.g., Eisenberg et al., 2019; Katsiyannis et al., 2008), these characteristics may have affected the high recidivism rates in the DCD group. Due to the lack of randomization, there may have also been unobserved differences between the participants in the two study conditions, which could have positively affected the program outcomes. For example, given their interest in voluntarily signing up to train a shelter dog, participants in the DCD group may have been more empathetic, making them more likely to function better overall. This may have influenced the positive program outcomes on criminal behavior for certain subgroups. The issue of self-selection bias has been noted previously in DTP research (e.g., Grommon et al., 2020). To prevent this, randomized controlled trials are needed in the future.

Another limitation is that participants in the current study were only released for an average of 1.7 years, as the funding period did not cover a longer follow-up assessment. Ideally a two-year minimum window should be used for all participants as most recidivists recidivate within this time period (Wartna, 2005). In addition, there can be a delay in the processing of judicial data within two-years in the Netherlands, therefore, current results may be an underestimate of reconvictions (Wartna, 2005). In this regard, it is also important to mention that 37 study participants were still incarcerated at the end of the observation period (July and September 2020), which reduces but not eliminates the possibility of recidivism (32% of those who recidivated in our sample, did so during incarceration). Although a longer follow-up period is preferred, we would like to stress that this is the longest follow-up period for a DTP study on recidivism (Chianese, 2009; Cooke, 2014; Hill, 2020). In addition, as the still incarcerated participants were almost evenly divided across study conditions (DCD = 13.9%; TAU = 16.7%), and the amount of time

post-detention was controlled for in the analyses, it is unlikely that our final conclusions were impacted. Future research, however, should aim to use a longer follow-up period for all participants.

Strengths of the current study include the examination of subgroup responsiveness, the naturalistic research setting (high external validity), and the comprehensive assessment of recidivism (including time as a factor). Based on the current study, the following recommendations for future research on the effects of DTPs on recidivism and criminal behavior can be formulated. Firstly, as stated more research with high quality designs (i.e., Randomized Controlled Trials) and larger sample sizes – in order to reduce self-selection bias and detect smaller effects on recidivism – is needed (Farrington & Welsh, 2005; Wartna, 2005). Many of the (moderator) analyses in the current study were significant at trend level, a larger sample size would facilitate more definitive conclusions about DCD's effectiveness and the influence of subgroups on program outcomes. Unfortunately, conducting DTP research with larger samples is a challenge in the Netherlands as offender populations attending DTPs may not be large enough to evaluate within the allotted research grant timeframes (i.e., generally 3–4 years; Wartna, 2005).

Secondly, future research should examine the role of participants' static and dynamic risk factors on DTP effectiveness. Risk factors such as criminal history, age of first offense, and history of violence are important predictors of recidivism (Cottle et al., 2001; Mulder et al., 2011). Study conditions should be compared in terms of prevalence of these risk factors and risk profiles could also be interesting to include as moderators. Future research on DTPs should also consider measuring outcomes beyond recidivism (Furst, 2019). Although a recent study on the short-term effectiveness also demonstrated that DCD did not outperform TAU on socioemotional and therapeutic outcomes (Duindam et al., 2021a), an abundance of qualitative research suggests DTP participation may enhance environmental processes (e.g., reduce the criminogenic nature of prison, improve staff-offender interactions) and vocational skills (e.g., taking responsibility, discipline, enhancing goal directed behaviors, collaboration; Britton & Button, 2005; Minton et al., 2015; Turner, 2007).

In conclusion, overall DCD did not outperform TAU in terms of recidivism and self-reported criminal behavior. To our knowledge, this is the first prospective evaluation of a DTP on recidivism conducted on a relatively large scale, including moderators. The

present study demonstrated that subgroups based on age, cultural background, and detainees' functioning responded differently to DCD on some outcomes. DCD is a short-term, low-dosage, program. Therefore, the expectation that DCD can influence complex recidivism patterns seems unrealistic. However, as DTPs elicit enthusiasm and hope in the difficult environment of correctional facilities (e.g., Aufderheide & Renck Jalongo, 2019) and break the chain of many shelter dogs (e.g., Wiegerinck & Buijtelts, 2017), more experimental research is needed to discover how and why these programs may contribute to inmates' wellbeing and functioning in the long term.

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References

- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms & profiles*. University of Vermont, Research Center for Children, Youth, & Families.
- Achenbach, T. M., & Rescorla, L. A. (2003). *Manual for the ASEBA adult forms & profile*. University of Vermont, Research Center for Children, Youth, & Families.
- Asscher, J. J., Deković, M., Manders, W., van der Laan, P. H., Prins, P. J. M., & van Arum, S. (2014). Sustainability of the effects of multisystemic therapy for juvenile delinquents in the Netherlands: Effects on delinquency and recidivism. *Journal of Experimental Criminology*, 10, 227–243. <https://doi.org/10.1007/s11292-013-9198-8>
- Aufderheide, C., & Renck Jalongo, M. (2019). Celebrating the achievements of prison dog programs. In M. Renck Jalongo (Ed.), *Prison dog programs: Renewal and rehabilitation in correctional facilities* (pp. 275–304). Springer.
- Beetz, A. (2017). Theories and possible processes of action in animal assisted interventions. *Applied Developmental Science*, 21(2), 139–149. <https://doi.org/10.1080/10888691.2016.1262263>
- Britton, D. M., & Button, A. (2005). Prison pups: Assessing the effects of dog training programs in correctional facilities. *Journal of Family Social Work*, 9(4), 79–95. https://doi.org/10.1300/J039v09n04_06
- Bures, R. M., & Gee, N. R. (2021). *Well-being over the life course incorporating human-animal interaction*. Springer.
- Cauffman, E., & Steinberg, L. (2000). (Im)maturity of judgment in adolescence: Why adolescents may be less culpable than adults. *Behavioral Sciences & the Law*, 18(6), 741–760. <https://doi.org/10.1002/bsl.416>
- Chianese, N. (2009). *Girls, jails, and puppy dog tails: An evaluation of the new leash on life program* [Master's thesis]. Department of Sociology, California State University.
- Conroy, J. W., Coppola, E. C., Ferris, C. S., Conroy, N. L., Devlin, S. J., & Boc, J. A. (2019). Evaluation outcomes in a prison-based canine program: A mixed-method analysis of new leash on life. In M. Renck Jalongo (Ed.), *Prison dog programs: Renewal and rehabilitation in correctional facilities* (pp. 193–211). Springer.
- Cooke, B. J. (2014). *Bad to the bone?: The effects of dog training programs on factors related to desistance*. [Doctoral dissertation]. Institute of Criminology, University of Cambridge.
- Cooke, B. J. (2019). Exploring types of programs: Dog, rescue, rehabilitation and training. In M. Renck Jalongo (Ed.), *Prison dog programs: Renewal and rehabilitation in correctional facilities* (pp. 37–51). Springer.
- Cooke, B. J., & Farrington, D. P. (2014). Perceived effects of dog-training programmes in correctional settings. *Journal of Forensic Practice*, 16(3), 171–183. <https://doi.org/10.1108/JFP-08-2013-0041>
- Cornet, L. J. M., Van Der Laan, P. H., Nijman, H. L. I., Tollenaar, N., & de Kogel, C. H. (2015). Neurobiological factors as predictors of prisoners' response to a cognitive skills training. *Journal of Criminal Justice*, 43(2), 122–132. <https://doi.org/10.1016/j.jcrimjus.2015.02.003>
- Cottle, C., Lee, R., & Heilbrun, K. (2001). The prediction of criminal recidivism in juveniles: A meta-analysis. *Criminal Justice and Behavior*, 28(3), 367–394. <https://doi.org/10.1177/0093854801028003005>
- Dmitrieva, J., Monahan, K. C., Cauffman, E., & Steinberg, L. (2012). Arrested development: The effects of incarceration on the development of psychosocial maturity. *Development and Psychopathology*, 24(3), 1073–1090. <https://doi.org/10.1017/S0954579412000545>
- Duindam, H. M., Asscher, J. J., Hoeve, M., Stams, G. J. J. M., & Creemers, H. E. (2020). Are we barking up the right tree? A meta-analysis on the effectiveness of prison-based dog programs. *Criminal Justice and Behavior*, 47(6), 749–767. <https://doi.org/10.1177/0093854820909875>
- Duindam, H. M., Creemers, H. E., Hoeve, M., & Asscher, J. J. (2021a). A quasi-experimental study on the effectiveness of Dutch Cell Dogs on incarcerated youth. *International Journal of Offender Therapy and Comparative Criminology*, 65(5), 644–666. <https://doi.org/10.1177/0306624X20983748>
- Duindam, H. M., Creemers, H. E., Hoeve, M., & Asscher, J. J. (2021b). Who lets the dog in? Differential effects of a dog-training program for incarcerated adults. *Anthrozoös*, 1–23.
- Eisenberg, M. J., van Horn, J. E., Dekker, J. M., Assink, M., van der Put, C. E., Hendriks, J., & Stams, G. J. J. M. (2019). Static and dynamic predictors of general and violent criminal offense recidivism in the forensic outpatient population: A meta-analysis. *Criminal Justice and Behavior*, 46(5), 732–750. <https://doi.org/10.1177/0093854819826109>
- Farrington, D. P., & Ttofi, M. M. (2014). Editorial: Criminal careers in self-reports compared with official records. *Criminal Behaviour and Mental Health*, 24(4), 225–228. <https://doi.org/10.1002/cbm.1932>

- Farrington, D. P., & Welsh, B. C. (2005). Randomized experiments in criminology: What have we learned in the last two decades? *Journal of Experimental Criminology*, 1(1), 9–38. <https://doi.org/10.1007/s11292-004-6460-0>
- Farrington, D. P., Gaffney, H., & Ttofi, M. M. (2017). Systematic reviews of explanatory risk factors for violence, offending, and delinquency. *Aggression and Violent Behavior*, 33, 24–36. <https://doi.org/10.1016/j.avb.2016.11.004>
- Fournier, A. (2016). Pen pals: An examination of human-animal interaction as an outlet for health masculinity in prison. In C. Blazina & L. R. Kogan (Eds.), *Men and their dogs* (pp. 175–194). Springer International Publishing.
- Frick, P. J. (2004). *Inventary of callous-unemotional traits* (University of New Orleans). <http://labs.uno.edu/developmental-psychopathology/ICU.html>
- Furst, G. (2006). Prison-based animal programs. *The Prison Journal*, 86(4), 407–430. <https://doi.org/10.1177/0032885506293242>
- Furst, G. (2019). The empirical evidence supporting dog training programs for incarcerated people. In M. Renck Jalongo (Ed.), *Prison dog programs: Renewal and rehabilitation in correctional facilities* (pp. 17–36). Springer.
- Gottfredson, M., & Hirschi, T. (1990). *A general theory of crime*. Stanford University Press.
- Grommon, E., Carson, D. C., & Kenney, L. (2020). An experimental trial of a dog-training program in a juvenile detention center. *Journal of Experimental Criminology*, 16(2), 280–299. <https://doi.org/10.1007/s11292-018-9346-2>
- Hawes, D. J., Brennan, J., & Dadds, M. R. (2009). Cortisol, callous-unemotional traits, and pathways to antisocial behavior. *Current Opinion in Psychiatry*, 22(4), 357–362. <https://doi.org/10.1097/YCO.0b013e32832bfa6d>
- Hill, L. B. (2020). Becoming the person your dog thinks you are: An assessment of Florida prison-based dog training programs on postrelease recidivism. *Corrections*, 5(3), 149–169. <https://doi.org/10.1080/23774657.2018.1433564>
- Jaffe, A., Du, J., Huang, D., & Hser, Y. I. (2012). Drug-abusing offenders with comorbid mental disorders: Problem severity, treatment participation, and recidivism. *Journal of Substance Abuse Treatment*, 43(2), 244–250. <https://doi.org/10.1016/j.jsat.2011.12.002>
- Jennings, W. G., & Reingle, J. M. (2012). On the number and shape of developmental/life-course violence, aggression, and delinquency trajectories: A state-of-the-art review. *Journal of Criminal Justice*, 40(6), 472–489. <https://doi.org/10.1016/j.jcrimjus.2012.07.001>
- Katsiyannis, A., Ryan, J. B., Zhang, D., & Spann, A. (2008). Juvenile delinquency and recidivism: The impact of academic achievement. *Reading & Writing Quarterly*, 24(2), 177–196. <https://doi.org/10.1080/10573560701808460>
- Koehler, J. A., Lösel, F., Akoensi, T. D., & Humphreys, D. K. (2013). A systematic review and meta-analysis on the effects of young offender treatment programs in Europe. *Journal of Experimental Criminology*, 9(1), 19–43. <https://doi.org/10.1007/s11292-012-9159-7>
- Kruger, K. A., Trachtenberg, S. W., & Serpell, J. A. (2004). *Can animals help humans heal? Animal-assisted interventions in adolescent mental health*. Center for the Interaction of Animals and Society (CIAS) and University of Pennsylvania School of Veterinary Medicine.
- Lambie, I., & Randell, I. (2013). The impact of incarceration on juvenile offenders. *Clinical Psychology Review*, 33(3), 448–459. <https://doi.org/10.1016/j.cpr.2013.01.007>
- Laub, J. H., & Sampson, R. J. (2001). Understanding desistance from crime. *Crime and Justice*, 28, 1–69. <https://doi.org/10.1086/652208>
- Leonardi, R. J., Buchanan-Smith, H. M., McIvor, G., & Vick, S. J. (2017). You think you're helping them, but they're helping you too": Experiences of Scottish male young offenders participating in a dog training program. *International Journal of Environmental Research and Public Health*, 14(8), 945–972. <https://doi.org/10.3390/ijerph14080945>
- Lipsey, M. W. (2009). The primary factors that characterize effective interventions with juvenile offenders: A meta-analytic overview. *Victims & Offenders*, 4(2), 124–147. <https://doi.org/10.1080/15564880802612573>
- Lipsey, M. W. (2019). Rehabilitation programs for adult offenders: A meta-analysis in support of guidelines for effective practice. <https://www.ncjrs.gov/pdffiles1/nij/grants/252504.pdf>
- Minton, C. A., Perez, P. R., & Miller, K. (2015). Voices from behind prison walls: The impact of training service dogs on women in prison. *Society & Animals*, 23(5), 484–501. <https://doi.org/10.1163/15685306-12341379>
- Monahan, K. C., Steinberg, L., Cauffman, E., & Mulvey, E. P. (2009). Trajectories of antisocial behavior and psychosocial maturity from adolescence to young adulthood. *Developmental Psychology*, 45(6), 1654–1668. <https://doi.org/10.1037/a0015862>
- Monahan, K. C., Steinberg, L., Cauffman, E., & Mulvey, E. P. (2013). Psychosocial (im)maturity from adolescence to early adulthood: Distinguishing between adolescence-limited and persisting antisocial behavior. *Development and Psychopathology*, 25(4Pt 1), 1093–1105. <https://doi.org/10.1017/S0954579413000394>
- Montori, V. M., & Guyatt, G. H. (2001). Intention-to-treat principle. *Canadian Medical Association Journal = Journal de L'Association Medicale Canadienne*, 165(10), 1339–1341.
- Mueller, M. K. (2014). Is human-animal interaction (HAI) linked to positive youth development? Initial answers. *Applied Developmental Science*, 18(1), 5–16. <https://doi.org/10.1080/10888691.2014.864205>
- Mulcahy, C., & McLaughlin, D. (2013). Is the tail wagging the dog? A review of the evidence for prison animal programs. *Australian Psychologist*, 48(5), 370–378. <https://doi.org/10.1111/ap.12021>
- Mulder, E., Brand, E., Bullens, R., & Van Marle, H. (2011). Risk factors for overall recidivism and severity of recidivism in serious juvenile offenders. *International Journal of Offender Therapy and Comparative Criminology*, 55(1), 118–135. <https://doi.org/10.1177/0306624X09356683>
- Richards, K. (2011). What makes juvenile offenders different from adult offenders? *Trends and Issues in Crime and Criminal Justice*, 409, 1–8. https://eprints.qut.edu.au/65093/8/What_makes_juvenile_offenders.pdf
- Schenk, G., Duindam, H. M., Creemers, H. E., Hoeve, M., Stams, G. J. J. M., & Asscher, J. J. (2018). The effectiveness of Dutch cell dogs in correctional facilities in the Netherlands: A study protocol of a quasi-experimental trial. *BMC Psychiatry*, 18(1), 218. <https://doi.org/10.1186/s12888-018-1797-5>

- Seivert, N. P., Cano, A., Casey, R. J., Johnson, A., & May, D. K. (2018). Animal assisted therapy for incarcerated youth: A randomized controlled trial. *Applied Developmental Science, 22*(2), 139–153. <https://doi.org/10.1080/10888691.2016.1234935>
- Serpell, J., McCune, S., Gee, N., & Griffin, J. A. (2017). Current challenges to research on animal-assisted interventions. *Applied Developmental Science, 21*(3), 223–233. <https://doi.org/10.1080/10888691.2016.1262775>
- Shearer, R. A., Myers, L. B., & Ogan, G. D. (2001). Treatment resistance and ethnicity among female offenders in substance abuse treatment programs. *The Prison Journal, 81*(1), 55–72. <https://doi.org/10.1177/0032885501081001005>
- Souverein, F., Dekkers, T., Bulanovaitė, E., Doreleijers, T., Hales, H., Kaltiala-Heino, R., Oddo, A., Popma, A., Raschle, N., Schmeck, K., Zanoli, M., & van der Pol, T. (2019). Overview of European forensic youth care: Towards an integrative mission for prevention and intervention strategies for juvenile offenders. *Child and Adolescent Psychiatry and Mental Health, 13*(1), 6–9. <https://doi.org/10.1186/s13034-019-0265-4>
- Steinberg, L., Cauffman, E., & Monahan, K. C. (2015). *Psychosocial maturity and desistance from crime in a sample of serious juvenile offenders.*
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 212–271. <https://doi.org/10.1111/j.0022-3506.2004.00263.x>
- Turner, W. G. (2007). The experience of offenders in a prison canine program. *Federal Probation, 71*(1), 38–43.
- Usher, A. M., & Stewart, L. A. (2014). Effectiveness of correctional programs with ethnically diverse offenders: A meta-analytic study. *International Journal of Offender Therapy and Comparative Criminology, 58*(2), 209–230. <https://doi.org/10.1177/0306624X12469507>
- Van Der Helm, G. H. P., Wissink, I. B., De Jongh, T., & Stams, G. J. J. M. (2013). Measuring treatment motivation in secure juvenile facilities. *International Journal of Offender Therapy and Comparative Criminology, 57*(8), 996–1008. <https://doi.org/10.1177/0306624X12443798>
- Van Der Laan, A. M., Blom, M. (2006). *Jeugddelinquentie: risico's en bescherming. Bevindingen uit de WODC Monitor Zelfgerapporteerde Jeugdcriminaliteit 2005.* https://www.wodc.nl/binaries/ob245-volledige-tekst_tcm28-67986.pdf
- Wartna, B. S. J. (2005). Evaluatie van daderprogramma's. Boom Juridische Uitgevers website: https://www.wodc.nl/binaries/OV2005-01_volledigetekst_tcm28-236517.pdf
- Wartna, B. S. J., Blom, M., Tollenaar, N. (2011). *The Dutch Recidivism Monitor.* https://www.wodc.nl/binaries/the-dutch-recidivism-monitor-2011-20110803_tcm28-78143.pdf
- Weijters, G., Verweij, S., Tollenaar, N., Hill, J. (2019). *Recidivism among offenders in the Netherlands: Report on the period 2006-2018.* https://www.wodc.nl/binaries/Cahier2019-10_Summary_tcm28-396009.pdf
- Weisz, J. R., Jensen-Doss, A., & Hawley, K. M. (2006). Evidence-based youth psychotherapies versus usual clinical care: A meta-analysis of direct comparisons. *The American Psychologist, 61*(7), 671–689. <https://doi.org/10.1037/0003-066X.61.7.671>
- Wells, D. L. (2009). The effects of animals on human health and well-being. *Journal of Social Issues, 65*(3), 523–543. <https://doi.org/10.1111/j.1540-4560.2009.01612.x>
- White, S. F., Frick, P. J., Lawing, K., & Bauer, D. (2013). Callous-unemotional traits and response to functional family therapy in adolescent offenders. *Behavioral Sciences & the Law, 31*(2), 271–285. <https://doi.org/10.1002/bsl.2041>
- Wiegerinck, H., & Buijtsels, B. (2017). *Dutch Cell Dogs: Jaaverslag 2016.* Bergeijk.
- Wright, B., Renck Jalongo, M., & Guy, T. (2019). Screening and selecting inmates for program participation. In M. Renck Jalongo (Ed.), *Prison dog programs: Renewal and rehabilitation in correctional facilities* (pp. 123–141), Springer.
- Yukhnenko, D., Sridhar, S., & Fazel, S. (2019). A systematic review of criminal recidivism rates worldwide: 3-year update. *Wellcome Open Research, 4*, 28. <https://doi.org/10.12688/wellcomeopenres.14970.1>