Effects of Dog-Based Animal-Assisted Interventions in Prison Population: A Systematic Review

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Simple Summary: Inmates usually suffer from depression, anxiety, or loss of empathy. Thus, animal-assisted therapies, and in concrete dog-based assisted therapy, were introduced in prisons in order to ameliorate the consequences of being into prison. Therefore, the aim of this study was to provide an up-to-date analysis of the research on the effects of dog-based animal-assisted therapy in the prison population. Results showed that mental health, emotional control, empathy, or academic skills could be improved after dog-based assisted therapy. Most of the studies included activities related to dog training, dog caring, or activities. The duration of dog-based therapies ranged between 60 and 120 min, with the frequency being between 1 and 3 days/week. In conclusion, these potential enhancements might lead to a reduction in recidivism and violence.

Abstract: Background: Animal-assisted interventions, in concrete dog-assisted intervention, have been introduced in prisons to reduce recidivism as well as to improve the well-being of prisoners. Therefore, the aim of the present systematic review is to provide an up-to-date analysis of the research on the effects of dog-based animal-assisted therapy in prison population. Methods: An electronic search of the literature was performed, and 20 articles were included. The PRISMA guideline methodology was employed. Results: Included studies involved a total of 1577 participants. The vast majority of protocols included activities related with dog training, dog caring, or activities, which included vocational or educational components. Duration of dog-based therapies ranged between 60 and 120 min, with the frequency being between 1 and 3 days/week. Statistically significant improvements in prisoners were observed in 13 studies. Conclusions: Dog-based animal-assisted therapy may improve anxiety, stress, recidivism, and other social variables in male or female inmates.

Keywords: inmates; prison; animal-assisted therapy; dog therapy; anxiety; stress; recidivism

1. Introduction

The proportion of both female and male inmates has been increasing since 2000. In this regard, the worldwide rate of female inmates has increased 50.2%, while the worldwide rate of male inmates grew 18.1%. Moreover, in the United States (EEUU), it is estimated that 221,600 young people were incarcerated [1] because of antisocial behaviors such as, theft, vandalism, bullying, or use of weapons [2]. People involved with criminal justice frequently are exposed to violence, traumatic experiences,
or critical life events. Thus, the prevalence of posttraumatic stress disorder among sentenced prisoners is higher than that in the general population [3]. In this regard, prevalence of psychiatric disorders such as stress or anxiety is relatively high in prisons [4–8]. It is estimated that 10% of inmates experience depression or 50% experience antisocial personality disorder [7]. Due to the large number of people in prisons, which is more than 10 million individuals worldwide, and the large proportion of physical and mental health issues compared to the general population, there is a need to develop programs that help to reduce inmate prison infraction rates or violence and increase physical and mental health [9]. These intervention programs, which should be focused in psychosocial well-being, can be an effective way to maintain both staff and inmates’ safety within correctional facilities, while also reducing the likelihood of recidivism [10–12]. In this regard, animal-assisted interventions (AAI) are a promising strategy for these purposes, which is used in different countries [13–15].

The AAI is the umbrella term that refers to the deliberate and meaningful inclusion of animals into human health, wellbeing, or educational interventions [16]. Therefore, animal-assisted activities (AAA) and animal-assisted therapies (AAT) fall under this umbrella term. On the one hand, the AAA are less-formal interventions that aim to provide opportunities for motivational, educational, recreational, and/or therapeutic benefits to enhance quality of life but are not necessarily individualized or documented [17]. On the other hand, the AAT are defined as a goal oriented, planned, structured, and documented therapeutic intervention directed by health and human service providers in which an animal that meets specific criteria is an integral part of the treatment process [16,18]. Therefore, the interaction between the animal and the human could help to achieve a large variety of psychological and physical benefits for humans. These benefits could be explained by different reasons such as the biophilia hypothesis [19], which is explained as the genetically based propensity of humans to seek connections with other living organisms or an increase in oxytocin levels [20], which induces antidepressant and calming effects [21–24]. In addition, previous studies have shown a positive physiological response after being in contact with animals [25,26]. For instance, an increase in beta endorphins or dopamine production were found in humans [26]. Moreover, oxytocin levels seemed to increase [20]. This is relevant, since oxytocin is a peptide hormone and neuropeptide, released by the posterior pituitary, with antidepressant and calming effects [27]. This could be the reason why the AAI can reduce anxiety, depression [28], blood pressure [29], or cortisol [30], as well as increase wellbeing. However, methodological weaknesses in the AAI literature prevent a firm conclusion about the effectiveness of these approaches [31].

Different AAI approaches in terms of scope, aim, eligibility, or animal species involved have been described [32]. In this regard, dogs and horses are the most common therapy animal [18,33], but equine-assisted activities or therapies usually requires that the participant go to a specific facility where the horses are, thus the applicability in the prison context is reduced. The dog-based AAI consists of providing care and training for dogs, and sometimes, it includes vocational or educational components to enhance employability [15,34–38]. These kinds of interventions have shown positive effects on inmates. For instance, inmates who participated in dog-bases AAI needed less medication, were less violent to others, were less depressed, improved their social behaviors, and had fewer infractions at the same time that their self-esteem was increased and their stress levels were decreased [39]. In addition, since high dropout to behavioral intervention could be expected in this population, the inclusion of animals can increase adherence and motivation [40], which could be a key factor to consider, explaining the effectivity of AAI.

To our knowledge, one related review has been published in this area [41]. However, this review was focused in recidivism and included a total of 10 studies, with only three of them published in journals and including some unpublished material. Moreover, the search was conducted through March 2014 and authors did not follow the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) approach [42] to conduct the systematic review. Therefore, the aim of the present review was to provide an up-to-date analysis of the studies, published in scientific journals indexed in well-known databases, on the effects of dog-based AAI in female and male inmates, independently of their age (young or adults inmates), as well as to provide future directions.
2. Materials and Methods

The PRISMA guideline [42] has been followed to conduct the present systematic review.

2.1. Data Sources and Searches

Eligible literature articles were selected from PubMed, Web of Science (including Current contents connect, Derwent innovations index, Korean journal database, Medline, Russian science citation index, SciELO citation index), and Google Scholar databases. The search terms were: (a) the type of treatment (“dog” or “dogs” or “animal-assisted”) and (b) the population (“inmates” or “young criminal” or “juvenile offender” or “juvenile delinquents” or “prisoner” or “incarcerated” or “jail” or “prison” or “reform school” or “reformatory”).

The search was conducted by SV and checked by BVD. In case of disagreement, a consensus discussion directed by DCM was performed. The search ended on 31 March 2020.

The studies were included if they met the following inclusion criteria: (a) quantitative or qualitative randomized controlled trial or observational design, focused on dog’s assisted therapy (b) the target population were juvenile or adult delinquents. The following exclusion criteria were set: (a) the study was not written in English, French, Italian, Portuguese, or Spanish, (b) the article was presented as a summary at a conference or seminar, (c) it was a dissertation or thesis, (d) it was a professional experience.

2.2. Risk of Bias

The risk of bias of selected studies has been assessed by the Evidence Project risk-of-bias tool [43]. This tool includes eight items that are rated as yes, no, not applicable, or not reported: (1) cohort; (2) control or comparison group; (3) pre-post intervention data; (4) random assignment of participants to the intervention; (5) random selection of participants for assessment; (6) follow-up rate of 80% or more; (7) comparison groups equivalent on sociodemographics; and (8) comparison groups equivalent at baseline on outcome measures.

2.3. Data Extraction

Following the PRISMA methodology, the Participants, Intervention, Comparison, Outcome and Study design (PICOS) strategy was used [42]. The PICOS strategy allows us to extract these essential elements of the research question. Thus, this information was retrieved from the articles. In this regard, results reported the characteristics of the sample, as well as the interventions performed by the experimental and control group (when appropriate). Moreover, the details of the protocols, including durations of sessions, number of weeks, weekly frequency was extracted (when reported).

3. Results

3.1. Article Selection

Figure 1 shows the article selection process followed in this systematic review. A total of 133 articles were identified in the electronic databases: WOS (68 articles), PubMed (28 articles), and Google Scholar (37 articles). Twenty-eight articles were removed because they were duplicated. Moreover, 81 articles were removed after reading title/abstract (see Figure 1 for reasons). Of the remaining 24 articles, four were eliminated (see Figure 1 for reasons). After this exhaustive selection, twenty articles were included in the qualitative synthesis.
3.2. Risk of Bias

Risk-of-bias assessment was summarized in Table 1. The lack of control or comparison group (only 25% of the articles fulfilled this criteria) [32,44–47], random assignment of participants to intervention (15% of the articles fulfilled this criteria) [44–46], random selection of participants for assessment (0% of the articles fulfilled this criteria), or the follow-up rate (25% of the articles fulfilled this criteria) [39,45–48] are the most critical concerns.
Table 1. Risk of bias of randomized and non-randomized controlled trial using the Evidence Project risk-of-bias tool.

| Study               | Cohort | Control or Comparison Group | Pre/Post Intervention Data | Random Assignment of Participants to Intervention | Random Selection of Participants for Assessment | Follow-Up Rate of 80% or More | Comparison Groups Equivalent on Sociodemographics | Comparison Groups Equivalent at Baseline On Disclosure |
|---------------------|--------|-------------------------------|----------------------------|---------------------------------------------------|-------------------------------------------------|--------------------------------|---------------------------------------------------|--------------------------------------------------|
| Antonio (2017)      |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Collica-Cox (2018)  |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Contalbringo (2017) |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Cooke (2015)        |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Dell (2019)         |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Flynn (2019)        |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Holman (2020)       |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Jasperson (2010)    |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Jasperson (2015)    |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Koda (2015)         |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Koda (2016)         |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Kunz-Lomelin (2019) |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Leonardi (2017)     |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Minke (2017)        |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Minton (2015)       |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Seivert (2016)      |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Smith (2019)        |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Smith and Smith (2019) |      | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Stetina (2020)      |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |
| Syzmski (2018)      |        | Red                           | Red                        | Red                                               | Red                                              | Red                            | Red                                               | Red                                              |

The Evidence Project risk-of-bias tool rated as: yes, no, not applicable, or not reported. Green: yes; red: no; orange: not reported; white: not applicable.
3.3. Participants

Table 2 shows the population characteristics for each article. A total of 1295 participants are included in the present systematic review comprising ages between 13 and 69.

Seven studies (35% of the total) evaluated exclusively female inmates [14,44,49–53]. In this regard, four of them [14,44,49,53] were focused on psychiatric and emotional problems, mental health prison, multilevel security prison, and both adults and young female inmates.

Moreover, five articles (25% of the total) evaluated only male inmates [39,47,48,54,55]. Three of them [39,47,48] were focused on developmental disorders, psychiatric disorders, and drug-addicted inmates.

In addition, four articles [18,32,56,57] (20% of the total) evaluated both female and male inmates; one of them [18] was developed in a psychiatric prison. Additionally, four articles [45,46,58,59] (20% of the total) investigated young inmates.

Table 2. Characteristics of the sample and the protocol.

| Study/Year | Participants | Sample Size (N) | Age (SD) | Study Design | Control Group Protocol |
|------------|--------------|----------------|----------|--------------|------------------------|
| Antonio (2017) | Female and male inmates and staff | 62 | 45.36 (9.29) 43.85 (11.69) | Observational (Quantitative) | None |
| Collica-Cox (2018) | Female inmates | 10 | NR | Non-RCT (Qualitative) | Parenting, prison, and pups program without animal-assisted intervention |
| Contalbringo (2017) | Drug-addicted male inmates | 22 | EG: 35.5 (13.83) CG: 42.9 (9.1) | Non-RCT (Quantitative) | Standard rehabilitation program |
| Cooke (2015) | Female inmates (Adults and young) with problems in psychological and emotional health | 20 | AI: 38.36 YI: 14–19 | Observational (Qualitative) | None |
| Dell (2019) | Male and female inmates in psychiatric prison | 3 1 F 2 M | 48 | Observational (Quantitative) | None |
| Flynn (2019) | Male and female inmates | 229 | EG: 39.4 (13.0) CG: 40.9 (11.0) | Non-RCT (Quantitative) | Passive control group. They did not participate in the program |
| Holman (2020) | Female inmates in mental health prison unit | 6 | 31 (7) | Observational (Quantitative) | None |
| Jasperson (2010) | Female inmates with mental illness | 5 | 26–42 | Observational (Qualitative) | None |
| Jasperson (2013) | Female inmates | 81 | 36 | RCT (Quantitative) | Psycho-education and therapeutic intervention without dog |
| Koda (2015) | Male inmates with developmental disorders | 72 | 26–60 | Observational (Quantitative) | None |
| Koda (2016) | Male inmates with psychiatric or/and developmental disorders | 73 | 26–60 | Observational (Quantitative) | None |
| Kunz-Lomelin (2019) | Male inmates | 17 | 19–58 | Observational (Quantitative) | None |
| Leonardi (2017) | Young offenders | 66 | 16–21 | Observational (Qualitative) | None |
| Minke (2017) | Female inmates | 12 | 39 | Observational (Qualitative) | None |
| Minton (2015) | Female inmates (multi-level security prison) | 30 | 50.23 | Observational (Qualitative) | None |
| Seivert (2016) | Young inmates | 117 | 15.7 (0.9) | RCT (Quantitative) | Animal education component and interaction component |
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(Not engaged in dog training and were not assigned to any specific dog)

| Study/Year          | Intervention Duration (Weeks) | Session Duration (Minute) | Weekly Frequency (Days) | Activities Included in Session                                                                 |
|---------------------|------------------------------|---------------------------|-------------------------|--------------------------------------------------------------------------------------------------|
| Smith (2019)        | 285                          | NR                        | 21                      | Observational (Qualitative) None                                                                    |
| Smith and Smith (2019) | 31                           | 21                        |                         | Observational (Qualitative) None                                                                    |
| Stetina (2020)      | Female and male inmates      | 81                        | 50 M                    | Observational (Quantitative) None                                                                  |
| Syzmanski (2018)    | Young inmates                | 73                        | 43 EG                   | Only walking dogs without teaching them                                                           |
|                     |                              |                           | 30 CG                   |                                                                                                  |

EG: experimental group; CG: control group; CG*: other control group; N: sample size; NR: not reported; RCT: Randomized controlled trial; SD: standard deviation; I: inmates; S: staff; AI: adult inmates; YI: young inmates; F: female; M: male; None: participants were not enrolled in any activity.

3.4. Study Design

Table 2 displays the study design in each for the selected articles. A total of 14 (70% of the total) articles were classified as observational studies (an experimental group that was only assessed once at the end of the intervention) [14,18,39,44,48,49,52–59]. Of them, seven (50%) followed a quantitative [18,39,48,49,54,56,57] and seven (50%) a qualitative methodology [14,44,52,53,55,58,59]. Moreover, three articles (15% of the total) were classified as non-randomized controlled trials [32,47,51] (two groups with pre and post assessments but without randomization) and three (15% of the total) were classified as randomized controlled trials [45,46,50].

3.5. Intervention

Table 2 shows the intervention protocols in the treatment group for each article. In all the studies, the protocol includes a group of inmates who performed an AAI. Among the activities included in these programs were dog walking, dog training, taking care of dogs or rescue dogs as well as using the dog as emotional support during the therapy. Further details of intervention are summarized in Table 3.

Table 3. Frequency, duration, and activities of the dog-based AAI interventions.

| Study/Year       | Intervention Duration (Weeks) | Session Duration (Minute) | Weekly Frequency (Days) | Activities Included in Session                                                                 |
|------------------|------------------------------|---------------------------|-------------------------|--------------------------------------------------------------------------------------------------|
| Antonio (2017)   | --                           | --                        | --                      | Dog training program.                                                                            |
| Collica-Cox (2019) | 8                            | 120                       | 2                      | The classes included Orientation and Parenting Styles; Effective Speaking; Effective Listening; Effective Problem Solving; Bonding Through Play and Reading; The Parent's Job and The Child’s Job; Directions and Encouragement; Rules, Rewards and Consequences; Time Out with Back-Up Privilege Removal (non-violent discipline); Going Home To Your Children; Stress Management and Meditation; Healthy Adult Relationships; and CPR, First Aid, and AED certification for adults, children, and infants. The dogs will serve as emotional support during the class when difficult topics are discussed and the dogs will be incorporated into each lesson and serve as avatars/surrogates as women practice some of their skills. The therapy dogs will be available for the children and family members during the reunification/graduation day. |
| Contalbringo et al. (2017) | 26                           | 60                        | 1                      | Experimental group is involved in dog-assisted therapy session, while control group is only part of standard rehabilitation program. Participants had to experience |
| Author          | N   | Duration | Sessions | Summary                                                                 |
|-----------------|-----|----------|----------|-------------------------------------------------------------------------|
| Cooke (2015)    | 8   | --       | --       | Rehabilitation and educational program where participants have to train and care for shelter dogs. |
| Dell (2019)     | 26  | 30       | --       | Participants are part of animal-assisted therapy where it is intended to work human-animal bond.    |
| Flynn (2019)    | --  | --       | --       | There are inmates who are part of dog training program, while there is a control group who are not part of dog training program. |
| Holman (2020)   | 8   | 30       | 1        | The treatment group implemented the use of a dog in order to facilitate the educational and therapeutic goals. In general, sessions were focused on the development of social skills, coping skills, and self-awareness. Each week, treatment group would sit in a circle on the floor and the dog would remain in the center of the circle. So, human-animal interaction was based on group member or animal initiative. |
| Jasperson (2010)| 4 or 8 | 60     | 2 or 1   | The group focused on personal safety, developing trust, being trustworthy, responsibility, understanding emotions, expressing emotions in a healthy manner, and learning new behaviors. Each week, group members sat in a circle on the floor and the dog remained in the center of the circle. Member or animal initiative prompted human-animal interaction. |
| Jasperson (2015)| 8   | 60       | 1        | The treatment group implemented the use of a dog in order to facilitate the educational and therapeutic goals. In general, sessions were focused on the development of social skills, coping skills, and self-awareness. Each week, treatment group would sit in a circle on the floor and the dog would remain in the center of the circle. So, human-animal interaction was based on group member or animal initiative. |
| Koda (2015)     | 12  | 70       | 1        | The program was semi-structured with six themes, namely dog walking, dog obedience training, dog health check, dog massage, dog health care, and games with dogs. Each theme was repeated twice in successive weeks with different visitation dog-handler pairs. |
| Koda (2016)     | 12  | 70       | 1        | The program was semi-structured and consisted of six activities, namely dog walking, dog obedience training, dog health check, dog massage, dog healthcare, and playing games with dogs. Each activity was repeated twice, in two successive weeks with different visiting dog-handler pairs. |
| Kunz-Lomelin    | 5   | --       | --       | Participants are involved in a dog training course in which dogs receive Canine Good Citizenship. |
| Leonardi (2017) | 8   | --       | 3        | Maximum 10 young men participating in each session. Participants learns how to train and care for the dogs, so they design training plans and use positive reinforcement methods to achieve their training goals. |
| Minke (2017)    | --  | --       | --       | Participants are involved in activities such as walking dog, cooking and dining, manufacturing key-hangers, and engaging in hobbies. |
| Minton (2015)   | 26–208 | -- | --       | Dog training program in which women participated as dog trainers or assistants for the prison pup program. Sessions included a didactic 1 h animal education component and 1 h dog interaction component. The intervention group, in the interaction component, is involved in experiential learning in the form of positive dog training. While the control group do not engage in dog training and are not assigned to any specific dog. |
| Seivert (2016)  | 10  | 120      | 2        | Dog-assisted group therapy is involved in competence and communication training that aims to enhance the social and emotional skills of the participants learning through interaction with the dog based on social and |
| Smith (2019)    | --  | --       | --       | Participants are involved in a dog-training program in which inmates are part of a program with rescue dogs. |
| Smith and Smith (2019) | -- | -- | -- | Participants are involved in a dog-training program in which inmates are part of a program with rescue dogs. |
| Stetina (2020)  | 10  | 60       | 1        | Dog-assisted group therapy is involved in competence and communication training that aims to enhance the social and emotional skills of the participants learning through interaction with the dog based on social and |
emotional skills that humans can learn from canines or socio-emotional interactions.

| Study          | N  | D  | G |
|----------------|----|----|---|
| Syzmanski (2018) | 10 | 120| 2 |

Experimental group was learning to train dogs, while control group was walking the dogs. They also had classroom-based didactic sessions each week that focused on information about dog care, dog behavior, and humane treatment.

3.6. Comparison Groups

Table 2 shows the control group protocols for each article. Fourteen of them [14,18,39,44,48,49,52–59] did not include a control group, while the design of remaining six studies [32,45–47,50,51] did. In this regard, treatment as usual or activities without dog presence were the most usual protocols for control groups. Only one article of those which present a control group included a passive control group (where participants did not participate in any therapy or activity) [32]. Further details can be checked in Table 2.

3.7. Outcomes

In order to summarize the outcomes, Table 4 (for quantitative studies) and Table 5 (for qualitative studies) were created.

Table 4 shows all the instruments and outcomes measures for the quantitative studies. Regarding the most studies variables in these studies, anxiety was measured in six articles [32,39,47,49,54,57], depression was measured in four of them [39,47,54,57], and, lastly, tension, irritation, vigor fatigue, distraction, and perspective taking were measured in two articles [32,39]. Three studies were classified as randomized controlled trials [45,46,50], two of them [45,50] showing within group improvements in social role, symptom distress, interpersonal relationships, or empathic concern, among others. Moreover, two articles were classified as non-randomized controlled trials [32,47] (two groups with pre and post assessments but without randomization), showing between groups effects on depression, sleep disorders, infraction rate, or state anxiety. The other seven articles [18,39,48,49,54,56,57] were observational studies, with reporting effects on recidivism, emotional state, tension, cortisol level, or emotional stability among other variables.

Furthermore, Table 5 shows the instruments and outcomes for the qualitative studies. One article was classified as a randomized controlled trial [51] and seven as observational studies [14,44,52,53,55,58,59]. Anxiety, depression, symbolism of the rescue dog, universal support, and psychological and emotional health were the most common outcomes among the qualitative studies. Other outcomes such as stress, self-stem, or empathy were also measured. The studies obtained the data using interview, report, observation, and survey questions (see Table 5 for further details).
Table 4. Results synthesis of quantitative studies.

| Authors          | Instruments                   | Outcome Measure              | EG Baseline | EG after Treatment | CG Baseline | CG after Treatment | Reported Effect |
|------------------|-------------------------------|------------------------------|-------------|--------------------|-------------|--------------------|-----------------|
| Randomized Controlled Trials |              |                              |             |                    |             |                    |                 |
| Jasperson (2015) | Questionnaire (OQ)            | -Social Role                 | 14.33 (4.27)| 12.65 (3.80)       | 12.25 (4.39)| 11.57 (4.82)       | WG (EG)         |
|                  |                               | -Symptom distress            | 45.47 (11.77)| 37.16 (13.98)      | 39.56 (14.31)| 33.58 (13.06)      | WG (EG)         |
|                  |                               | -Interpersonal relationships  | 21.40 (4.57)| 19.91 (6.37)       | 19.82 (5.12)| 17.98 (6.30)       | WG (EG)         |
| Seivert (2016)   | TRF                           | -Staff report internalizing  | 56.76 (9.09)| 58.36 (9.50)       | 55.72 (9.18)| 55.84 (9.62)       | WG (EG/CG)      |
|                  | YSR                           | -Youth report internalizing  | 55.43 (10.74)| 56.33 (11.04)      | 53.89 (11.09)| 55.07 (10.86)      | WG (EG/CG)      |
|                  |                               | -Empathic concern            | 17.74 (5.54)| 17.67 (5.42)       | 16.85 (5.50)| 18.43 (4.63)       | WG (EG/CG)      |
|                  |                               | -Perspective taking          | 14.30 (5.92)| 14.47 (5.58)       | 14.93 (5.12)| 16.25 (5.35)       |                 |
| Syzmanski (2018) | Review and medical chart      | -Future orientation          | NR          | 6.13 (2.91)         | NR          | 4.33 (3.15)         | =               |
|                  |                               | -Cognitive growth            | NR          | 8.05 (3.93)         | NR          | 4.70 (2.52)         | =               |
|                  |                               | -Self-awareness              | NR          | 3.14 (1.27)         | NR          | 3.04 (1.90)         | =               |
|                  |                               | -Attachment                  | NR          | 6.79 (5.29)         | NR          | 3.13 (3.10)         | =               |
|                  |                               | -Attitude toward program     | NR          | 3.12 (2.63)         | NR          | 1.08 (0.95)         | =               |
|                  |                               | -Positivity of emotion       | NR          | 4.03 (1.21)         | NR          | 2.97 (2.64)         | =               |
| Non-Randomized Controlled Trial |              |                              |             |                    |             |                    |                 |
| Contalbringo (2017) | SCL-90-R                     | -Somatization                | 0.98 (0.89)| 0.21 (0.24)         | 1.17 (1.30)| 0.65 (0.74)         | WG (EG)         |
|                  |                               | -Obsessive-compulsive symptoms| 1.07 (0.61)| 0.46 (0.29)         | 1.37 (1.05)| 0.83 (0.53)         | WG (EG)         |
|                  |                               | -Interpersonal sensitivity   | 0.60 (0.59)| 0.23 (0.24)         | 0.70 (0.51)| 0.52 (0.55)         | =               |
|                  |                               | -Depression                  | 1.34 (0.84)| 0.45 (0.32)         | 1.10 (0.77)| 0.83 (0.48)         | WG (EG/BG)      |
|                  |                               | -Anxiety                    | 1.39 (0.95)| 0.44 (0.35)         | 1.07 (0.83)| 0.73 (0.41)         | WG (EG)         |
|                  |                               | -Hostility                   | 0.57 (0.58)| 0.43 (0.36)         | 0.67 (0.75)| 0.53 (0.54)         | =               |
|                  |                               | -Phobic anxiety              | 0.46 (0.55)| 0.06 (0.07)         | 0.82 (1.40)| 0.35 (0.51)         | =/BG            |
|                  |                               | -Paranoid ideation           | 1.17 (0.72)| 0.54 (0.49)         | 0.86 (0.74)| 0.83 (0.59)         | WG (EG)         |
|                  |                               | -Psychoticism                | 0.73 (0.62)| 0.19 (0.16)         | 0.84 (0.77)| 0.66 (0.41)         | WG (EG)         |
|                  |                               | -Sleep disorders             | 1.78 (0.53)| 0.63 (0.59)         | 1.89 (1.47)| 1.00 (1.02)         | WG (EG/CG)/BG   |
|                  |                               | -Global severity index       | 1.01 (0.54)| 0.35 (0.19)         | 1.00 (0.82)| 0.67 (0.43)         | WG (EG)         |
| Flynn (2019)     | Survey                        | -Infraction rate             | 0.68        | 0.34               | 0.54        | 1.01               | WG (EG)         |
|                  |                               | -Self-efficacy               | NR          | 3.23 (0.47)         | NR          | 3.15 (0.55)         | =               |
|                  |                               | -State anxiety               | NR          | 1.54 (0.48)         | NR          | 1.70 (0.61)         | BG              |
|                  |                               | -Trait anxiety               | NR          | 1.91 (0.49)         | NR          | 1.98 (0.56)         | =               |
|                  |                               | -Empathy                    | NR          | 4.00 (0.75)         | NR          | 3.81 (0.88)         | =               |
|                  |                               | -Perspective taking          | NR          | 3.42 (0.94)         | NR          | 3.42 (0.93)         | =               |
| Study | Questionnaire | Measure |  |  |  |  |  |
|-------|--------------|---------|---|---|---|---|---|
| Antonio (2017) | SAQ | Reduced recidivism | NR | 6.88 (2.36) M | NR | 7.80 (2.37) F | BG |
| | | Non-violent incidents in prison | NR | 3.76 (0.98) M | NR | 4.09 (1.17) F | BG |
| | | Violent incidents in prison | NR | 4.32 (0.79) M | NR | 4.50 (0.72) F | = |
| | | Cooperative with correctional staff | NR | 4.26 (0.73) M | NR | 4.44 (0.90) F | = |
| | | Improved morale | NR | 4.24 (0.82) M | NR | 4.39 (0.91) F | = |
| | | Brings all inmates together as a community | NR | 3.67 (0.98) M | NR | 4.10 (0.86) F | BG |
| | | Provides inmates with marketable skills | NR | 4.26 (0.89) M | NR | 4.24 (0.88) F | = |
| | | Positive interactions with other inmates | NR | 4.18 (0.75) M | NR | 4.39 (0.61) F | = |
| Dell (2019) | Questionnaire | Emotional state | 3.3 (0.66) | 4.8 (0.17) | NR | NR | WG (EG) |
| Holman (2020) | Generalized Anxiety Disorder 7-item scale (GAD-7) | Levels of anxiety | 16.16 (1.04) | 4.33 (4.04) | NR | NR | = |
| Koda (2015) | Questionnaire (PGFSME) | Tension | 1.65 (1.10) | 1.16 (1.20) | NR | NR | WG (EG) |
| | | Depression | 1.46 (1.02) | 1.14 (1.10) | NR | NR | = |
| | | Irritation | 1.22 (1.01) | 1.09 (1.13) | NR | NR | = |
| | | Vigor | 1.91 (1.00) | 2.12 (1.22) | NR | NR | = |
| | | Fatigue | 1.35 (0.93) | 1.25 (1.11) | NR | NR | = |
| | | Distraction | 1.49 (0.90) | 1.22 (1.11) | NR | NR | = |
| | | Anxiety | 1.37 (1.04) | 1.18 (1.16) | NR | NR | = |
| Koda (2016) | Monitoring salivary cortisol | Cortisol level | Psychiatric disorders | NR | NR | NR | WG |
| | | | Development disorders | NR | NR | NR | = |
| | | | Psychiatric and development disorders | NR | NR | NR | = |
| Kunz-Lomelin (2019) | CES-D | Depression | 36.94 (11.62) | 32.18 (12.50) | NR | NR | = |
| | | Anxiety | 6.59 (5.81) | 5.53 (5.94) | NR | NR | = |
| | | Self esteem | 17.76 (6.77) | 17.41 (6.65) | NR | NR | = |
|                    | PCL-C - PTSD | UCLA - Loneliness scale | RS - Brief resiliency scale | SEE - Accept own emotion | Emotional flooding | Lack of emotions | Somatic representation | Imaginative representation | Emotional regulation | Self-control | Anxious vs. free from fear | Depressive vs. happy | Tired vs. dynamic | Aggressive vs. calm | Inhibited vs. spontaneous | Lonely vs. secure | Imbalanced feeling vs. well being | |
|--------------------|--------------|--------------------------|-----------------------------|--------------------------|--------------------|-----------------|----------------------|---------------------------|--------------------|----------------|----------------------------|-------------------|----------------------|-------------------|---------------------------|-----------------|-----------------------------| |
|                   | 36.24 (14.42)| 49.27 (8.63)             | 3.82 (1.03)                 | 22.30 (3.56)             | 21.93 (3.91)       | 13.35 (2.81)    | 24.77 (6.49)        | 17.90 (4.64)                | 12.16 (3.01)       | 20.83 (3.66) | 64.44 (9.48)                | 29.76 (4.37)      | 29.56 (4.13)         | 26.78 (5.01)       | 32.11 (5.67)               | 30.67 (3.75)    | 50.56 (11.12)             | |
|                   | 27.23 (10.49)| 42.55 (14.34)            | 4.10 (0.91)                 | 23.23 (2.69)             | 20.22 (3.81)       | 13.29 (2.28)    | 27.03 (4.78)        | 17.32 (4.93)                | 12.80 (2.7)        | 21.74 (4.48) | 65.11 (6.86)                | 28.22 (4.39)      | 30.00 (2.03)         | 29.22 (2.87)       | 32.44 (3.15)               | 29.11 (2.37)    | 49.33 (14.4)             | |
|                   |               | NR                       | NR                          | 21.46 (4.69)            | 21.36 (5.84)       | 13.82 (3.97)    | 25.20 (5.98)        | 16.40 (4.82)                | 13.30 (3.11)       | 19.54 (4.36) | 57.61 (12.97)               | 29.78 (8.04)      | 29.00 (7.65)         | 26.97 (7.71)       | 29.86 (6.24)               | 30.50 (6.70)    | 57.80 (14.5)             | |
|                   |               | NR                       | NR                          | 24.70 (3.8)             | 19.43 (5.03)       | 12.20 (3.32)    | 26.30 (5.45)        | 16.98 (4.68)                | 15.66 (2.37)       | 22.64 (3.82) | 49.16 (12.38)               | 22.00 (7.27)      | 24.36 (6.84)         | 22.63 (6.81)       | 27.08 (7.02)               | 26.52 (4.99)    | 45.36 (13.73)             | |
|                   |               | NR                       | NR                          | 27.23 (10.49)           | 19.43 (5.03)       | 12.20 (3.32)    | 26.30 (5.45)        | 16.98 (4.68)                | 15.66 (2.37)       | 22.64 (3.82) | 49.16 (12.38)               | 22.00 (7.27)      | 24.36 (6.84)         | 22.63 (6.81)       | 27.08 (7.02)               | 26.52 (4.99)    | 45.36 (13.73)             | |
|                   |               | NR                       | NR                          | 27.23 (10.49)           | 19.43 (5.03)       | 12.20 (3.32)    | 26.30 (5.45)        | 16.98 (4.68)                | 15.66 (2.37)       | 22.64 (3.82) | 49.16 (12.38)               | 22.00 (7.27)      | 24.36 (6.84)         | 22.63 (6.81)       | 27.08 (7.02)               | 26.52 (4.99)    | 45.36 (13.73)             | |

NR: not reported; BG: between groups; WG: within groups; EG: experimental group; CG: control group; F: female; M: male; SAQ: self-administered questionnaire; SCL-90-R: psychological test; PGFSME: Practical Group for Stress Management Education; RS-E: Rosenberg’s self-esteem; RS: Resiliency Scale; TRF: Teacher Report Form; YSR: Youth Self Report; SEE: Scales for Experiencing Emotions; EMI-B: Emotionality Inventory As a Measure of Well-Being; SDQ III: Self-Description Questionnaire III; PTSD: Post-Traumatic Stress Disorder; CES-D: scale that measures self-reported symptoms of depression; GAD-7: 7-item measure symptoms of anxiety; PCL-C: self-report to diagnose changes in PTSD; UCLA: loneliness scale.
| Authors       | Instrument                | Outcome Measures                              | EG Results                                  | CG Results                           |
|--------------|---------------------------|-----------------------------------------------|---------------------------------------------|--------------------------------------|
| Non-Randomized Controlled Trial |                          | Levels of stress                              | NR                                         | −Stress, depression, and parental stress +Self-esteem |
| Collica-Cox  | Interview (DASS21)        | Anxiety                                       | NR                                         |                                      |
| (2018)       |                           | Depression                                    |                                             |                                      |
|              |                           | Self-esteem                                   |                                             |                                      |
| Cooke        | Interview (Psychometric test) | Psychological and emotional Health            | +Motherhood                                 | NR                                   |
| (2015)       |                           | Motherhood                                    | +Transferable skills                        | NR                                   |
|              |                           | Transferable skills                           | +Security                                   | NR                                   |
|              |                           | Security                                       | +Trust                                      | NR                                   |
|              |                           | Trust                                          | +Serving time                               | NR                                   |
|              |                           | Serving time                                   | +Social competence                         | NR                                   |
|              |                           |                                                | +Interpersonal dynamics                     | NR                                   |
| Jasperson    | Report GM and T’S         | Anxiety                                       | −Anxiety                                   | NR                                   |
| (2010)       |                           | Depressive symptoms                           | −Depressive symptoms                        | NR                                   |
|              | Observation (MHP)         | Self-awareness                                | +Self-awareness                             | NR                                   |
|              |                           | Social isolation                              | −Social isolation                           | NR                                   |
|              |                           | Pro-social behaviors                          | +Prosocial behaviors                        | NR                                   |
| Leonardi     | Semi-structured interviews | −Dogs                                          | +Educational engagement                     | NR                                   |
| (2017)       |                           | −Positive effects                             | +Developing employability skills             | NR                                   |
|              |                           | −Motivation                                    | +Enhancing well-being                       | NR                                   |
| Minke        | Interview                 | −Social relations                             | +The prison atmosphere and emotional support was better after treatment | NR                                   |
| (2017)       |                           | −Emotional support                            | +Dog calm them and they defined prison as a “safe place” | NR                                   |
|              | Observation               | −Normalizing the prison setting                |                                             |                                      |
|              |                           | −Physical and emotional health                 |                                             |                                      |
|              |                           | −Goal-directed                                 |                                             |                                      |
| Minton       | Semi-structured interviews | Behaviors                                     |                                             |                                      |
| (2015)       |                           | −Self-concept                                 |                                             |                                      |
|              |                           | −Empathy and self-control                     |                                             |                                      |
|              |                           | −Socialization                                |                                             |                                      |
4. Discussion

The aim of the present systematic review was to evaluate the effects of dog-based AAI in prisoners. Most of the included articles support the relevance and usefulness of this kind of therapy for male and female inmates. In this regard, many different variables could be improved after dog-based AAI in prisoners, including mental health variables, such as anxiety or depression, emotional outcomes, and other very relevant variables for prisoners, such as empathy, self-control, and even academic skills. The potential enhancements in those variables could also lead to a reduction in recidivism, which was also suggested in the previous review conducted by Cooke and Farrington [41]. However, although there are 20 articles included in this systematic review, given that some concerns may have increased the risk of bias, the interpretation of results must be done with caution.

The mechanisms that explain the improvements of these interventions are not usually investigated in AAI studies or in the analyzed studies. Furthermore, the complexity of the target population leads to a great heterogeneity of the studies and a poor methodological quality of many of them. This makes it difficult for this systematic review to draw conclusions in relation to the different mechanisms and specific strategies used in AAI.

A total of 1295 prisoners were included in this systematic review. In this regard, a similar number of men and women were included. The vast majority of the therapies were conducted in adults [14,18,32,39,47–57], in which usually both men and women equally benefited from the therapy. However, one intervention [57] reported evidence that dog-based AAI could be more affective among men compared with women. Authors hypothesized that this could be due to the observed better health status of males and also due to the lower stress factors compared to women. In this regard, it must be noted that female inmates often come from disadvantaged backgrounds and have poor education [57], and the frequency of physical and sexual abuse before going to prison is high [60]. Therefore, potential differences between male and female inmates may be relevant when designing AAI programs, but this hypothesis must be confirmed in future studies.

Regarding interventions duration and frequency, eleven articles [14,18,44,45,47,50,51,53,55,57,59] showed effects on relationships, psychological problems, empathic
concern, emotional state, personal skills, and control of emotions. The proposed dog-based AAI in the vast majority of those studies had a duration of 60 min, one day a week. However, previous studies focused on psychological therapies indicated that the longer the intervention the greater the effects [61,62]. Thus, future studies should investigate the role of duration in the effectiveness of the AAI. In terms of the activities to be carried out, the most beneficial are related to keeping in touch with rescued dogs, dog training, and therapies focused on educational and interaction components. Moreover, future dog-based AAI should take into account some of the essential principles proposed by Samhsa [63]. In this regard, dog-based interventions should fulfil some criteria such as (1) safety; (2) trustworthiness and transparency; (3) peer support and mutual self-help; (4) collaboration and mutuality; (5) empowerment, voice, and choice; and (6) cultural, historical, and gender issues.

Regarding the design of the studies, only three of the twenty articles were randomized controlled trials. Therefore, results must be taken with caution, since the risk of bias and quality assessment showed critical issues in the vast majority of the articles. The lack of a comparison group, randomization, or the follow-up rate are the most critical concerns. Furthermore, the large heterogeneity of the people in prison in terms of sex, gender, age, educational background, mental disorders, drug addiction, etc., must be considered. Thus, larger randomized controlled trials are needed, and studies that follow animal-assisted intervention guidelines [64] are encouraged to enable the extraction of strong recommendations and conclusions. Nevertheless, the exceptionality of this research field, the nature of participants as well as situational and environmental context concerns make it almost impossible to achieve these research standards.

There are some limitations that should be considered. First, articles in English, French, Italian, Portuguese, or Spanish were included in the systematic review, so it is possible that studies in other languages were not found. Second, the quality of the articles (only three randomized controlled trials) and the heterogeneity of participants and outcomes mean that the conclusions of the systematic review must be taken with caution.

5. Conclusions

Dog-based AAI could be a useful tool to improve many different variables including mental health, emotional control, empathy, or academic skills in male and female inmates. However, the methodological quality of the included studies was not optimal, and the heterogeneity of the participants and outcomes was large. Thus, further studies with higher methodological quality are required and subgroups are encouraged to enable the extraction of strong recommendations and conclusions.

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