Psychological Effects Of Animal-Assisted Programs Among Children With Special Needs- Experiences From A Systematic Review

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Abstract

Programmes involving animals are becoming more and more common. These programmes can vary widely in their methodology, focus and purpose, and their developmental impact can be significant for healthy children and those with various disorders. In the present systematic review, we aimed to explore the psychological effects of animal-assisted activities (AAA), therapies (AAT) and interventions (AAI). Using the EBSCO Discovery Service search engine, we searched 85 databases for relevant studies alongside the relevant keywords. The search yielded 262 results, of which 21 studies were relevant after title and abstract filtering and full-text analysis. The results show that most animal-assisted programmes involve dogs and horses. Regarding the type of the disorder, autism, cerebral palsy and ADHD were over-represented. There was considerable variability in the duration of sessions and the overall programme, independent of disorder type and patient age. The main indicators revolved around relational, cognitive and behavioural effectiveness. Overall, the studies were of high methodological quality. The studies typically focus on a single segment or the child/adolescent only, but the results are not interpreted in context. In the future, it would be worthwhile to broaden the spectrum of studies in terms of comparisons of psychological and physiological indicators and follow-up, longitudinal design and analysis.

Keywords: animal assisted therapy, animal assisted intervention, animal assisted activity, special needs, children, adolescents.

Introduction

Animal-assisted programmes are increasingly raising public awareness of the effectiveness of animal-assisted learning methods. The concept that animal-assisted methods can provide a solution for healing pedagogy, general pedagogy and medicine is becoming more and more common. It is important to evaluate the processes of understanding and development that take place during the interaction between animal and child (Dan, 2021; Hercz, 2015). Concerning animal-assisted interventions, activities and therapies in general, the presence of animals has been shown to have a very positive impact on the acquisition of knowledge, to help children develop skills and to participate

in collaborative work and to promote the development of cooperative skills. In the presentation of animal-assisted activities, the thesis that the human-animal therapeutic/educational relationship is protective of humans is usually taken as an axiom. It is also a common view among professionals involved in this field that the presence of the animal, its spontaneous behaviour, its openness to interaction, etc., helps the educational or therapeutic process (Aubrey 2001, Csányi 1999).

In the development of animals-assisted programs, several formulations exist. The most common are Animal Assisted Intervention (AAI), Animal Assisted Therapy (AAT) and Animal Assisted Activity (AAA). AAI is a set of interventions in which the intervention involves an animal to achieve a therapeutic or developmental effect. AAI interventions can be individual or group based and can be linked to different ages and abilities. AAI encompasses other areas of AAI, including AAA, AAE and AAT. While AAI is a broader term used to describe the involvement of animals in various interventions, AAT and AAA are equally examples of different types of animal-assisted interventions. In the case of AAA, we are talking about an animal-assisted activity where the presence of the animal has a motivating effect on a healthy or sick person. AAA can be used to support social behaviour; reduce isolation, stress, anxiety and loneliness; aid communication, positively affect mood and overall well-being. The literature on animal-assisted interventions uses animal-assisted therapy as defined by the international non-profit organization Delta Society (Chandler, 2012). AAT is a goal-oriented intervention in which the therapeutic goal is achieved by the involvement of a purpose-trained animal in the therapeutic process. The sessions also work with the beneficial effects of the human-animal bond and consider it as a therapeutic factor. The goals of therapy can be very diverse: improving movement (coordination, inducing more movement - e.g. for people with mobility problems), emotional, social, cognitive development, stimulating communication, improving quality of life, etc.

The AAA intervention starts from the perspective of an existing animal. In this case, a situation when the person already has a pet is acceptable as condition. AAT, on the other hand, usually identifies the patient's needs and finds the right animal to meet them. Interventions involving animals have been studied for a variety of pathologies, including physiological disorders and mental disorders, as well as cancer. Some interventions have been targeted at elderly patients or children. In addition, AAT and AAA can be implemented in various settings such as hospitals, nursing homes and schools.

Several research aimed to discover the impact of various animal assisted programs on the child development, however, there is a lack in the systematic analysis of the existing literature focusing on the psychological impact of animal assisted programs since most reviews focus on a specific area. First, most papers focus only on one type of programs, i.e. only AAA, AAT, AAE. Also, although there is a growing number of papers exploring children and adolescents with special education needs collectively, most papers only investigate only a specific disorder or a slice of the continuum of special needs. Nevertheless, such reviews ultimately reflect on the positive and developing impact of animal assisted programs on various aspects of the child's and youth's life. n their meta-analysis, Charry-Sánchez et al. (2018) concluded that animal-assisted therapy may be useful as a complementary intervention in the management of children with cerebral palsy and pain. In a broader point of view, Fornefeld et al. (2023) detected that integrating canine-assisted therapy into the inpatient psychiatric setting may improve psychopathological conditions, particularly in the areas of mood, affectivity, psychomotor functioning, attitudes toward illness, anxiety, and exposure behaviors. The systematic analysis of Rehn et al. (2023) pointed out that the use of animal assisted therapy has a positive impact on social skills of children and adolescents with autism spectrum disorder because animals are social mediators and social supporters for humans especially among younger children.

Following the line mentioned above, the aim of our review was to explore the existing literature on animal-assisted interventions, therapies or activities for children and adolescents with special needs from a broad interpretation of disorders and animal assisted programs. Indicators considered were the animal, duration, length, disorder type, outcome indicators of the therapy/intervention/activity and methodological quality of the studies. Therefore, the novelty of the research lays down in the wider target group (regarding both participants and programs) and the broader interpretation of the settings explored during the analysis. Our goals is to include better understanding the implementation of such programs and opportunities for further development and practical impact. In our review, we would like to go beyond the well-known benefits of these programs. Therefore, we posed the following research question: What are the most typical psychological consequences of animal-assisted activities, interventions, and treatments? What distribution of session length and project duration can be determined based on the age of the animals involved and the participants? What are the implications for practice? By bringing together existing research, such a review can provide a comprehensive view of the range of health outcomes associated with animal-assisted activities. It can also help identify patterns, trends, and gaps in the literature and enable critical assessment of the methodological rigor of individual studies. Due to the unique challenges and considerations that children with special education needs face, it is critical to investigate the impact of animal-assisted activities on their psychological health. Children with special needs often experience difficulties in various aspects of physical development, including motor skills, coordination, and general physical health. Animal-assisted activities can provide a comprehensive and supportive approach to not only addressing physical health issues, but also the emotional and social aspects of development. Therefore, examining the existing literature and summarizing its key findings can provide theoretical and practical knowledge for professionals working with children with special needs.

Methods

This systematic literature review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2015).

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram
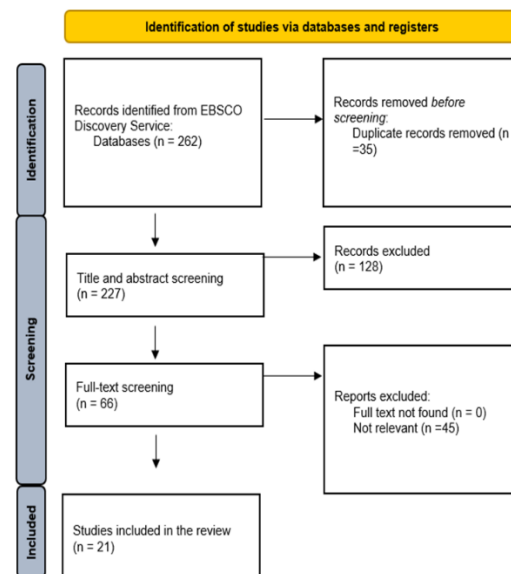
Systematic searching process

EBSCO Discovery Service Search Engine was used for systematic search, which contains 85 databases. The keywords, determined according to the Medical Subject Heading (MeSH), we used for searching were "animal assisted therapy" or "animal assisted activity" or "animal-assisted intervention" or "pet therapy" AND "children" AND "special education" AND "psychological intervention". The searches were performed in July 2023. Our systematic searches resulted in a total of 262 records. After double filtering, 35 records were excluded. Unscreened articles were listed in Zotero (V6.0.22, Roy Rosenzweig Center for History and New Media, George Mason University, Washington DC). After title and abstract screening, 128 records were excluded. Therefore, 66 papers were sent for full-text screening which led to involving 21 papers in the qualitative synthesis.

Inclusion and exclusion criteria

The following inclusion criteria were set, following the PICOS format (P: Population, I: Interventions, C: Comparisons, O: Outcomes, S: Study designs):

1.   population: age below 18 years (due to focusing on children and adolescents) and focused on children with special needs;

2.   intervention: original empirical research published in a peer-reviewed journal;

3.   comparison: examined the impact of an animal assisted intervention, or animal assisted activity or animal assisted therapy

4.   outcomes: any kind of psychological impact on the development of the child and/or adolescent

5.   study design: intervention programs

6.   written in English language; and

7.   in disciplines of education, psychology, social sciences and humanities and sports sciences.

Studies were excluded if they were

•   reviews, commentaries, letters to the editor, conference papers, books, book chapters, dissertations and newspaper articles

•   focusing on participants.

Data Extraction and Assessment of Methodological Quality

We performed a multistage screening process to select studies which met the inclusion criteria. One author (KEK) independently searched the literature and reviewed study titles and abstracts. In the next stage, the first review author screened the titles and abstracts of all identified records (KK), and twenty-five per cent of all titles and abstracts were independently assessed by a second review author (EZB, IE, BE). All studies whose adequacy was questionable were taken forward to the full-text screening at this stage. In the next step, full-text screening was performed, in which the authors (KKE, EZB, IE, BE) independently screened all full texts. In cases of uncertainty, the other authors also checked the

decision. One author (KEK) independently searched the literature and reviewed study titles and abstracts.

For data extraction, an Excel spreadsheet and Data Extraction Forms were applied. We included full article citation, study objectives, study design, how the study attempted to avoid bias, participant characteristics and numbers, intervention and/or comparison, results/outcome and comments related to study quality.

The evaluation of the risk of bias and the quality of the studies was evaluated by the Joanna Briggs Institute (JBI) critical appraisal tool (randomized controlled trials and non-randomized controlled trials followed by Barker et al. (2023 and cross-sectional studies followed by Moola et al. (2020). Papers were evaluated according to the appropriate tool on a 4-point scale (yes/no/unclear/not applicable).

Results

Overall, the systematic search yielded a total of 262 records. Firstly, title and abstract screening was carried out, which led to keeping 66 records for full-text screening (Figure 1). All of these were examined for eligibility. A total of 21 articles met the criteria (Table 3). The articles were published between 2006 and 2022. Most studies (N=8) were investigated in the United States (Erdman et al., 2015; Gabriels et al., 2015; Germone et al., 2019; Kern et al., 2011; Kwon et al., 2015; Petty et al., 2017; Schuck et al., 2015; Silkwood-Sherer & McGibbon, 2022), three interventions were implemented in Germany (Deutz et al., 2018; Prothmann et al., 2006; Stumpf & Breitenbach, 2014) and three in Korea (Ahn et al., 2021; Jang et al., 2015; Oh et al., 2018). The study of Hill et al. (2020) was conducted in Australia, Steiner & Kertesz (2015) carried out research in Hungary, Hession et al. (2014) in Ireland, Uccheddu et al. (2019) in Italy. Also, one study was designed in the Netherlands (Griffioen & Enders-Slegers, 2014), one in Spain (Hernández-Espeso et al., 2021) and one in Turkey (Demiralay & Keser, 2022). Therefore, most studies were conducted in the United States (N=8) or Europe (N=9).

Table 3. Papers involved in the systematic review

Authors	Disorder	Study design	Animal	Session length	Program length	Frequency	Age	Psychological outcome	Other outcome	Measure
Ahn et al. (2021)	cerebral palsy	RCT	horse	40 min	16 weeks	2 per week	6-13 years	attention, quality of life	-	Korean-Wechsler Intelligence Scale for Children-Fourth Edition (K-WISC-IV), Conner's Continuous Performance Test (CPT), Korean ADHD Rating Scale (KARS), Pediatric Quality of Life Inventory (PedsQl)
Demiralay & Keser (2022)	physical disability	RCT	cat	45-60 min	7 weeks	1 per week	8-11 years	stress, anxiety	blood pressure	Perceived Stress Scale (PSS), Social Anxiety Scale for Children-Revised Version (SASC-R)
Deutz et al. (2018)	cerebral palsy	RCT	horse	16-20 min	N/A	1 per week	5-15 years	quality of life	gross motor function	Assessment of gross motor function (GMFM 66), Child Health Questionnaire (CHQ), KIDSCREEN-27
Erdman et al. (2015)	autism	mixed method	horse	75 min	10 weeks	1 per week	11-15 years	behavioural analysis, responsiveness	-	exploration, Social Responsiveness Scale (SRS), interview with parents
Gabriels et al. (2015)	autism	RCT	horse	45 min	10 weeks	1 per week	6-16 years	self-regulation, socialisation, communication, adaptive behaviour	motoric behaviour	Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4), Systematic Analysis of Language Transcripts (SALT), Bruininks-Oseretsky Test of Motor Proficiency–2nd Ed (BOT-2) (Short Form) and two subscales of the Sensory Integration and Praxis Test (SIPT), Vineland Adaptive Behavioral Scales – 2nd Edition, Survey, Interview Form (VABS-II)
Germone et al. (2019)	autism	RCT	dog	32 min	N/A	1 per week	4-17 years	social and communication behaviour	-	OHAIRE–Version 3, videoanalysis
Griffioen & Enders-Slegers (2014)	Down-syndrome	semi-crossover	dolphin	60 min	6 weeks	1 per week	6-10 years	impulsivity, verbalisation, understanding rules, building relationships	-	Severe Retardation (MESSEER)
Hernández-Espeso et al. (2021)	autism	RCT	dolphin	45 min	6 weeks	3 per week	4-5 years	behaviour	-	The Autism Diagnostic Observation Schedule-Generic, the Reynell Developmental Language scales, the Vineland Adaptive Behavior scales
Hession et al. (2014).	dispraxia	pilot	horse	30 min	8 weeks	1 per week	6-15 years	cognition, mood	gait	The Standard Progressive Matrices (Raven), the Childhood Depression, Inventory, GAITRite Pressure Mapping System
Hill et al. (2020)	autism	RCT	dog	60 min	9 weeks	1 per week	4-7 years	task performance, goal setting, attachmen	-	The Children's Attitudes and Behaviours Towards Animals (CABTA), Canadian Occupational Performance Measure (COPM)

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Jang et al. (2015)	ADHD	pilot	horse	30 min	12 weeks	1 per week	7-11 years	behaviour, self-evaluation	motoric behaviour	ADHD-Rating Scale (ARS-I), Clinical Global Impressions (CGI)–Severity Scale, Clinical Global Impressions–Improvement Scale (CGI-I), Gordon Diagnostic System, Korea-Child Behavior Checklist (K-CBCL), Self-Esteem Scale, Bruininks-Oseretsky test of motor proficiency (BOT-2),
Kern et al. (2011)	autism	pilot	horse	60 min	6 months	1 per week	3-12 years	quality of parent-child interactions	-	Childhood Autism Rating Scale (CARS), Timberlawn Parent-Child Interaction Scale, Quality of Life Enjoyment and Satisfaction Questionnaire (QLES-Q
Kwon et al. (2015)	cerebral palsy	RCT	horse	30 min	8 weeks	2 per week	4-10 years	behavioural balance	gross motor function	Gross Motor Function Measure (GMFM)-88, GMFM-66, Pediatric Balance Scale
Oh et al. (2018)	ADHD	RCT	horse	60 min	12 weeks	2 per week	6-12 years	self-esteem, quality of life	-	ADHD Rating Scale (ARS), Child Behavior Checklist (CBCL), Self-Esteem Scale (SES), Pediatric Quality of Life Inventory (PedsQL) child and parent report version, Developmental Coordination Disorder Questionnaire (DCDQ), Clinical Global Impressions-Severity (CGI-S),
Petty et al. (2017)	autism	RCT	horse	60 min	10 weeks	1 per week	6-16 years	attachment to the animal	-	Child's Attitude and Behavior toward Animals (CABTA)
Prothmann et al. (2006)	psychiatric disorders	NRCT	dog	30 min	5 weeks	1 per week	11-20 years	mental state	-	Basler Befindlichkeits-Skala (BBS)
Schuck et al. (2015)	ADHD	RCT	dog	10 min	12 weeks	1 per week	7-9 years	animal-human interaction, social skills	-	ADHD–Rating Scale–Fourth Edition, Home and School Version (ADHD-RS-IV), Social Skills Improvement System–Rating Scales, Parent Form (SSIS-RS), Social Competence Inventory (SCI)
Silkwood-Sherer & McGibbon (2022)	cerebral palsy	RCT	horse	45 min	12 weeks	1 per week	3-6 years	balance, quality of life	-	Pediatric Balance Scale (PBS), Activities Scale for Kids with delayed improvement on the 1 Minute Walk Test, Pediatric Quality of Life – CP Module
Steiner & Kertesz (2015)	autism	RCT	horse	30 min	4 weeks	1 per week	10-13 years	skills	gait	Ariel Performance Analysis System, Pedagogical Analysis and Curriculum (PAC) test
Stumpf & Breitenbach (2014)	severe disability	RCT	dolphin	25-30 min	1,5 weeks	1 per week	5-10 years	communication skills, social-emotional behaviour, quality of life of parents	-	N/A
Uccheddu et al. (2019)	autism	RCT	dog	30 min	10 weeks	1 per week	6-11 years	reading, cognition, intelligence	-	Cornoldi's MT2 reading test of reading comprehension, TORC; metaphonological competence test, MCF; Wechsler intelligence scale for children,

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Regarding the methodological diversity of the papers, most studies (N=15) can be considered randomized controlled trials (Ahn et al., 2021; Demiralay & Keser, 2022; Deutz et al., 2018; Gabriels et al., 2015; Germone et al., 2019; Hernández-Espeso et al., 2021; Hill et al., 2020; Kwon et al., 2015; Oh et al., 2018; Petty et al., 2017; Schuck et al., 2015; Silkwood-Sherer & McGibbon, 2022; Steiner & Kertesz, 2015; Stumpf & Breitenbach, 2014; Uccheddu et al., 2019), two can be regarded as non-randomized controlled trials (Prothmann et al., 2006; Griffioen & Enders-Slegers, 2014). The research of Erdman et al. (2006) used mixed methods while the research of Hession et al. (2014), Jang et al. (2015) and Kern et al. (2011) are pilot (cross-sectional) studies.

Regarding the applied statistical methods, a significant variety could be experienced. Due to the methodolgcal nature od the interventions, pre- and post-test measures were applied in most cases. Therefore, several study used paired t-test (Hession et al., 2014; Jang et al., 2015; Kwon et al., 2015; Oh et al., 2018; Prothmann et al., 2006; Steiner & Kertesz, 2015) and/or repeated measures ANOVA in their analysis (Ahn et al., 2021; Erdman et al., 2015; Griffioen & Enders-Slegers, 2014; Kern et al., 2011; Steiner & Kertesz, 2015; Stumpf & Breitenbach, 2014). To test between-group differences mostly Mann-Whitney tests (Hernández-Espeso et al., 2021; Hill et al., 2020; Kwon et al., 2015; Oh et al., 2018; Steiner & Kertesz, 2015; Stumpf & Breitenbach, 2014; Uccheddu et al., 2019) and/or independent samples t-test (Hill et al., 2020; Kwon et al., 2015; Oh et al., 2018; Schuck et al., 2015; Silkwood-Sherer & McGibbon, 2022) were applied. In some cases, student t-tests (Gabriels et al., 2015; Petty et al., 2017), Wilcoxon signed rank sum test (Oh et al., 2018; Uccheddu et al., 2019), mixed-design ANOVA (Demiralay & Keser, 2022), F-probe (Steiner & Kertesz, 2015) or ANCOVA (Schuck et al., 2015) were applied. In some cases, Pearson correlation was used to detect connection between the variables (Oh et al., 2018; Silkwood-Sherer & McGibbon, 2022). To measure the impact of specific variables, linear mixed effect models (Deutz et al., 2018; Gabriels et al., 2015; Petty et al., 2017), poisson regression (Germone et al., 2019), interclass correlation coefficient model (Hill et al., 2020) or multivariate linear regression model (Jang et al., 2015) was executed. Where categorical variables were also involved (mostly dociodemographic background variables), Pearson Chi-square tests were also applied (Demiralay & Keser, 2022; Gabriels et al., 2015; Oh et al., 2018; Petty et al., 2017; Schuck et al., 2015; Steiner & Kertesz, 2015). At this point, we have to note that due to the heterogeneity of studies with respect to interventions, participants, measures and outcomes, no pooled effect sizes were calculated.

Animals involved in the programs

First, we checked the animals used in the therapy/activity/intervention. Most of the research (N = 12) implemented a horse/equine-assisted activity (Ahn et al., 2021; Deutz et al., 2018; Erdman et al., 2015; Gabriels et al., 2015; Hession et al., 2014); Jang et al., 2015; Kern et al., 2011; Kwon et al., 2015; Oh et al., 2018; Petty et al., 2017; Silkwood-Sherer & McGibbon, 2022; Steiner & Kertesz, 2015). Unsurprisingly, the second most dominating animal was the dog which appeared in five cases (Germone et al., 2019; Hill et al., 2020; Prothmann et al., 2006; Schuck et al., 2015; Uccheddu et al., 2019). The researchers explored the effects of an activity based on the involvement of a dolphin (Griffioen & Enders-Slegers, 2014; Hernández-Espeso et al., 2021; Stumpf & Breitenbach, 2014) and one intervention was based on the assistance of a cat (Demiralay & Keser, 2022). The interventions described were usually conducted by therapists who had received specific AAT certifications from a variety of organizations.

Age of the patients

The age of the patients varied between 3 and 18 years. Most of the studies (N=13) focused on early childhood and pre-adolescence (Ahn et al., 2021; Demiralay & Keser, 2022; Hernández-Espeso et al., 2021; Griffioen & Enders-Slegers,

2014; Hill et al., 2020; Jang et al., 2015; Kwon et al., 2015; Oh et al., 2018; Silkwood-Sherer & McGibbon, 2022; Stumpf & Breitenbach, 2014; Uccheddu et al., 2019; Schuck et al., 2015), while three studies explored only adolescent patients (Steiner & Kertesz, 2015; Erdman et al., 2015; Prothmann et al., 2006). The last five studies involved both children and adolescents in their research procedure (Germone et al., 2019; Deutz et al., 2018; Gabriels et al., 2015; Hession et al., 2014; Kern et al., 2011; Petty et al., 2017). The youngest patients were 3 years old (Kern et al., 2011; Silkwood-Sherer & McGibbon, 2022) while the oldest were 20 years old (Prothmann et al., 2006).

Among the studies focusing on younger children, most (N=5) was based on the involvement of a horse (Ahn et al., 2021; Jang et al., 2015; Kwon et al., 2015; Oh et al., 2018; Silkwood-Sherer & McGibbon, 2022); three studies involved dolphins (which covered all of the dolphin-assisted implementations) (Griffioen & Enders-Slegers, 2014; Hernández-Espeso et al., 2021; Stumpf & Breitenbach, 2014), three involved dogs (Hill et al., 2020; Schuck et al., 2015; Uccheddu et al., 2019) and the only paper introducing the effect of a cat-assisted activity (Demiralay & Keser, 2022) also focused on patients belonging to early childhood. Concerning papers involving both young children and adolescents, only one paper could have been detected introducing the impact of a dog-assisted therapy (Germone et al., 2019) while the other five papers explored the impact of an equine-assisted activity (Deutz et al., 2018; Gabriels et al., 2015; Hession et al., 2014; Kern et al., 2011; Petty et al., 2017). Lastly, among the projects involving only adolescent patients, one research focused on the efficacy of a dog-assisted activity (Prothmann et al., 2006) and two on that of an equine-assisted therapy (Erdman et al., 2015; Steiner & Kertesz, 2015). Overall, we can state that studies focusing on early childhood and pre-adolescence are overrepresented. Typically, studies include patients of different age groups, but it is important to note that the cognitive and social characteristics of children in different age groups can vary significantly. We can also see

that equine-assisted programs are being implemented across a wider age range.

Type of disorder

Concerning type of disorder, we could see that regrading autism spectrum disorder, the most often measured therapy was based on the involvement of horses (Erdman et al., 2015; Gabriels et al., 2015; Kern et al., 2011; Petty et al., 2017; Steiner & Kertesz, 2015) while three paper focused on the impact of a dog-assisted therapy (Germone et al., 2019; Hill et al., 2020; Uccheddu et al., 2019) and one on the impact of a dolphin-assisted activity (Hernández-Espeso et al., 2021). Among the three papers focusing on ADHD, two introduced equine-assisted therapies (Jang et al., 2015; Oh et al., 2018) and one introduced a dog-assisted activity (Schuck et al., 2015). Regarding cerebral palsy, all of the papers introduced investigations related to equine-assisted therapies (Ahn et al., 2021; Deutz et al., 2018; Kwon et al., 2015; Silkwood-Sherer & McGibbon, 2022). The therapy of the measurement of children with dyspraxia was based on the assistance of horses. The paper focusing on Down-syndrom (Griffioen & Enders-Slegers, 2014) and the one on severe disabilities (Stumpf & Breitenbach, 2014) applied dolphin-assisted therapies. The research of Prothmann et al. (2006) involving adolescents with psychiatric disorders involved dogs while the exploration of Demiralay & Keser (2022) focusing on physical disabilities involved a cat in their experiments. Therefore, we can see that equine-assisted programs were implemented in a broader context regarding the type of disorder.

Length and duration

The length and duration of the interventions were also compared. The longest program lasted for 6 months (Kern et al., 2011) while the shorted lasted for only one and a half week (Stumpf & Breitenbach, 2014). Overall, four papers reported a 10-week-long intervention (Erdman et al., 2015; Gabriels et al., 2015; Petty et al., 2017; Uccheddu et al., 2019) and another four papers introduced 12-week-long programs (Jang et al., 2015; Oh et al., 2018; Schuck et al., 2015, Silkwood-Sherer & McGibbon, 2022) which were the most frequently appeared

durations. Regarding the length of the sessions, we could see a huge variety. Typically, the sessions were at least 30 minutes long. The shortest session lasted for only 10 minutes (Schuck et al., 2015) while the longest session lasted for 75 minutes (Erdman et al., 2015). Regarding the frequency, most programs applied weekly sessions (Demiralay & Keser, 2022; Deutz et al., 2018; Erdman et al., 2015; Gabriels et al., 2015; Germone et al., 2019; Griffioen & Enders-Slegers, 2014; Hession et al., 2014; Hill et al., 2020; Jang et al., 2015; Kern et al., 2011; Petty et al., 2017; Prothmann et al., 2006; Schuck et al., 2015; Silkwood-Sherer & McGibbon, 2022; Steiner & Kertesz, 2015; Stumpf & Breitenbach, 2014; Uccheddu et al., 2019) while having two (Ahn et al., 2021; Kwon et al., 2015; Oh et al., 2018) or three sessions (Hernández-Espeso et al., 2021) was less typical. Regarding the disorder, the length of the sessions and duration of the programs significantly differed. In case of ADHD, all the three programs had the similar duration, 12 weeks. Among them, the two equine-assisted activities were longer, 30 minutes (Jang et al., 2015) and 60 minutes (Oh et al., 2018), however, the dog-assisted activity of Schuck et al. (2015) was the shortest session with 10 minutes. Regarding autism spectrum disorder, two programs had 30-minute-long sessions: a dog-assisted one for 10 weeks (Uccheddu et al., 2019) and an equine-assisted one for 4 weeks (Steiner & Kertesz, 2015). The therapy of Germone et al. (2019) involving dogs included approximately 32-minute-long sessions, however, the duration is unknown in this case. Hernández-Espeso et al. (2021) reported conducting a dolphin-assisted therapy with 45-minute-long sessions for 6 weeks while Gabriels et al. (2015) introduced an equine-assisted program with the same length for 10 weeks. The most frequently appeared 60-minute-length was typical in three cases: the dog-assisted program of Hill et al. (2020) lasting for 9 weeks and the equine-assisted program of Kern et al. (2011) and Petty et al. (2017), the former lasting for 6 months and the latter lasting for 10 weeks. The longest session was related to the program of Erdman et al. (2015) with the assistance of horses. Concerning cerebral palsy, the least long session lasted for 16-20 minutes belonging to the

intervention of Deutz et al. (2018) where the duration is unknown. The sessions were 30-minute-long lasting for 8 weeks in the intervention of Kwon et al. (2015), 40-minute-long lasting for 16 weeks in the research of Ahn et al. (2021), 45-minute-long lasting for 12 weeks in the exploration of Silkwood-Sherer & McGibbon (2022) while the length was unclear in the case of Deutz et al. (2018). Regarding dyspraxia, Hession et al. (2014) reported having 30-minute-long equine-assisted sessions for 8 weeks. In case of severe disability, Stumpf & Breitenbach (2014) reported providing 25-30-minute-long dolphin-assisted sessions for 1,5 weeks. concerning psychiatric disorders Prothmann et al. (2006) introduced a dog-assisted activity with 30-minute-long sessions for 5 weeks. In relation with physical disorder, Demiralay & Keser (2022) conducted their research about a cat-assisted activity with 45-60-minute-long sessions lasting for 7 weeks. Lastly, Griffioen & Enders-Slegers (2014) showed research results belonging to the issue of Down-syndrome about a dolphin-assisted therapy with 60-minute-long sessions for 6 weeks. Overall, no specific consistency could be experienced in the session length applied in the programs although some type of disorders would require shorter length (e.g. disorders with cognitive dysfunction or ADHD, e.g. Lopez et al., 2018).

Concerning age, also a huge diversity could be seen. In case of small children (age between 3 and 12 years), the program length varied between 10 minutes (Schuck et al., 2015) and 60 minutes (Oh et al., 2018; Hill et al., 2020; Griffioen & Enders-Slegers, 2014). The duration of these three programs were also different, 6, 9 and 12 weeks. However, most programs had approximately 30-minute-long sessions (Stumpf & Breitenbach, 2014; Jang et al., 2015; Uccheddu et al., 2019; Kwon et al., 2015) which seems to be ideal for this age group supported by basic therapeutic statements (e.g. Shafi et al., 2019; Schleider et al., 2019). The equine-assisted program of Ahn et al. (2021) had 40-minute-long sessions while the program of Hernández-Espeso et al. (2021) (dolphin), Silkwood-Sherer & McGibbon (2022) (horse) and Demiralay & Keser (2022) (cat) had an average of 45-minute-long sessions which may

be long for younger children, especially in the case of Hernández-Espeso et al. (2021) and Silkwood-Sherer & McGibbon (2022) where the age of children varied between 3 and 6 years. In case of programs focusing only on adolescents, two different lengths could be seen: the equine-assisted program of Steiner & Kertesz (2015) and the dog-assisted one of Prothmann et al. (2006) had 30-minute-long sessions lasting for 4 and 5 weeks. On the contrary, the equine-assisted program of Erdman et al. (2015) had the longest, 75-minute-long sessions lasting for 10 weeks. Lastly, the programs involving both younger children and adolescents, the patterns of the length and duration were similar to the programs focusing on younger children. Deutz et al. (2018) designed 16-20-minute-long equine-assisted sessions which can be ideal for both groups. The horse-assisted program of Hession et al. (2014) had 30-minute-long sessions while the dog-assisted one of Germone et al. (2019) had almost the same, 32-minute-long sessions. Three papers reported longer sessions: the sessions of the intervention of Gabriels et al. (2015) lasted for 45 minutes while the sessions of Kern et al. (2011) and Petty et al. (2017) lasted for 60 minutes although their duration varied since the former lasted for 6 months while the latter for 10 weeks. Overall, no specific consistency could be experienced in the session length applied in the programs, although it is suggested to have shorter programs in early childhood due to the specific cognitive progress and capacity of such children, e.g. Diamond & Ling, 2016).

Outcomes

Regarding the topics, we could differentiate three big topics namely relationship efficacy, cognitional efficacy and behavioural efficacy (see Table 4). Relationship efficacy included human-animal relationship and attachment to animal, parent-child relationship, developing relationships, and social skills and behaviour. In this group, papers usually focused on the impact of animal assisted programs on the development of relationship patterns, attachment and social progress. The relevant research highlighted the positive impact of the various animal assisted activities in all cases. Cognitional efficacy included task performance and setting aim, pedagogical skills, attention and cognition, intelligence, reading efficacy, verbalization and communication skills, and understanding rules and self-regulation. Papers introducing the significant positive impact of the various animal assisted programs were collected here. Such studies visualized the positive impact of the programs on cognitive development such as task performance and orientation, verbal communication, understanding and using rules, intellectual development and reading efficacy. Lastly, behavioural efficacy incorporated behavioural balance, mood, self-assessment, stress and anxiety, children's quality of life and parents' quality of life. In this group, papers exploring the impact of the programs on the behavioural outputs, and mental health more specifically, were summarized, concluding the significant positive role of the animal assisted programs on this aspect as well, emphasizing the potential of such programs to create a healthier, less stressful and anxious and better life of the children concerned.

Table 4. Categories of outcome variables and papers dealing with them

Relationship efficacy		Cognitional efficacy		Behavioural efficacy	
human-animal relationship, attachment to anima	Schuck et al. (2015)	**task performance and setting aims**	Hill et al. (2020)	**behavioural balance**	Silkwood-Sherer & McGibbon (2022)
	Hill et al. (2020)	**pedagogical skills**	Steiner & Kertesz (2015)		Kwon et al. (2015)
	Petty et al. (2017)	**attention and cognition**	Ahn et al. (2021)		Griffioen & Enders-Slegers (2014)
parent-child	Kern et al.		Uccheddu et al.		Hession et al.

relationship	(2011)			(2019)	(2014).
developing relationships	Griffioen & Enders-Slegers (2014)		Hession et al. (2014).	**mood**	Prothmann et al. (2006)
		intelligence	Uccheddu et al. (2019)	**self-assessment**	Oh et al. (2018)
social skills and behaviour	Schuck et al. (2015)	**reading efficacy**	Uccheddu et al. (2019)		Jang et al. (2015)
	Stumpf & Breitenbach (2014)	**verbalization and communication skill**	Griffioen & Enders-Slegers (2014)	**stress and anxiety**	Demiralay & Keser (2022)
	Gabriels et al. (2015)		Stumpf & Breitenbach (2014)	**children's quality of life**	Silkwood-Sherer & McGibbon (2022)
	Germone et al. (2019)		Gabriels et al. (2015)		Deutz et al. (2018)
	Hernández-Espeso et al. (2021)		Germone et al. (2019)		Ahn et al. (2021)
	Jang et al. (2015)	**understanding rules and self-regulation**	Griffioen & Enders-Slegers (2014)		Oh et al. (2018)
	Erdman et al. (2015)		Gabriels et al. (2015)	**parents' quality of life**	Stumpf & Breitenbach (2014)

The above-mentioned outcome indicators served as dependent variables. Beside them, most study dealt with other independent variables. Gender/sex (Ahn et al., 2021; Demiralay & Keser, 2022; Deutz et al., 2018; Gabriels et al., 2015; Germone et al., 2019; Griffioen & Enders-Slegers, 2014; Hill et al., 2020; Jang et al., 2020; Kwon et al., 2015; Oh et al., 2018; Schuck et al., 2015; Silkwood-Sherer & McGibbon; 2022) and age (Ahn et al., 2021; Demiralay & Keser, 2022; Deutz et al., 2018; Gabriels et al., 2015; Germone et al., 2019; Hill et al., 2020; Kwon et al., 2015; Oh et al., 2018; Petty et al., 2017; Schuck et al., 2015; Silkwood-Sherer & McGibbon; 2022) were the most frequently involved independent variables. As other sociodemographic variables, ethnicity/race (Germone et al., 2019; Griffioen & Enders-Slegers, 2014; Petty et al., 2017; Schuck et al., 2015), education (Griffioen & Enders-Slegers, 2014; Schuck et al., 2015) and

income level (Demiralay & Keser, 2022) were assessed. However, in most cases, these sociodemographic variables did not have any significant impact.

Regarding physical characteristics as independent variables, laterality (Kwon et al., 2015), weight (Kwon et al., 2015), height (Kwon et al., 2015) were mentioned, but none of them had any significant impact. In terms of disorder-specific variables, community psychiatric diagnosis (Gabriels et al., 2015; Germone et al., 2019; Hill et al., 2020; Jang et al., 2020; Oh et al., 2018; Petty et al., 2017; Petty et al., 2017; Schuck et al., 2015; Silkwood-Sherer & McGibbon; 2022) was mentioned the most often. However, it did not have a crucial impact in most cases. Besides, medication (Gabriels et al., 2015; Oh et al., 2018), the percentage of physical disability (Demiralay & Keser, 2022; Kwon et al., 2015), additional therapy (Hill et

al., 2020) and the history of surgery (Kwon et al., 2015) was noticed, also not having any relevant impact. However, having a preterm delivery (Deutz et al., 2018) had a relevant role since the ratio of behavioural problems was higher among premature children. As other type of capital, the possibly protective role of the higher number of people spent time with (Demiralay & Keser, 2022) and having a pet (Hill et al., 2020; Petty et al., 2017) was mentioned in two cases. In some papers, no sociodemographic or other independent variables were mentioned Erdman et al., 2015; Hernández-Espeso et al., 2021; Hession et al., 2014; Kern et al., 2011; Protham et al., 2006; Steiner & Kertesz, 2015; Stumpf & Breitenbach, 2014; Uccheddu et al., 2019). Overall, the papers usually do not put enough emphasis on the investigation of the sociodemographic background, although it is well-known that these may also have a significant impact on the development of psychological health of children with special education needs.

Conclusion

Animal-assisted activities, therapies and interventions have become due to their various positive impact. Interacting with animals can have a calming effect on individuals, supporting emotional well-being. Engaging with animals often involves physical activities such as walking, grooming, and playing. This can improve physical fitness, enhance mobility, and reduce blood pressure (Cherniac & Cherniack, 2014). From the aspect of the personality, a better mood and a boost in self-esteem can be a result as well (Christian et al., 2018). It can also contribute to cognitive stimulation since AAT/AAI/AAA can stimulate memory, problem-solving skills, and overall cognitive function (Quintavalla et al., 2021). Animals also provide a non-judgmental and unconditional form of companionship, supporting social interaction and improving social skills, communication, and empathy (Cassels et al., 2017). Also, as in the focus of the current review, AAA/AAI/AAT can be beneficial for children and youth with special needs. For individuals undergoing medical treatments or

rehabilitation, the presence of an animal can be a powerful motivator. It can encourage them to participate more actively in their treatment plan and to persevere through challenges. It can also be a therapeutic tool and a complementary approach to traditional therapy (Hawkins et al., 2017).

Regarding the animals involved in the activities, we could see that mostly horses and dogs were involved. Due to a combination of their unique characteristics, behaviours, and therapeutic benefits, involving these animals (if they are trained to be therapeutic animals) can be significant (Lass-Hennemann et al., 2022). We could see that these animals were overrepresented, disregarding the type of disorder and age. Horses are large animals that require physical engagement for grooming, leading, and riding. These activities can provide opportunities for physical exercise, building strength, improving coordination, and increasing confidence (Maujean et al., 2023). Horses primarily communicate through non-verbal cues and body language. This can be a valuable aspect of therapy, as it encourages individuals to become more aware of their non-verbal communication and emotional responses. Horses can be involved in a wide range of therapeutic activities, including grooming, leading, riding, groundwork exercises, etc. This versatility allows for tailored interventions to meet the specific needs and goals of each individual, which can make it more favourable compared to other animals. These statements are also true for the human-dog interactions (Gee et al., 2021). We could not detect a significant difference in the choice of the animal concerning age since these animals can be optimal for all age groups. Since no significant difference could be seen in the animals involved in the programs, we can say that developing animal-assisted therapy with the involvement of the animals mentioned above can be supportive and beneficial for most types of disorders. We should emphasise that involving dolphins can have such efficacy; however, the lower number of these animals that could be involved in therapeutic progress can hinder the development of such programs. We could see that studies covered various topics, including relationship

efficacy (including human-animal relationship and attachment to animals, parent-child relationship, developing relationships and social skills and behaviour), cognitional efficacy (task performance and setting aim, pedagogical skills, attention and cognition, intelligence, reading efficacy, verbalisation and communication skills, and understanding rules and self-regulation) and behavioural efficacy (behavioural balance, mood, self-assessment, stress and anxiety, children's quality of life and parents' quality of life). These skills can be developed by such programs effectively.

The length of the programs can be crucial as well. Overall, the mean duration of the programs was between 10 and 12 weeks, with lower intensity (fewer sessions, usually one per week). This is similar to the therapeutic progress since most psychological therapies are done weekly. This also sets a great frame for the program. However, there is no evidence concerning the efficacy of the programs based on their length, and these show a significant variety. No conclusion can be drawn, neither regarding the age of the participants nor their disability. Overall, this length can be ideal for developing a secure attachment with the animal and can have a long-term impact on mental health and psychological well-being. Also, such duration allows the therapist and the patient to develop a strong, secure and mutual relationship (Lass-Hennemann et al., 2022; Martin et al., 2000). Therefore, for further practice, it would be beneficial to set this length as ideal.

Regarding the length of the session, the same statement can be concluded. The length of the sessions was usually at least 30 minutes, which can be enough to support the developmental progress depending on the topic. Various therapeutic schemes support to have 30-45-minute-long sessions during the therapy (e.g. Shafi et al., 2019; Schleider et al., 2019). In the case of children with special needs, some types require short sessions due to the nature of the disability and the cognitive and physical capacity of the participants. Shorter sessions can also be better for younger children due to their attention capacity and skills, and the researchers should keep in mind that providing too long sessions for younger children cannot be as

efficient as programs with shorter sessions (where the content is developed appropriately) (Diamond & Ling, 2016). However, regardless of the length and duration of the sessions, designing the sessions and the progress is crucial. Setting introductory and closing sessions, as well as having starting and closing games/tasks, should be important to have a beneficial and supportive framework.

From the methodological perspective, a relatively high quality of the papers examined could be experienced. A high-quality methodology for interventions and programs is essential for designing and conducting studies that produce reliable and valid results. Although the methods and program characteristics (such as lengths, duration, tools applied, dependent and independent variables) were diverse, it can be undoubtedly concluded the animal assisted programs are useful and helpful and significantly improves various areas of life including cognitive and emotional development, relationship patterns, mental health and general and specific behavioural efficacy since all of the studies highlighted the significant positive impact of the applied intervention. Usually, the articles define clear research objectives and hypotheses and a well-defined target population. Except for a few cases, control groups were also assessed. Randomisation was not possible in all cases, but whether the authors could recruit enough participants was also ensured. In the case of RCTs and NRCTs, blinding was also applied. As a deficiency, we should note that the development and evaluation progress should be also introduced on the CONSORT (Consolidated Standards of Reporting Trials) diagram to support the understanding of the progress. However, the introduction and interpretation of the results were usually well-described.

We should emphasise that papers usually focus on the perspective of the child; however, after analysing their context and development, they are not put into context. More precisely, the children's environment is not considered, although it is usually critical. The close environment, the micro-system surrounding the children and youth has a significant impact on the development of the children, and the positive

and supportive climate from the family and peers can significantly contribute to the developmental progress (Levínská & Bittnerová, 2021; Gebregergis et al., 2023; Sánchez-Bolívar et al., 2024). However, we should note that in many cases, children with special needs come from socially disadvantaged families (even if this was not emphasised in the papers involved in the review) and for this reason, they lack a supportive toolkit to contribute to their children's development (Hrabéczy, 2021).

As implications for practice, this systematic analysis provides useful information to physicians, healthcare providers, and educational providers and supports the identification of various psychological effects of animal-assisted programs (interventions, treatments, activities). This includes developing or ensuring the use of checklists for needs assessment, sampling, scheduling (including session length and duration), selection of animals and measurement tools. The conclusions drawn about the length and duration of different programs can help professionals design their therapeutic activities. The programs launched also help professionals choose the most appropriate animal assistance program based on the special needs and health concerns, as well as the age of the patient.

Although this review offered a detailed comparison between the studies in the literature, the research has limitations. The impact of animal-assisted activity/therapy/interventions was included, which may not provide a comprehensive understanding of its development. Only cross-sectional studies could have been detected (although pre-and post-tests were applied), which did not allow us to investigate the impacts in a longitudinal nature. Only English papers and journal articles were included, which can also hinder detecting such programs. Future studies should also focus on the topics detected as underrepresented themes to understand the nature of animal-assisted programs better. Furthermore, longitudinal investigations should also be carried out to reach a better understanding.

Summary

Animal-assisted activity (AAA), therapy (AAT) and intervention (AAI) involve animals as a part of a treatment plan to promote physical, emotional, cognitive, and social well-being in individuals. The practice has gained significant attention and acceptance due to its numerous benefits and positive impact on human health and well-being. Research on animal-assisted activities, therapies and interventions among children and youth with special needs is a dynamic field, and based on the research findings of the current systematic review, measuring the long-term impact of AAA/AAT/AAI, comparative studies, tailored interventions, the exploration of the perspectives of other actors of the process (parents, caregivers, therapists, even the animal from an ethological view) in a complex point of view should be important.

This study identified several issues related to animal-assisted interventions, therapies, and programs targeting the psychological development of children and adolescents with special needs. The methodology of the papers represents a high niveau, however, due to their diversity, they are hard to be compared. In conclusion, following the basic therapeutic guidelines, an ideal of 10-12 week-long duration and 30-45-minute session length are advised based on the comparison of the various programs. It cannot be concluded that one program is more effective than the other. Also, the application of the programs showed significant positive impacts in all papers although the methodology of the programs significantly differed, therefore, we can only conclude that using any kind of animal assisted program can be supportive and may be better that not participating in such programs. We could also see the lack of independent variables especially the sociodemographic background variables, although controlling these variables may also contribute to the development of such programs. Identifying these issues can provide useful information in order to recommend strategies to improve the practice and management of animal-assisted programs for children and young people with special educational needs. Also, specific

recommendations for future research include the use of randomised, parallel designs with longer follow-ups when complex behaviors are the outcome measures. To improve the practice and management of animal-assisted programs, strategies must be carefully considered to ensure the welfare of animals and participants. Regarding methodological aspects, the relevance of the screening progression can also be highlighted, as participants are subjected to a thorough screening process to identify any allergies, fears or health conditions that may affect their interaction with animals. Therefore, further research should pay more attention to these details. This helps tailor plans to individual needs and ensures a positive experience. Additionally, an ongoing evaluation process is critical to assess the effectiveness and impact of animal assistance programs. Obtain feedback from participants, supervisors, and other stakeholders to continuously improve project quality. There should also be greater focus on promoting collaboration between animal assistance programs and related professionals such as psychologists, veterinarians, and educators. This interdisciplinary approach ensures a comprehensive understanding of the benefits and challenges associated with these programs.

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