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Who Lets the Dog In? Differential Effects of a Dog-Training Program for Incarcerated Adults

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ABSTRACT

This quasi-experimental study examined the short-term effectiveness of Dutch Cell Dogs (DCD), a short prison-based dog-training program, on anti-social behavioral and wellbeing outcomes of incarcerated adults ($n = 138$; men = 133; women = 5). Little is known about the responsiveness of subgroups – and the prerequisites of change – in dog-training programs (DTPs). Therefore, the role of moderators (age, cultural background, correctional facility type) and predictors (dog bond, implementation process) of DCD was also assessed. Results demonstrated that DCD ($n = 70$) did not outperform treatment-as-usual (TAU; $n = 68$) in any of the outcomes, although a small negative effect was found for aggression ($F_{(1,135)} = 5.552$, $p = 0.020$), which appeared driven by the group of participants who had a weaker bond with the dog. This group had higher aggression levels after the program, compared with TAU ($F_{(1, 98)} = 9.443$, $p = 0.003$). The dog bond was not associated with any other outcomes post-intervention. In addition, age moderated program effectiveness on infractions (Wald $\chi^2_{(1)} = 6.254$, $p = 0.012$), suggesting differential effects for younger (< 36 years) participants. No evidence was found for the other moderators and predictor of implementation quality. In conclusion, DCD did not outperform TAU in anti-social behavioral and wellbeing outcomes. Some evidence for predictors and moderators were found. The present study is only one of the first to examine what matters for whom in a DTP for incarcerated adults. More research, preferably in the form of randomized controlled trials with sufficiently large sample sizes, is needed.

KEYWORDS

Anti-social behavior; dog bond; dog-training; human–animal interaction; incarceration; prison; wellbeing

Prison-based dog-training programs (DTPs) are a popular type of animal-assisted intervention (AAI) in correctional facilities (e.g., Mulcahy & McLaughlin, 2013). Participation in DTPs is expected to facilitate positive behavioral change. However, the research base to support the implementation of these programs is relatively thin (e.g., Duindam et al.,

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2020). An important blind spot of previous studies is that most focus on overall program effectiveness, whereas scholars have come to agree that the more important question to ask is for whom specific interventions work, and under what circumstances (e.g., Conroy et al., 2019). Identifying subgroups who benefit more (or less) from DTPs may be helpful (e.g., Serpell et al., 2017). Therefore, the purpose of the current study was to gain insight into the workings of Dutch Cell Dogs (DCD) – an eight-week-long DTP – for adult offenders by not only examining overall effectiveness, but also assessing the role of potential moderators and predictors of change on the effectiveness of DTPs.

DTPs are popular in correctional facilities worldwide; most often, these programs are offered in a community-service format where inmates train shelter dogs for a period of time in order to improve the dogs' adoption chances (Cooke, 2019). DTPs – and AAls more generally – are expected to facilitate mood and behavioral improvement based on the psychosocial and health benefits associated with human–animal interaction (e.g., Beetz et al., 2012). Several hypotheses have been developed on how participation in DTPs may instigate positive change. Dogs play a central role in these hypotheses, as these animals in particular have been recognized for their capability to form strong relationships with humans, owing to their sensitivity (and responsivity) to human emotion (Renck Jalongo et al., 2019). The companionship of a dog can be particularly needed in prison, as the correctional environment can be repressing and physically as well as socially depriving (e.g., Fournier & Winston, 2019; Furst, 2019). In this “lonely” prison environment (e.g., Furst, 2019), the attachment to the dog can help inmates feel socially supported; this may help them deal with negative emotions and increase their wellbeing (e.g., Beetz, 2017). The bond with the dog may also provide a bridge and help inmates become more open and trusting of other humans, such as therapeutic professionals, which could further enhance wellbeing (Jasperson, 2010; Leonardi et al., 2017). Similarly, feeling empathetic toward shelter dogs – who have experienced rejection, isolation, and confinement just like the detainees – may also help elicit empathetic feelings more generally (Mills & Hall, 2014).

Because dogs are known for their ability to mirror human behavior and emotion, inmates may become more aware of how they come across, which may stimulate them to improve and practice (new) emotion regulation skills and behaviors (e.g., caring for, patience, taking responsibility, controlling impulses; Kruger et al., 2004; Renck Jalongo, 2019). The experience of successfully training a shelter dog may not only enhance self-esteem (Fournier et al., 2007), it also gives detainees a unique opportunity to engage in prosocial behavior, which could facilitate a positive sense of purpose during incarceration that could reduce anti-social thinking and help build a more prosocial, “anti-criminal” identity that fosters further desistance from crime (Grommon et al., 2018; Hill, 2018).

Previous research supports some of these hypothesized DTP benefits in terms of improving self-esteem, self-control, and emotion regulation (Britton & Button, 2005; Leonardi et al., 2017; Walsh & Mertin, 1994), decreasing externalizing behavioral problems (e.g., Cooke & Farrington, 2016), enhancing empathy (e.g., Minton et al., 2015), improving wellbeing (e.g., Cooke & Farrington, 2016), decreasing prison misconduct (Fournier et al., 2007; Van Wormer et al., 2017), and providing an opportunity to “give back” to the community (e.g., Fournier, 2016). However, most studies on AAls – and DTPs, in particular

– conducted up until now have significant limitations, such as nonexperimental research designs and small sample sizes (Duindam et al., 2020; O’Haire et al., 2015).

Another limitation is that the majority of studies have focused on average programs effects. As a consequence, variation in intervention responsiveness (i.e., perhaps DTPs are more suitable for certain groups) may remain unidentified. The implicit assumption underlying AAls seems to be that they are universally beneficial; however, studies have shown that various demographic factors, such as age, gender, and cultural background, can influence attachment to companion animals (for an overview, see Serpell et al., 2017). If these factors influence the human–animal bond, they can presumably also influence the effectiveness of AAls, such as DTPs (Serpell et al., 2017). Therefore, it is important to look beyond DTPs’ overall effectiveness to try to disentangle to what extent effects may be differential. Conformingly, the importance of identifying subgroups for whom interventions may (not) work has been stressed across disciplines (see e.g., Furst, 2019; Kazdin, 2017; Kraemer et al., 2002; Serpell et al., 2017; Weisz et al., 2006).

In research on AAls/DTPs, this is not (yet) commonly done (Serpell et al., 2017), resulting in limited knowledge on moderators of effectiveness. In 2007, a meta-analysis did not find participants’ characteristics (e.g., age, type of problem, participants’ functioning) to influence the outcome of animal-assisted therapies (Nimer & Lundahl, 2007). A recent meta-analysis (11 studies) on prison-based dog programs found besides larger effects with increasing age no other sample moderators of effectiveness (e.g., gender, addicted versus general prison population, and cultural background; Duindam et al., 2020). The authors of both meta-analyses commented on the scarcity of studies that examined for whom and under which circumstances these type of interventions are (most) beneficial (Duindam et al., 2020; Nimer & Lundahl, 2007). Specifically for DCD, the DTP under study, recent research points in the direction of differential responsiveness (Duindam et al., 2021). For instance, more favorable outcomes were found in incarcerated youth with an older age or immigrant background (Duindam et al., 2021). In sum, there are indications that participants’ characteristics may moderate the effectiveness of DTPs; this warrants further exploration.

In addition, the context in which DTPs are embedded in correctional facilities may also affect program effectiveness. Common variation between correctional sites includes differences in programming offered, treatment accessibility, and group climate; contextual factors that may influence DTPs’ embedding. One particularly important contextual factor in the Netherlands is the type of correctional facility, which can either be regular or psychiatric, based on court-ordered placement. Adult offenders who have committed a serious offense, with high recidivism risk, can be placed in a psychiatric correctional facility when they lack culpability (to a certain degree) as a result of their mental and/or developmental illness (Dienst Justitiële Inrichtingen, 2017). In psychiatric correctional facilities, inmates receive extensive treatment (as long as needed) to facilitate successful reintegration upon release, whereas in regular adult facilities, treatment is not part of the daily program (Dienst Justitiële Inrichtingen, 2017, 2019). As the (lack of) treatment nature may influence DTP implementation, it is important to study the impact of correctional facility type on program effectiveness.

Another important research avenue for DTP effectiveness studies is exploring potential predictors of DTP effects (Duindam et al., 2020). Many DTP effects are derived back to the

benefits of the bond that is formed between the detainees and dogs; this human–animal attachment is seen as a cornerstone of AAls in general (Menna et al., 2019). However, the extent to which positive changes in participants are conditional upon the quality of this relationship has not directly been examined. Another potential predictor that has been underexplored in AAI research is the quality of the implementation process (e.g., O’Haire, 2013). In general, research on correctional programs has mainly consisted of pre–post outcome studies that ascribe the lack of effects to “unsuccessful” interventions without considering the circumstances under which programs were implemented (Bouffard et al., 2003). Failing to deliver a program as intended most likely impacts the outcomes (Bouffard et al., 2003). Therefore, the quality of the implementation process can be an important predictor of change. It allows for enhanced confidence in ascribing positive changes in outcomes to the DTP and possibly also increases statistical power by reducing error linked with poorer implementation processes (Breitenstein et al., 2010).

In sum, the purpose of the current study was to examine the effectiveness of DCD for incarcerated adults by studying (1) overall effectiveness, and (2) the influence of moderators (i.e., age, cultural background, correctional context) and predictors (i.e., detainee–dog bond, quality of the implementation process) on program outcomes. Outcomes included several hypothesized DTP benefits, categorized as anti-social behavioral outcomes (i.e., reduction in aggression and institutional infractions; enhancement of self-control and empathy) and wellbeing (i.e., reduction in stress; enhancement of self-esteem and life satisfaction). To our knowledge, this is the first study on a DTP with a large sample of incarcerated adults that includes the examination of potential moderators and predictors of program effectiveness.

Methods

The Ethical Committee of the Faculty of Social and Behavioral Sciences of the University of Amsterdam approved this study (No. 2015-CDE-6363) and it was registered in the Netherlands National Trial Registry (TC = 6894).

Design

For the current study, a pre–post quasi-experimental design was used with two groups (intervention and comparison). For this study, data were collected pre-DCD (baseline/T1), halfway during DCD (T2), and at the end of DCD (T3).

Participants

Between 2017 and 2019, DCD was offered at six adult correctional facilities across the Netherlands, including three psychiatric and three regular correctional facilities (for an overview, see Table 2). In the week before the start of the DCD program, participants were recruited for this study and other inmates at the respective facilities were recruited for the comparison group. In total, 138 incarcerated adults participated in the study, consisting of 70 participants in the DCD group and 68 participants in the comparison group.

This sample size was determined *a priori*: 128 participants were needed to detect a medium effect size, given a power of 0.80 and an alpha of 0.05 (Schenk et al., 2018). Table 1 includes demographic and background information of the participants. The majority of the study participants were incarcerated men ($n = 133/ 96.4\%$), most of whom were convicted for violent offenses. On average, participants were 38.10 years old ($SD = 11.50$; range = 18.48–73.19). Approximately half of the participants ($n = 70$) resided in a psychiatric correctional facility; the other half ($n = 68$) in regular correctional facilities for adults. Based on participants level of aggression, 10.9% of the participants fell in the (sub)clinical range (Achenbach & Rescorla, 2003).

As reported in Table 1, there were some differences between the DCD and comparison group in terms of background characteristics and pre-intervention scores. In general, DCD participants were younger ($M = 35.95$) than those in the comparison group ($M = 40.31$). In addition, the majority of participants in the DCD group had a native Dutch cultural background (72.9%), whereas in the comparison group, 44.1% of the participants had a native Dutch background. In terms of pre-intervention scores, there were two differences between the groups: DCD participants were on average engaged in more infractions at baseline ($M = 1.62$) than the comparison participants ($M = 0.35$). In addition, DCD participants scored lower on affective empathy ($M = 2.96$) than their counterparts in the comparison group ($M = 3.15$).

Despite extensive efforts of the researchers, there were 15 participants at T3 (10.9%) who did not complete the assessment due to various reasons (e.g., scheduling conflicts, unmotivated). Completers and drop-outs differed on one background variable: for drop-outs, educational background was more often “primary school or nothing” ($p = 0.011$). In terms of pre-intervention scores, there was one difference: drop-outs engaged in more infractions ($M = 3.1$, $SD = 6.4$) than completers ($M = 0.8$, $SD = 2.7$; $F_{(1, 116)} = 5.067$, $p = 0.026$).

Procedure

In the week before the start of the program, inmates interested in participating met with DCD staff. At this meeting, a researcher gave a brief introduction about the study. At the same time, the comparison group participants were recruited at the same facilities through flyers, posters, and word of mouth. All participants gave informed consent before study participation. Assessments, which lasted for ~60–90 min, took place in a quiet, private room in the facilities. Participants were provided reading assistance if needed. As a token of appreciation, participants received a small gift (e.g., shower gel, certificate for the prison store) upon completion of each assessment. More elaborate information about study procedures can be found in our study protocol (Schenk et al., 2018).

Study Conditions

Intervention Group (Dutch Cell Dogs): Participants in the intervention group took part in the DCD training at their correctional facility. When DCD is newly implemented in a correctional facility, incarcerated people get introduced to the program during a presentation by DCD staff. Each correctional facility has one staff member responsible for the

Table 1. Background characteristics of the participants, including pre-intervention scores for anti-social problems and wellbeing.

	DCD (<i>n</i> = 70)		TAU (<i>n</i> = 68)		F/Wald χ^2
	<i>M</i> (range)	<i>SD</i>	<i>M</i> (range)	<i>SD</i>	
<i>Anti-social problems</i>					
Aggression	0.34 (0.00–1.20)	0.29	0.31 (0.00–1.40)	0.29	0.284
Institutional infractions (T1) ¹	1.62 (0.00–21.00)	4.33	0.35 (0.00–8.00)	1.22	5.978*
Self-control	3.57 (2.12–4.67)	0.54	3.73 (2.5–5.00)	0.55	3.219
<i>Empathy</i>					
Cognitive empathy	3.82 (1.89–4.78)	0.54	3.78 (2.33–4.78)	0.49	0.277
Affective empathy	3.00 (1.45–4.09)	0.58	3.15 (1.91–4.27)	0.52	3.986*
<i>Wellbeing</i>					
Stress	1.45 (0.20–3.70)	0.73	1.53 (0.00–3.40)	0.72	0.444
Self-esteem	2.14 (0.90–3.00)	0.45	2.13 (0.70–3.00)	0.45	0.002
Life satisfaction	3.67 (1.00–7.00)	1.48	3.73 (1.00–7.00)	1.49	0.051
<i>Background characteristics</i>					
Mean age (years)	35.95 (18.48–55.96)	10.32	40.31 (20.17–73.19)	12.28	5.116*
Average incarceration (years) ²	1.63 (0.15–14.58)	2.32	2.11 (0.13–10.57)	2.24	1.334
	%	<i>n</i>	%	<i>n</i>	χ^2
<i>Type of offense</i> ³					
(Attempted) homicide	18.6	13	17.6	12	3.638
Violent behavior	32.9	23	47.1	32	
Theft or fraud	11.4	8	8.8	6	
Sexual offences	15.7	11	8.8	6	
Drug-related crime	5.7	4	4.4	3	
Other and unknown	15.7	11	13.2	9	
<i>Offense category</i>					
Single	39.7	27	39.7	27	0.754
Mix	41.2	28	44.3	31	
Unknown	19.1	13	22.9	16	
<i>Cultural background</i>					
Native Dutch	72.9	51	44.1	30	11.751***
1st or 2nd generation immigrant	27.1	19	55.9	38	
<i>Educational background</i>					
None or primary education	11.4	8	7.4	5	5.199
Secondary education	32.9	23	32.4	22	
Tertiary education	40.0	28	54.4	37	
Other or unknown	15.7	11	5.9	4	
<i>Psychiatric conviction</i>					
Yes	50.0	35	55.9	38	0.479
No	50.0	35	44.1	30	
<i>Intervention enrollment</i>					
Yes	82.3	56	80	52	0.728
No	17.6	12	20	13	

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

¹Only available for a subset: Wald χ^2 results are reported for these data.

²This information was only available for a subset of our sample (*n* = 118), Offense category – single = individual is currently serving sentence based on a single offense, Offense category – mix = individual is currently serving sentence based on multiple offenses.

³Categorization based on most severe crime, Fisher exact test statistic is reported because cell size < 5.

**p* < 0.05

****p* < 0.001.

recruitment of incarcerated people for DCD. Generally, recruitment occurs by means of word of mouth: for example, incarcerated people see or hear about the program and approach the contact person to express interest. Approximately one week before a new DCD training starts in a correctional facility, those who expressed interest meet with the DCD staff to test motivation and check the inclusion criteria. The inclusion criteria

Table 2. Participants per correctional facility.

Correctional facility type	DCD		TAU		# of trainings
	<i>n</i>	%	<i>n</i>	%	
<i>Psychiatric</i>					
De Rooyse Wissel	6	8.6	5	7.4	1
De Woenselse Poort	22	31.4	23	33.8	5
Oostvaarderskliniek	6	8.6	10	14.7	4
<i>General</i>					
PI Zuyderbos	20	28.6	18	26.5	5
PI Almelo	11	15.7	12	17.6	2
PI Lelystad	5	7.1	0	0	1
<i>Total</i>	70	100	68	100	18

Note: DCD = Dutch Cell Dogs; TAU = treatment-as-usual; # of trainings = the number of trainings given by DCD in the respective facilities.

for DCD are: (1) presence in the facility for the entire duration of the training; (2) participants have to be physically able to walk a dog and be alert enough (despite potential medication use) to follow DCD staff's instructions (correctional staff decide whether applicants meet this second criterion, based on their behavior on the ward); and (3) applicants have to express their motivation for the program in a letter. Usually, there is only a short phase right before the start of DCD during which incarcerated people can apply for the program. Some facilities keep a running waiting list for DCD, which gives precedence to those who have expressed interest in program participation before. If there are more than six participants, the correctional facility decides who can enroll in DCD.

Each DCD training program lasts for eight weeks – consisting of biweekly two-hour sessions – and consists of four phases. Each training session is run by two DCD staff (certified canine instructors with extensive group training experience) in the presence of a contact person of the correctional facility (e.g., prison officer, psychologist, group coordinator). During phase 1 – the intake meeting – two DCD staff closely observe participants' behavior while explaining the program rules and expectations. Based on these behavioral observations, and goals identified by correctional facility staff, DCD staff match each participant with their own shelter dog. An example match might be an “energetic” participant who is matched with a busy dog to foster self-insight of participants. The formed dog-participant pairs remain the same throughout the entire program. There are no inclusion criteria for the shelter dogs in the program, in terms of breed, age, or gender. The only inclusion criterion for shelter dogs is that they have to be interested in treats, as this is needed for the reward-based training methods (see the next paragraph). As each participant is paired with their own shelter dog, there are six participant-dog pairs in each DCD training.

During the following seven weeks of the program (phase 2), participants train, take care of, and play with their assigned dog biweekly for two-hour-long sessions. Positive reinforcement, with the use of a clicker and rewards, is used to train the dogs and stimulate their resocialization. This is necessary because shelters in the Netherlands only provide basic care (e.g., food, veterinary care, walks), whereas often additional training is needed to facilitate adoption for shelter dogs with behavioral issues. The training topics are: basic commands, (the understanding and handling of) dog aggression, grooming, and playing to foster relaxation. Prior to each session, training content is taught; during the remainder of the session, participants practice with their dogs. At the end

of each session, there is “chill” time, during which participants will play with or groom their dogs to help them relax before they have to return to the shelter.

Phase 3 consists of a ceremonial “graduation day,” during which participants demonstrate what they and their dogs have learned to staff members of the shelter, family, prison personnel, and (whenever possible) the new dog owners. Participants receive a certificate, a DCD T-shirt, and a picture of their dog after the ceremony. Phase 4 – the “evaluation” – takes place approximately one month after program termination; during this phase, DCD staff return to the correctional facilities to update participants about the current living situation of “their” shelter dog and ask participants how they look back on the program.

All DCD staff are certified cynological instructors who have completed a secondary vocational education program that included modules such as animal welfare, learning principles and dog behavior, and didactic skills. To ensure the quality of implementation across facilities, DCD staff also follow an internal training provided by senior staff. In addition, DCD staff are frequently observed by a senior staff member while working in the correctional facilities. Moreover, DCD staff attend compulsory workshops and supervision meetings where challenges are discussed.

There are some differences in the implementation of DCD, depending on the type of facility. In psychiatric facilities, the DCD program is one week shorter (seven weeks total) to accommodate for participants with mental illness, which means that phase 2 is one week shorter. In response, they will instruct participants on how they can positively respond to the dogs to meet their needs. Although the exact formation of treatment teams may differ between facilities, it generally consists of licensed mental health professionals, including but not limited to a psychiatrist, psychologist, and socio-therapists, who are continuously present on the wards, with the aim of creating a safe and restorative environment. Finally, DCD was a supplementary program for all participants in the intervention group, meaning that they also participated in treatment-as-usual (TAU), which can include treatment (e.g., cognitive behavioral therapy, multisystemic therapy), daily activities (e.g., sports, workshops, religious groups), and work opportunities as provided by the correctional facilities.

Even though there are currently no standardized guidelines on the ethics of the human–animal relationship in AAs and no formal rules for how animal welfare should be ensured (e.g., Johnson & Bruneau, 2019), DCD takes several steps to ensure the dogs’ safety and wellbeing. Before the start of the program, DCD closely collaborates with the correctional facilities to guarantee that there is appropriate training ground available, where enough distance can be kept between dog–participant dyads and there is no interruption by others. During the program, dog welfare and protection is assured by the two DCD staff who are continuously present when participants train and groom their shelter dog. As there are two staff members per six dog–participant pairs, DCD staff are able to be vigilant and can tell when dogs potentially become stressed. In response, they will instruct the participant on how he can positively respond to the dog to meet their needs. These two DCD staff also ensure that the dogs are safely transported to and from the correctional facilities, in airconditioned vans where each dog has its own secured dog bench. DCD closely collaborates with the shelters to ensure the dogs’ wellbeing, they communicate about the dogs’ behavior in the training and request veterinary care when needed. As a result, no dogs have been hurt while in the DCD program, and

~95% of them are adopted out of the shelter into a new family home thanks to the program (Wiegerinck & Buijtels, 2017).

Comparison Group (Treatment-as-Usual): Participants in the comparison group received TAU (as specified above) and did not participate in DCD for several reasons (e.g., uninterested, too busy, too late to sign up).

Instruments

All outcome measures were assessed at two timepoints: before the start of the intervention (T1) and at the end of the intervention (T3). For all outcomes except for institutional infractions, the means of item scores of Dutch versions of validated self-report scales were calculated after reverse-scoring negatively worded items. Higher total scores are indicative of higher levels of the measured constructs.

Anti-Social Behavioral Problems: Anti-social behavior problems were examined by assessing participants' aggression, self-control, empathy (cognitive and affective), and the number of institutional infractions participants engaged in.

Aggression: This was measured using the Aggression subscale of the Adult Self Report form (ASR; Achenbach & Rescorla, 2003), which consists of 15 items; responses are scored on a 3-point Likert scale, ranging from 0 (not true) to 2 (often true). Internal consistency of the ASR was good (Cronbach's α T1 = 0.835; α T3 = 0.904).

Self-Control: This was assessed with the Brief Self Control Scale (BSCS; Tangney et al., 2004), which contains 13 items that were rated on a 5-point Likert-type scale, ranging from 1 (not at all) to 5 (very much). The internal consistency of the BSCS was insufficient, with Cronbach's α T1 = 0.612 and α T3 = 0.623. To increase the internal consistency to acceptable levels (e.g., Tavakol & Dennick, 2011), which is a necessary condition for validity (Drost, 2011), item 6 was removed resulting in acceptable reliability (i.e., α T1 = 0.704; α T3 = 0.705).

Empathy (cognitive and affective): This was measured using the Basic Empathy Scale (BES; Jolliffe & Farrington, 2006; Van Langen et al., 2009), which consists of a cognitive (9 items) and affective subscale (11 items); responses are given on a 5-point Likert-type scale, ranging from 1 (completely disagree) to 5 (completely agree). Both subscales demonstrated sufficient internal consistency (i.e., cognitive empathy: α T1 = 0.710; α T3 = 0.780; affective empathy, α T1 = 0.727; α T3 = 0.763).

Institutional Infractions: The number of institutional infractions (e.g., fighting, drug use, contraband) in the two months before and during DCD, as logged by prison personnel, was registered. Prison personnel indicated the amount of infractions (0, 1, 2, 3, ..., 18, 19, 20, or more than 20) during the designated time period. When prison personnel had selected the "more than 20" answer option, the number of infractions was set to 21 for the analyses ($n = 1$).

Wellbeing: Wellbeing was examined by measuring participants' stress, self-esteem, and life satisfaction.

Stress: This was measured with the Perceived Stress Scale (PSS; Cohen et al., 1983), which consists of 10 items that were scored on a 5-point Likert-type scale, ranging from 0 (never) to 4 (very often). Cronbach's alpha's of the PSS were good (α T1 = 0.840; α T3 = 0.801).

Self-Esteem: This was assessed using Rosenberg's Self Esteem Scale (RSES; Rosenberg, 1979), which contains 10 items that are scored on a 4-point Likert-type scale, ranging

from 0 (strongly disagree) to 3 (strongly agree). Internal consistency of the RSES was good (α T1 = 0.780; α T3 = 0.821).

Life Satisfaction: This was measured with the Satisfaction with Life Scale (SWLS; Diener et al., 1985), which includes five statements about life satisfaction. Participants indicated the extent to which they agreed with these statements on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Cronbach's alpha's demonstrated good internal consistency (α T1 = 0.794; α T3 = 0.811).

Moderators: Participants' age at T1, cultural background (native Dutch versus 1st or 2nd generation immigrant background; Junger-Tas, 1997), and type of correctional facility (psychiatric versus general) were added as moderators in the analyses.

Predictors: Predictors were assessed at different time points. The quality of the bond with the dog was measured at T2 and T3. In addition, ratings on the quality of the implementation process were collected after program termination.

The quality of DCD participants' bond with the dog was assessed by using the Pet Bonding Scale (PBS; Angle, 1994), which consists of 25 items to be answered on a 3-point scale, ranging from 1 (never) to 3 (always). The scale was slightly altered to fit the study purposes: the word "pet" was replaced with "dog." Internal consistency of the PBS was good at both timepoints: α T2 = 0.931; α T3 = 0.911. To get an overall estimate of the quality of the bond during the program, the average of PBS total scores at T2 and T3 was taken. This mean score was used in subsequent analyses.

The quality of the implementation process (0–10) was evaluated post-program termination by the two DCD staff members who lead the respective training program (for an overview of the number of training programs offered during the research period, see Table 2). Staff were asked to take into consideration all factors associated with how well they were able to carry out the DCD program at the respective facilities. A score of 10 indicated that the DCD training was implemented at the highest quality (i.e., collaboration with the respective facility was perfect, all prerequisites for a successful training were met). A score of 0 reflects a very poor implementation (e.g., the correctional facility did not provide a contact person, resulting in an unsafe environment for DCD staff). The respective DCD staff members were asked to discuss their perspectives on the quality of the implementation, considering the above factors, to reach consensus on a rating (0–10).

Data Analysis

For the current study, the intention-to-treat approach was followed (Montori & Guyatt, 2001). This meant that the minority of DCD participants (10%) who did not finish the program were also included in the analyses, with the aim of reducing the potential confounding influence of treatment motivation. Additionally, to handle the missing outcome data at T3 ($n = 15$), data were imputed using the expectation-maximization algorithm (Graham, 2009). This process was performed separately for the intervention and comparison groups, to allow for an unbiased assessment of program effects (Yamaguchi et al., 2020). Therefore, the final sample size for the anti-social behavioral and wellbeing outcomes was 138, with the exception of institutional infractions. These data could only be retrieved for a subset ($n = 119$) of the sample owing to file closure (i.e., when a

participant leaves, files are closed) or, to a lesser degree, because some participants did not grant permission. Of the subset of participants for whom institutional fractions data were available at one time point (i.e., T1 or T3), some ($n = 10$) had missing data at the other timepoint. Therefore, institution infraction data for these 10 participants were also imputed following the procedures above (Graham, 2009), resulting in a final sample of 119 for infraction data. In sum, the missing data (10.9%) for anti-social behavioral and wellbeing outcomes at T3 and the infraction outcome (8.4%) at T1 or T3 were imputed, which is a recommended approach for handling study attrition (Graham, 2009; Schafer & Graham, 2002). Even though it is regrettable that data were missing of these participants, there were relatively few study drop-outs compared with research conducted in prison more generally, where attrition rates of around 25% are considered common (Arseneault et al., 2016; Lösel, 2001).

To test the overall effectiveness of DCD from pre- to post-intervention, ANCOVA's were conducted. For infractions, a negative binomial regression analysis was run as this is an appropriate test for non-normally distributed count data. Study condition (DCD versus TAU) was entered as a factor; outcome measures were included as dependent variables, while T1 (baseline) scores of the outcome measures were included as covariates. To examine the influence of moderators on program effectiveness, moderator analyses were performed by conducting the same ANCOVAs and negative binomial regression analysis, while each time entering a different moderator (age, cultural background, facility type) as an additional factor. For significant moderator findings, post-hoc analyses were conducted by running the same tests again while splitting the file according to the various levels of the moderators.

To examine the extent to which the program predictors (i.e., dog bond, implementation process quality) were related to behavioral changes post-intervention, we first conducted multiple regression tests in the DCD subgroup. In each model, post-intervention (T3) scores of the outcome variables were added as the dependent variables. Pre-intervention (T1) scores of the respective outcome variable were added to account for their possible influence, and the continuous variables "dog bond" or "process quality" were added as independent variables. For predictors that significantly influenced DCD participants' post-intervention (T3) outcomes, follow-up analyses were conducted by running the aforementioned ANCOVAs separately for subgroups that did or did not meet DCD conditions (in terms of attachment to the dog; sufficient level of process quality).

Results

Overall Program Effects

Anti-Social Behavioral Problems: A negative program effect was found for aggression, with DCD participants having higher levels of aggression post-intervention than TAU participants ($F_{(1,135)} = 5.552, p = 0.020$). No differences were found post-intervention between DCD and TAU participants in terms of the other anti-social behavioral outcomes (Table 3).

Wellbeing: At post-intervention, no differences were found between DCD and TAU participants on any of the indicators of wellbeing (Table 3).

Table 3. ANCOVA results, means, and standard deviations for DCD ($n = 70$) and TAU ($n = 68$) participants at T3.

	DCD T3 <i>M (SD)</i>	TAU T3 <i>M (SD)</i>	<i>F for group/Wald χ^2</i>	<i>d (95% CI)</i>
<i>Anti-social problems</i>				
Aggression	0.38 (0.33)	0.25 (0.35)	5.552*	0.3824 (0.7191, -0.0456)
Institutional infractions (T3) ¹	0.84 (2.91)	0.28 (1.15)	3.313	-0.3385 (-0.7029, -0.0260)
Self-control	3.63 (0.50)	3.78 (0.58)	0.296	-0.2773 (-0.6126, 0.058)
Empathy				
Cognitive empathy	3.84 (0.59)	3.74 (0.62)	0.802	-0.1653 (-0.4996, 0.1690)
Affective empathy	2.88 (0.68)	3.08 (0.58)	0.409	-0.3161 (-0.6519, 0.0197)
<i>Wellbeing</i>				
Stress	1.40 (0.73)	1.41 (0.71)	0.212	0.0139 (-0.3198, 0.3476)
Self-esteem	2.15 (0.50)	2.10 (0.54)	0.451	0.096 (-0.2378, 0.4301)
Life satisfaction	4.06 (1.48)	4.04 (1.43)	0.088	0.0137 (-0.3200, 0.3475)

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

¹These data were only available for a subset of the sample ($n = 119$): Wald χ^2 are reported for these data.

* $p < 0.05$.

Moderator Effects

Results demonstrated that age was a moderator for the anti-social behavior outcome of infractions (Wald $\chi^2_{(1)} = 6.254, p = 0.012$). Two groups were created based on a median split of age: group 1 consisted of participants who were 36 years or younger ($n = 56$), and group 2 consisted of those participants older than 36 years ($n = 63$). At post-hoc, there were no significant differences between DCD and TAU participants in the younger (Wald $\chi^2_{(1)} = 2.322, p = 0.128$) and older age group (Wald $\chi^2_{(1)} = 0.060, p = 0.807$). Even though post-hoc analyses failed to find significance, the significant moderator effect of age seems to be driven by younger participants, as findings demonstrated that infractions reduced for DCD participants (T1 $M = 2.2$, T3 $M = 1.4$) while they stayed approximately the same for TAU participants (T1 $M = 0.4$, T3 $M = 0.5$), resulting in a group difference at post-intervention.

Cultural background and correctional context did not moderate program effectiveness for any of anti-social behavioral or wellbeing outcomes (see Table 4).

Predictors

Dog bond was negatively associated with post-intervention levels of aggression ($\beta = -0.190, p = 0.049$). No association was found between attachment to the dog ($M = 2.56, SD = 0.25$, range = 1.76–3.03) and any of the other anti-social or wellbeing outcomes at T3 (see Table 5). Implementation process quality ($M = 7.4, SD = 1.28$, range = 5.00–9.00) was not associated with any of the anti-social behavioral and wellbeing outcomes (see Tables 5 and 6).

In order to interpret the findings regarding attachment to the dog, follow-up analyses were conducted for aggression. Two groups were created based on the quality of the bond with the dog by performing a median split. Group 1 consisted of DCD participants whose quality of the relationship was high ($n = 37$), whereas group 2 consisted of DCD participants whose quality of the relationship was low ($n = 33$). Results of the post-hoc ANCOVAs (see Table 7) revealed that, compared with TAU, DCD participants with a

Table 4. Moderator results.

	Age		Cultural background		Correctional context	
	<i>F</i> /Wald χ^2	<i>d</i> (95% CI)	<i>F</i> /Wald χ^2	<i>d</i> (95% CI)	<i>F</i> /Wald χ^2	<i>d</i> (95% CI)
<i>Anti-social problems</i>						
Aggression	1.481	0.2072 (-0.1274, 0.5418)	0.452	0.1145 (-0.2195, 0.4485)	0.517	0.1224 (-0.2116, 0.4565)
Institutional infractions (T3) ¹	6.254*	0.2796 (-0.0816, 0.6408)	0.782	0.0724 (-0.2871, 0.4320)	2.273	0.0724 (-0.2871, 0.4320)
Self-control	1.027	0.1726 (-0.1619, 0.5069)	1.117	0.1800 (-0.1544, 0.5144)	1.437	0.2041 (-0.1305, 0.5387)
Empathy						
Cognitive empathy	0.818	0.1540 (-0.1802, 0.4882)	0.933	0.1645 (-0.1698, 0.4988)	0.236	0.0827 (-0.2511, 0.4166)
Affective empathy	0.029	0.0290 (-0.3047, 0.3627)	0.218	0.0795 (-0.2544, 0.4134)	0.372	0.1039 (-0.2301, 0.4378)
<i>Wellbeing</i>						
Stress	0.026	0.0275 (-0.3063, 0.3612)	0.157	0.0675(-0.2664, 0.4013)	1.482	0.2073 (-0.1273, 0.5419)
Self-esteem	0.030	0.0295 (-0.3042, 0.3632)	1.071	0.1762 (-0.1582, 0.5106)	0.634	0.1356 (-0.1985, 0.4697)
Life satisfaction	1.097	0.1356 (-0.1985, 0.4697)	1.625	0.2171 (-0.1177, 0.5518)	2.988	0.2943 (-0.0412, 0.6298)

Note: *F* = from study condition*moderator interaction.

¹These data were only available for a subset of the sample (*n* = 119): Wald χ^2 statistic is reported for these data. TAU = treatment-as-usual; *d* = Cohen's *d* effect size.

**p* < 0.05.

Table 5. Summary of multiple hierarchical/negative binomial regression tests on predictors of change: anti-social behavior.

	Aggression			Self-control			Empathy						Infractions Wald χ^2
	β	R^2	ΔR^2	β	R^2	ΔR^2	Cognitive			Affective			
							β	R^2	ΔR^2	β	R^2	ΔR^2	
<i>Dog bond</i>													
Step 2		0.298	0.036*		0.495	0.027		0.276	0.018		0.328	0.015	
T1 level	0.616***			0.682***			0.511***			0.551***			4.538*
Dog bond	-0.190*			0.165			-0.133			0.123			0.250
<i>Process quality</i>													
Step 2		0.411	0.002		0.455	0.000		0.247	0.002		0.465	0.000	
T1 level	0.632***			0.675***			0.482***			0.683***			4.781*
Process	-0.043			0.002			0.047			-0.022			0.696

Note: β = standardized regression coefficient; Process = quality of implementation process.

* $p < 0.05$.

*** $p < 0.0001$.

Table 6. Summary of multiple hierarchical regression tests on predictors of change: wellbeing.

	Stress			Self-esteem			Life satisfaction		
	β	R^2	ΔR^2	β	R^2	ΔR^2	B	R^2	ΔR^2
<i>Dog bond</i>									
Step 2		0.380	0.026		0.439	0.016		0.509	0.002
T1 level	0.587***			0.649***			0.723***		
Dog bond	-0.160			-0.047			-0.043		
<i>Process quality</i>									
Step 2		0.367	0.000	0.309	0.309	0.006		0.442	0.006
T1 level	0.604***			0.558***			0.662***		
Process	-0.013			-0.078			0.074		

Note: β = standardized regression coefficient; Process = quality of implementation process.
 *** $p < 0.0001$.

Table 7 . Follow-up effects: predictors.

	DCD		TAU		F	Cohen's d (95% CI)
	T1 M (SD)	T3 M (SD)	T1 M (SD)	T3 M (SD)		
<i>Aggression</i>						
High bond ($n = 37$)	0.37 (0.29)	0.35 (0.30)	0.31 (0.30)	0.25 (0.35)	0.765	-0.2998 (-0.7012, 0.1016)
Low bond ($n = 33$)	0.30 (0.28)	0.41 (0.36)	0.31 (0.30)	0.25 (0.35)	9.443**	-0.4530 (-0.8724, -0.0335)

Note: DCD = Dutch Cell Dogs; TAU = treatment-as-usual; High bond = stronger bond with the dog; Low bond = weaker bond with the dog.
 ** $p < 0.01$.

weaker bond with the dog had significantly higher post-intervention aggression levels ($F_{(1, 98)} = 9.443, p = 0.003$). DCD participants who were more strongly attached to their dog did not differ in post-intervention aggression levels from TAU ($F_{(1, 102)} = 0.765, p = 0.384$).

Discussion

The present study examined the effectiveness of DCD for incarcerated adults. Results demonstrated that overall, DCD did not outperform TAU in reducing anti-social behavioral problems and improving wellbeing. Unexpectedly, a negative program effect was found for aggression. We also assessed to what extent subgroups responded differently to DCD based on sample moderators (age, cultural background, correctional context) and whether change within the DCD group was conditional upon predictors, more specifically the quality of the human–dog bond and implementation process. No evidence was found for most sample moderators. Age was a moderator for infractions; even though post-hoc tests failed to reach significance, moderator findings seemed driven by post-intervention group differences in the younger participant (< 36 years) group with a decrease in infractions in the DCD group. The quality of the dog bond was the only predictor associated with post-intervention outcomes, and only for aggression. DCD participants who had a weaker bond with their dog had higher post-intervention aggression levels, compared with TAU participants.

The absence of a positive effect of DCD on anti-social behavioral and wellbeing outcomes is consistent with the findings of a recent meta-analysis on prison-based dog

programs, demonstrating no effects of program participation on social–emotional functioning (Duindam et al., 2020). Other controlled studies also failed to find significant improvements in empathy, self-control, life satisfaction, and self-esteem in incarcerated adults (Cooke, 2014; Mulcahy, 2011; Richardson-Taylor & Blanchette, 2001). Yet, there is some evidence that DTP participation is associated with a reduction in institutional infractions (Flynn et al., 2020; Fournier et al., 2007; Van Wormer et al., 2017), which contrasts with our findings. As most previous research has been hampered by study limitations (e.g., extremely small sizes ($n < 25$), lack of pre–post assessments), it is premature to draw definitive conclusions about the effectiveness of DTPs for adults.

Perhaps DCD did not instigate post-intervention changes owing to its low intensity (e.g., eight weeks, part-time dog access), as the previous research that did find positive effects generally involved more intensive programs that included education, fulltime access to the dog, paths to certification, and work incentives schemes (e.g., Van Wormer et al., 2017). Alternatively, an often-cited limitation of prison-based dog program research is that participants are seen as the “cream” of the inmate population, referring to the most well-functioning inmates who are free from prison misconduct and are committed to helping a dog (e.g., Aufderheide & Renck Jalongo, 2019), which may explain some of the positive results of earlier studies. Interestingly, the opposite may be true in the current study. Even though DCD and TAU participants scored similarly on most background and pre-intervention scores, DCD participants had lower levels of affective empathy and were engaged in more infractions pre-intervention, suggesting that DCD participants may have been less adapted, compared with TAU participants. Perhaps, this also plays a role in the absence of positive DCD effects, in line with previous research that has shown that more chronic and complex problems can result in lack of program effects due to diminished motivation for interventions and suspicion toward care providers (Berg & Zoon, 2012; Vries et al., 2011).

To our knowledge, this is the first study that has found a small negative effect of a DTP on aggression. This finding may have been driven by the group of DCD participants whose bond with the dog was weaker, as results demonstrate that those who had a weaker bond with the dog had higher post-aggression levels. For DCD participants with a stronger dog bond, post-aggression levels did not significantly differ from TAU. The iatrogenic effect for those with a weaker bond was unexpected, and as it was only found for one outcome it should not be overinterpreted. At the same time, participants have previously reported that it can feel frustrating to train a shelter dog (e.g., when the dogs are not obeying; e.g., Currie, 2008); perhaps this frustration – in the absence of a strong bond – has resulted in increased aggression levels. It is also interesting for future research to explore if certain participants are less capable of forming a bond and to what extent this may be associated with increased maladaptation. Some exploratory follow-up analyses indicated that affective empathy at baseline was lower in the weak-bond DCD group compared with the TAU group, which was not the case for the high-bond group. Perhaps, a basic level of affective empathy is needed to form a bond with the dog, although there is also evidence that suggests that empathy toward humans – as measured in the current study – is only modestly linked with empathy toward animals (e.g., Paul, 2000). Clearly, more research is needed, including the examination of other factors – for example, personality type, past experience with dogs, type of

mental health issues – that may influence people’s ability to form a bond with dogs during DTPs (Serpell et al., 2017).

The current results demonstrate that cultural background and facility type do not influence DCD effectiveness. The moderator age influenced DCD effectiveness on infracctions, suggesting a differential effect for younger (< 36 years) participants. Previous studies on prison-based dog programs and DCD with incarcerated juveniles demonstrate diversity in program responsiveness based on age and cultural background (Duindam et al., 2021). However, research on other forms of correctional programming, and animal-assisted therapy more generally, also did not find evidence for moderation by cultural background (Usher & Stewart, 2014) and age group (Nimer & Lundahl, 2007). At the same time, the importance of examining subgroup responsivity over overall effectiveness has repeatedly been stressed (e.g., Conroy et al., 2019; Weisz et al., 2006). Therefore, other relevant moderators should be considered for future research, such as gender, offense background, psychopathic traits, and program duration.

In terms of predictors, the dog bond was not associated with most post-intervention outcomes. This was unexpected as the importance of the human–animal bond in AAls has been stressed repeatedly (e.g., Menna et al., 2019). Possibly, limitations of the Pet Bonding Scale that we used to assess the dog bond may explain our insignificant finding. As for other human–animal bond measures, limited psychometric properties are known for the PBS (Anderson, 2007; Martens et al., 2016). Although the scale has been used with adults (Su & Martens, 2020), it was originally developed for children, which was positive in that it resulted in simple, concise, and easy-to-understand items, but negative in that the fit for adults is unknown. Despite this limitation, the PBS was still preferred over other human–animal relationship instruments because the items were relevant for a DTP context. Other instruments measuring this bond included more items that were inapplicable to the human–dog bond in a DTP context (e.g., “If a young pet required extensive veterinary care, I would get rid of it,” Commitment to Pets Scale; “Within your family, your pet likes you best,” Pet Attachment Survey; “How often did you travel with your companion animal?” Companion Animal Bonding Scale; Anderson, 2007). Nevertheless, it is important for future research on the influence of the dog bond that valid and reliable ways of assessing this relationship are available to identify the key elements of the human–dog relationship (Robino, 2019).

Interestingly, not everyone advocates that the client–animal bond forms a key element in AAls. Marino (2012) suggests that it may be the mere inclusion of novel and stimulating components in AAls that foster change. Moreover, a recent study found that it was the therapist–animal bond rather than the client–animal bond that had the greatest impact in an animal-assisted therapy (e.g., Robino, 2019). More research is needed to understand the potential (absence of the) role of participants’ bond with the dog in the effectiveness of DTP.

The predictor “implementation quality” was surprisingly also unrelated to any of the post-intervention outcomes. However, it is valuable for future research on DTPs to further explore the influence of implementation quality on program effectiveness, as previous research shows that high implementation integrity is important for interventions to have an effect in correctional settings (e.g., Duwe & Clark, 2015; Lipsey, 2009, 2019). Perhaps, we did not find a relationship because we did not use a standardized instrument

to examine the program integrity of DCD (there are currently none available). In addition, we measured a single aspect of implementation quality, whereas a wider inclusion of implementation aspects (e.g., program design, staff training, intervention delivery and receipt; Gearing et al., 2011) seems relevant. Future research on DTPs should routinely incorporate measures that assess implementation processes (Duindam et al., 2020). This seems particularly important for programs in correctional settings, which may encounter more implementation challenges owing to the repressive prison climate (Van Der Helm et al., 2014).

The strengths of the current study include the relatively large sample size from six correctional facilities, the inclusion of a comparison group, the study's external validity, and the examination of moderators and predictors on program effectiveness. Some study limitations should also be considered. First, as relatively few inmates applied for DCD, probably because of the short period in which people could sign up for it after information was shared, it was not possible to randomly assign participants to study condition, which increases the chances of internal validity threats (Farrington & Welsh, 2005). Although the comparison group did not differ from the DCD group on most background and pre-intervention scores, participants in the DCD group had higher levels of infractions and lower levels of affective empathy at T1 than the comparison group participants. This could have influenced results (i.e., positive effects may have remained absent owing to DCD participants being less adapted, or DCD participants may have had more opportunity to grow than the comparison group participants). In addition, some participants in the comparison group were not interested in participating in DCD. As DTPs are a voluntary type of program for those people who are motivated to train a shelter dog, it would have been more fitting to have a comparison condition with incarcerated people interested in program participation. Another consideration regarding the comparability of the study conditions is that the exact content of treatment-as-usual (e.g., treatment, daily activities, work opportunities) of participants across study conditions was unknown. There may have been unobserved differences between study conditions in the treatment-as-usual received, which could have influenced the results. At the same time, the proportion of participants that was reportedly involved in treatment at baseline was approximately the same across study conditions.

Even though the sample size for the analyses on overall program effectiveness was large enough to detect a reasonable effect, the sample sizes for moderator and predictor analyses may have been too small. Some of the effect sizes for these analyses were considerable (e.g., dog bond predictor for the outcomes of self-control and empathy), which may indicate the sample size was too small to detect significant differences. Therefore, we echo the call of many other researchers in the AAI field that future high quality, experimental research with larger sample sizes is greatly needed (e.g., Duindam et al., 2020; Kendall et al., 2015; Lundqvist et al., 2017; Maujean et al., 2015). Perhaps, future research should also include other short-term outcomes supported by qualitative findings, such as vocational skills (e.g., taking goal-directed action, sense of responsibility) and aspects of the prison environment (e.g., group climate, staff-participant communication; Britton & Button, 2005; Minton et al., 2015; Turner, 2007).

In sum, no overall effects were found for DCD on anti-social behavioral and wellbeing outcomes. A small negative program effect was found on aggression; however, this could

have been caused by the subgroup of DCD participants who had a weaker bond with the dog. Overall, age moderated program effectiveness of infractions, suggesting differential effects for younger (< 36 years) participants. Little evidence was found for the other moderators (cultural background, facility type) and predictors (dog bond, implementation process quality) of DTP effectiveness. However, the current study is only one of the first to examine what matters for whom in DTPs for incarcerated adults. Therefore, more research, preferably in the form of RCTs with sufficiently large sample sizes, is needed.

Disclosure Statement

No potential conflict of interest has been reported by the authors.

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