

Animal-assisted Interventions: Review of Current Status and Future Challenges

Javier López-Cepero Borrego*

Universidad de Sevilla & Asociación INTAP, España

Luis Rodríguez Franco

Universidad de Sevilla, España

María A. Perea Mediavilla

Asociación INTAP, Sevilla, España

Nuria Blanco Piñero

Universidad de Sevilla, España

Arcadio Tejada Roldán

Asociación INTAP, Sevilla, España

Alfonso Blanco Picabía

Universidad de Sevilla, España

ABSTRACT

Previous bibliographic reviews have highlighted that Animal-Assisted Interventions (AAIs), though promising, may have some weaknesses in their empirical basis that must be addressed. Present study reviewed 228 references gathered through PyscINFO database, all of which included the terms animal and assisted within the key concepts field, providing several indicators of productivity (such as publications per year, the relative presence of different types of texts, the country and the language of publication, the author's productivity and type of reference, and the main sources of information such as journals and research teams) and content (relative presence of different assisted interventions, methodology, areas of interest, and contents addressed by the most prolific authors) in the field. The number of texts on AAI published per year has increased only slightly in the last decade, and such texts have been published in mainly U.S. English-language sources. Animal assisted therapy appeared as the most researched intervention, although inconsistencies in the use of terms and definitions were found. Empirical studies represented most of the classified texts, although their prominence among the most prolific authors was low. It was detected that AAIs have an increasing empirical base, although the gap between research and dissemination keeps open. More research efforts will be necessary to cover the deficiencies identified in the field.

Key words: animal-assisted interventions, animal-assisted therapy, animal-assisted activities.

Novelty and Significance

What is already known about the topic?

Animal assisted interventions (AAI) have proven useful in many contexts such as care units, hospitals, schools and many others.

Some difficulties regarding their empirical basis have been highlighted.

What this paper adds?

This study offers a systematic review of productivity and contents developed over last two decades, emphasizing new directions that researchers should attend in order to overcome weaknesses and to improve empirical background of AAI.

* Correspondence author: Javier López-Cepero Borrego, Camilo José Cela, s/n, Facultad de Psicología, 41018 Sevilla, España). E-mail: jalocebo@us.es.

Animal assisted interventions (AAIs) have attracted increasing attention among both professionals (health, education, etc.) and general population (Fine & Beck, 2010). This interest has fostered the publication of texts such as essays (made up collections, such as those published by Fundación Affinity, in Spain, or the Pet Partners-formerly Delta Society-, in US), theses/dissertations and journal articles. However, literature shows many disagreements on questions as basic as which terms and classifications should be used to describe AAIs.

Although several category systems have been used to label AAIs, the most well-known professionals in the field have adopted the proposal from the American Pet Partners as a reference (Kruger & Serpell, 2010). This institution classified AAIs in animal-assisted therapy (AAT), which always has individual therapeutic goals and places special emphasis on change assessment; and animal-assisted activities (AAA) programs, focused on recreational and/or educational aspects with non-specific objectives (published as Delta Society, 2008). Other alternative classification systems differ on key points, such as animal selection and certification requirements (according to different standards) or on the way the listed categories are subdivided (for example, differentiating animal assisted education-AAE from AAA), but none has yet to achieve broad acceptance among professionals (Kruger & Serpell, 2010).

The terms used to label AAI are also a topic of debate. For example, Kruger and Serpell (2010) gathered a dozen possible terms, all of which have some tradition in the area. Another sign of the existing confusion is that the Thesaurus of PsycINFO, the main reference within the Behavioral Sciences, identifies animal assisted therapy and pet therapy as equivalents, although the latter has been criticized and is not recommended nowadays (Delta Society, 2008).

Beyond theoretical considerations, establishing a solid empirical base to support the validity of AAIs is a priority that was underlined decades ago (Fawcett & Gullone, 2001). However, several authors have recently pointed out the slow progress in this regard (Fine & Beck, 2010; Katcher & Beck, 2010; Marino, 2012; Serpell, 2010). This phenomenon has been described even for health contexts, in which AAIs have aroused the most interest (Parshall, 2003).

Another possible symptom of the difficulties is the low number of references included in some of the recent reviews: Filan and Llewellyn-Jones (2006) found 15 studies focused on the effects of the human-animal interaction (a broad concept, which does not involve any intervention design) in people with dementia; Perkins, Bartlett, Travers, *et al.* (2008) found 9 empirical studies about dog-assisted therapy, also with people with dementia; Steed and Smith (2002) reviewed 12 programs of animal assisted activities in geriatric patients; Halm (2008) conducted a meta-analysis with 11 AAT experiences in hospitals; Marino (2012) gathered 30 references on AAI experiences; and Souter and Miller (2007) carried out a meta-analysis including 5 texts on the effects of AAA on depression. The most ambitious meta-analysis conducted to date (Nilmer & Lundahl, 2007) brought together 49 studies on AAT in several intervention contexts, and found a moderate use of AAT in four areas (autistic spectrum disorders, behavioral disorders, emotional well-being and medical problems). Even before having a closer look into the search methodology used, the reported numbers are remarkably low.

Opinion surveys conducted with professionals highlight another possible weaknesses. Experiences driven with American occupational therapists (Ferrese, Forster, Kowalski, *et al.*, 1998; as shown in Velde, Cipriani, & Fisher, 2005), in an Australian pediatric service (Moody, King and O'Rourke 2002), with Australian psychologists (Black, Chur-Hansen, & Winefield, 2011) and with Norwegian mental health professionals (Berget & Grepperud, 2011) show that the opinion of health professionals on AAIs was positive, although few had actually received any training on AAIs (Black, Chur-Hansen, & Winefield, 2011), or had any actual experience (Berget, Ekeberg, & Braastad, 2007).

Therefore, the publication of texts analyzing the state of the art seems fully justified. At least four reviews published in the last decade have focused on assessing the strengths and weaknesses of AAIs, and all of them have underlined its fragility: Johnson, Odendaal and Meadows (2002) conducted a review of the main physical and emotional positive effects of the AAIs, warning of the tendency to regard anecdotal results as valid; these conclusions were shared by Fawcett & Gullone (2001), who argued that the tendency of society to presume animal kindness also applies to professionals, who have given priority to intervention over empirical research (in accordance with Black, Chur-Hansen, & Winefield, 2011); moreover, Wilson and Barker (2003) conducted a review of the methodology used in AAI research, indicating the limitations of generalizing the results obtained (mainly by the selection of convenience samples and the poor control of exogenous variables). These three studies provide a state-of-the-art evaluation, but have their age (around a decade) as a serious drawback. The fourth and most recent evaluation of the field (published by Marino in 2012) also highlighted that most empirical studies published between 2005 and 2012 committed design errors which caused construct validity weaknesses, but it was focused only on methodological issues. Thereby, evaluating the performance of the field of AAIs in the last decade as a whole seems fully justified.

Consequently, the present study has two purposes. The first objective consists of assessing productivity in the area, establishing its level of global growth, the language and the country of the contributions, the relative presence of the different types of texts, and the activity and collaborations among the most prolific authors. The second major objective is the analysis of published contents, gathering information about research methods employed, the use of different labels (such as therapy, activities, education and/or animal assisted interventions) and the main topics detected on the subject. This is expected to provide an objective understanding of the form and substance of animal assisted interventions, as represented in the largest database for Behavioral Sciences professionals.

METHOD

Instruments

References were extracted from PsycINFO, a database maintained by the American Psychological Association which represents the main bibliographic resource in the field

of Behavioral Sciences, and which gathers the most large collection of publications regarding AAIs (Soprano, 2010). On the date the study was conducted, access was provided to the University of Seville through OvidSP (Wolters Kluwers).

Gathered data was stored using Reference Manager, version 11 (RM11-Thompson Researchsoft ISI). Research team tailored a specific filter, which included all areas of interest (type of reference, title, authors, address, keywords, descriptors, abstract, source, place of publication, language, age of the sample, and methodology, among others), in order to import references provided for PsycINFO.

Statistic Analysis

Collaboration Index (CI; sum of positions in which an author signs each work, divided by the total number of texts signed. References signed by only one author are assigned a zero) was calculated for the most prolific authors. This index provides information about both the presence of co-authorships and the degree of responsibility in shared texts.

Procedure

Inclusion of texts was determined due to information contained in their key concepts field (PsycINFO tag: id/keywords), instead of using descriptors such as subject headings. The choice of this strategy was justified, on a theoretical basis, by the greater fidelity of the terms chosen by the authors, against those imposed by the database, to the contents of each text.

This point was checked empirically. The search terms “animal” + “assisted” corresponded, in the PsycINFO Thesaurus, with the Animal Assisted Therapy descriptor. This term, interchangeable with Pet Therapy, offered 372 references. However, when searches were made within the resulting RM11 database, it was found that only 286 (76.9% of the total) contained the term *Assisted* among the keywords, and that 285 contained the term *Therap*. This lack of agreement between proposed descriptors and keywords added by the authors supported, in our opinion, the use of the latter to determine the inclusion of texts in the tailored database.

In order to determine the most appropriate search terms, we checked the number of references returned by different possible combinations (see Table 1). A decision

Table 1. Search terms and strategies used.

Terms	+ Assisted (id)	+ Facilitat* (id)
Animal (id)	232	38
Equin* (id)	23	14
Pet (id)	14	22
Dog (id)	14	13
Dolphin (id)	14	0
Farm (id)	3	0
Horse (id)	3	3
Cat (id)	1	17
Bird (id)	0	2

Notes: *= truncated. Id= keywords field.

was made to use the terms “animal” and “assisted”, as they allowed us to gather texts addressing different types of work (therapy, activities, education and/or interventions, among others), and because it is consistent with the proposal of the Delta Society (2008). Furthermore, the use of these words independently allowed us to locate texts that include different combinations (“animal-assisted”, “animal assisted”, “assisted by animals”), as well as publications in which both terms appeared in different key concepts (for example, “dog assisted therapy” and “animal welfare”).

The research team checked to ensure that all references included some of the combinations of *assisted*, and the truncated roots *therap*, *education*, *intervention* and/or *activit* among their keywords. Four journal articles about animal research were eliminated, as the term “assisted” was referred to technical resources (computer, camera, etc.), but not to the use of animals in interventions (1.75% of total database). Finally, 228 references published between 1991 and 2011 were included in our analysis.

RESULTS

Productivity by type of reference. The database contained data on five types of text. Journal articles accounted for a little more than half the production (51.3%), followed by book chapters and theses/dissertations (around 20% each), while book reports and whole books represented a little more than 6% of the total. Within the 117 journal articles, we noted an unequal distribution of contributions from the 65 sources listed in PsycINFO. Thus, while a single magazine (Anthrozoös) accumulated more than 22% of the articles, 47 sources made a single contribution (Table 2). The other seven journals that provided at least three references were: Behavioral American Scientist, Society & Animals, Verhaltenstherapie & Psychosoziale Praxis (with 4 references), Approche Neuropsychologique des Apprentissages chez l’Enfant, American Journal of Alzheimer’s Disease and Other Dementias, and the European Journal for Psychoanalytic Therapy and Research (with 3 references each).

Inter-annual productivity. The distribution of publications per year increased slightly. When the year 2012 was eliminated from the analysis, to avoid any bias introduced by PsycINFO update latency, the period 2000-2011 showed a mean of a little more than 17 annual publications, with a very irregular profile (Mean=17.42; SD=7.89). Within the low progression of inter-annual productivity, the years 2000 and 2006 showed significantly higher results than the previous and following years (Figure 1).

Table 2. Number of journals by percentage of their contribution.

Contributions	Journals	Total contributed (n= 117)	% Total (by journal)
26	1	26	22.20%
4	3	12	3.42%
3	4	12	2.56%
2	10	20	1.71%
1	47	47	0.85%

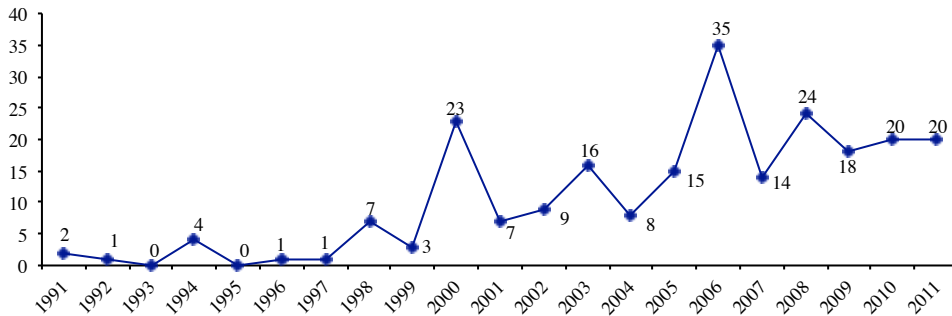


Figure 1. Number of publications listed in PsycINFO for the 1991-2011 period.

In order to clarify this information, types of reference were taken into account. In two of the most productive years (2000 and 2004), more than half of the references corresponded to book chapters (mainly drawn from both volumes edited by Aubrey H Fine), while theses and dissertations represented more than a quarter of the publications listed in four years (2001, 2004, 2005 and 2010).

Productivity by country. The United States contributed a little more than three-fourths of publications in the field of AAIs, followed by the United Kingdom and Germany (which together were responsible for a little more than 20% of the total). Complete distribution is included in table 3.

Productivity by language. Consistent with the publications by country, more than 90% of the references found were written in English, while up to seven other languages shared the remaining 8% (Table 4).

Productivity by author. Only the signatures appearing in the author field of each reference were taken into account, leaving book publishers and thesis/dissertation directors out of the analysis. The distribution of authors' productivity followed the so-called

Table 3. Publications by country ($n=228$).

Country	Publications	% of Total
USA	162	71.05%
United Kingdom	35	15.35%
Germany	13	5.70%
Holland	6	2.63%
France	4	1.75%
Croatia and Japan	2 (each)	0.88% (each)
Australia, Hungary, Italy, and Switzerland	1 (each)	0.44% (each)

Table 4. Publications by language ($n=228$).

Language	Publications	% of Total
English	212	92.98%
German	7	3.07%
French	4	1.75%
Japanese	2	0.88%
Hungarian, Italian, and Serbian-Croatian	1 (each)	0.44% (each)

Lotka's Law (Lotka, 1926), according to which most authors make a small contribution to the area, while only a few sign a large number of papers (Table 5).

Interaction between type of text and author. The percentage of authors who signed at least two different kinds of publications reached 5.2% (that is, 19 out of 365) with a ratio of exclusivity of over 80% for journal articles, books chapters and theses/dissertations (table 6). Authors that signed more than a type of text did it in both articles and book chapters (11), articles and dissertations (4) full books and book chapters (2) and full books and report (3); only one of these signatures appeared in three types of texts.

Collaborations among the most prolific authors. Beyond the distribution of each author separately, the degree of collaboration among the most prolific authors and other signing authors was explored (as above, book publishers and thesis/dissertation directors were excluded from the analysis).

Aubrey H. Fine (California Poly State University, California, US) showed a Collaboration Index (CI) of 1.25, appearing as the only signing author on 3 occasions and as the first author on 4 shared papers. Up to 19 professionals appeared as co-authors of the 5 remaining texts, with no collaboration repeated. Ten out of twelve signed texts were book chapters, with the two remaining references corresponded to both versions of the Handbook on animal assisted therapy (editions 2000 and 2006; 2010's was not listed in PsycINFO yet).

Aaron H. Katcher (University of Pennsylvania, Pennsylvania, US) appeared with three different signatures: no middle initial, with middle initial, and with his second full name (Honor). His CI reached one, appearing as the only signature on one occasion. As for his collaborators, he signed two papers in collaboration with Gregory G. Wilkins (the Devereux Foundation; he does not sign any other paper), and two with Alan A. Beck (see below).

Alan A. Beck (Purdue University, Indiana, US) appears with two signatures (with middle initial, and without it). He obtained a CI of 1.8, and shared 2 works with Katcher. He did not show other frequent connections.

Table 5. Distribution of contributions by signature.

Contributions	No. of Authors	Authors
12	1	Aubrey H. Fine
6	1	Aaron H. Katcher
5	3	Alan M. Beck; Erika Friedman; Rebecca A. Johnson
4	10	Several
3	11	Several
2	36	Several
1	302	Several

Table 6. Percentages of exclusivity by signing author and type of text.

Type of text	No. of authors	Exclusive authors for type of text	% of exclusive authors
Articles	250	235	94.0%
Book chapters	70	58	82.9%
Theses/Dissertations	45	41	91.1%
Reports	11	8	72.7%
Books	9	4	44.4%

Erika Friedmann (University of Maryland, Maryland, US) has two signatures in the PsycINFO database (with initial and full name). She received a CI of 1.4, sharing 2 publications with Chia C. Tsai (University of Yuanpei, China) and 2 with Penny L. Bernstein (Kent State University, Ohio, US), authors who were not related to each other.

Rebecca A. Johnson (University of Missouri-Columbia, Missouri, US) has two signatures (with and without middle initial). She received a CI of one, and shared three papers with her university colleague Richard L. Meadows.

The analysis of the network of collaborators made it possible to pinpoint the existence of at least three working groups or hidden schools: that of the University of Purdue (Indiana, US), whose core is made up by Beck and Melson; that of the University of Missouri-Columbia (US), represented by Johnson and Meadows; and a group that brings together Katcher, Beck, Teumer, and Wilkins, which was originated in the center Our Farm (Texas, US; Beck and Katcher, 1996). Figure 2 summarizes the described associations for these authors, including the number of matches found.

Type of animal-assisted intervention. Since the PsycINFO Thesaurus only includes pet therapy and animal assisted therapy as terms related to AAIs, we chose to classify publications using information contained in the keywords field. In addition to “animal” and “assisted”, we checked out how many references contained some of the truncated roots *therap*, *education*, *intervention* and/or *activit*. Most texts included references to therapy ($N=210$, 92.1% of total). On the other hand, a significant proportion of the texts ($N=43$, 18.9%) included two or three terms simultaneously; these matches were not fully dependent on whole books, since only two out of the six included in our analysis contained more than one term (AAT and AAI in Fine, 2006a; AAA, AAT and AAI in Pichot and Coulter, 2007). The text count by type of intervention is shown in Figure 3.

Study methodology. The Methodology field (tagged md in PsycINFO) provided labels for a little more than half of the references ($N=124$, 54.4% of total), including 1 of 52 book chapters, 67 of 117 articles, and 38 of 45 theses/dissertations.

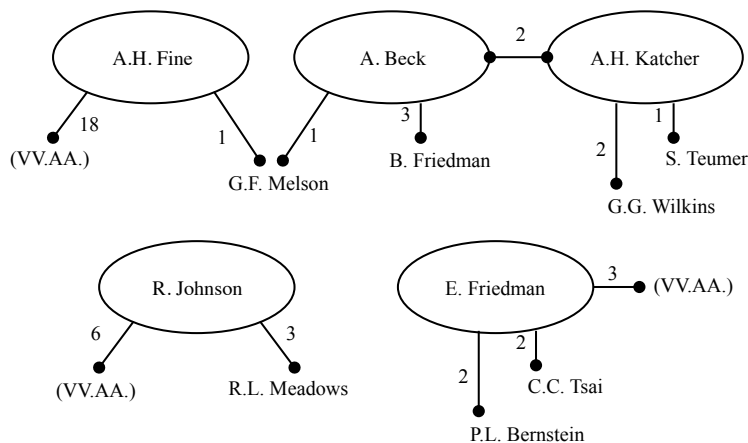


Figure 2. Representation of collaborations for the five most prolific authors (SA= Several Authors; it collapses collaborators who signed only one shared text).

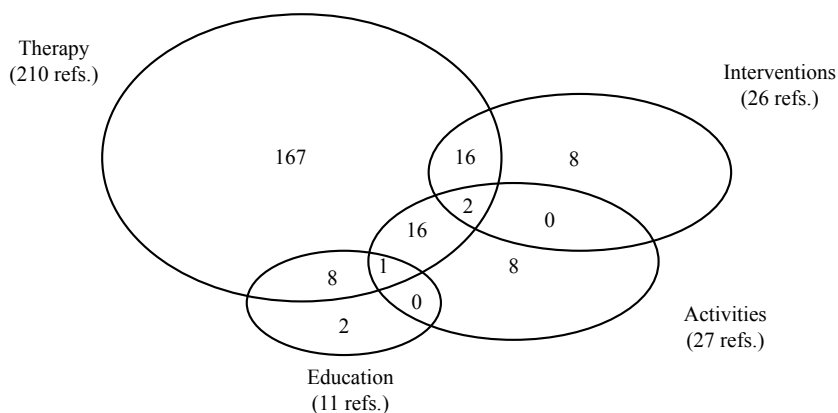


Figure 3. Text count by key concepts ($n = 228$).

These labels were classified into four categories (type of study, measure, data collection and temporal design; Table 7), which proved to be non-exclusive: one text was classified with more than one study type label; four were classified simultaneously as both qualitative and quantitative; and the only study classified as prospective was also ranked as longitudinal. The label most frequently used was the empirical study label, which appeared in 85.5% of the labeled references ($N = 106$).

Areas of interest in the study of AAIs (by descriptors). In the first step, descriptors provided within the field Subject Headings (sh) were analyzed. The 320 central terms (marked with an asterisk by PsycINFO) were retained, removing 175 peripheral descriptors. Only seven terms appeared in more than 10 references, with the 313 remaining terms having between 1 and 9 repetitions. The same procedure was

Table 7. Labels provided by PsycINFO in the methodology field ($n=124$).

Type of study	<i>n</i>	%
Empirical study	106	(85.5%)
Literature review	5	(4.0%)
Meta-analysis	2	(1.6%)
Measure		
Quantitative	60	(48.4%)
Qualitative	14	(11.3%)
Data Collection		
Clinical case study	11	(8.9%)
Treatment/clinical trial	9	(7.3%)
Interview	5	(4.0%)
Non-clinical	3	(2.4%)
Field study	2	(1.6%)
Temporal design		
Longitudinal study	5	(4.0%)
Prospective study	1	(0.8%)

Table 8. Comparison between the most frequent descriptors of the *subject headings* and *keywords* fields.

Subject Headings		Keywords	
Term	Repetitions	Term	Repetitions
Animal Assisted Therapy	194	Animal assisted therapy	146
Pets	27	Pets	14
Dogs	13	Dogs	13
Dementia	13	Dementia	8
Psychotherapeutic techs.	11	Psychotherapy	8
Health	11	Quality of life	7
Inter-species interaction	67	-	-
-	-	Animals	8
-	-	Anxiety	8
-	-	Companion animals	7

followed with the keywords provided by the authors, obtaining a list with 674 terms. We detected a similarity between the first 9 keywords (with 7 or more repetitions) and the above-mentioned 7 subject headings (see Table 8).

Areas of interest in the study of AAI (by most prolific authors). Since the descriptors did not provide significant information about the contents of interest within the AAI, we chose to analyze the abstracts of all references provided by the five most prolific authors. Removing the two whole books signed by Aubrey Fine (2000, 2006a), but keeping the chapters included in them, abstracts from $n= 29$ references (12.7% of the total distribution) were analyzed. In the opinion of our research team, the most remarkable data were the following (summary in Table 9):

Widespread use of the AAT label. The term animal assisted therapy was used 19 times in the abstracts. Three texts signed by Katcher (Katcher & Wilkins, 1998; Katcher & Wilkins, 2000; Katcher & Teumer, 2006,) combined it with assisted education; Fine, Dennis and Bowers (2011) did so with the AAI label, and Johnson (2011) with both.

Inconsistencies in the use of label AAT. In turn, the research team found three abstracts (Bernstein, Friedman, & Malaspina, 2000; Edwards & Beck, 2002; Tsai, Friedmann, & Thomas, 2010), whose description better reflected the criteria to be considered AAA (rather than AAT), and four of the remaining abstracts made no mention of any of the proposed labels. Moreover, another four references were focused on the study of the human-animal interaction, which does not match the AAT requirements.

Priority areas of intervention. Only 12 of the 29 references limited their scope to a specific area of intervention. Dementia and attention deficit disorder with hyperactivity (ADDH) were the most repeated areas, with three appearances each. As displayed on Table 8, dementia is one of the most commonly used descriptors in analyzed references.

Need for empirical research. Up to seven abstracts stressed the need for a greater research efforts in the area of AAI (Serpell, Coppinger, & Fine, 2000; Beck & Katcher, 2003; Fine, 2006b; Fine & Mio, 2006; Friedman & Tsai, 2006; Fine & Beiler, 2008; Prothman & Fine, 2011), but none of those texts provided empirical data of their own. Only 10 of the 29 references were empirical studies, a fact that did not reflect the preference shown through the Methodology field (Table 7).

There is no clear predominance of any single animal as intervention assistant. Only 5 of the 29 references stated their interest in a particular animal species. Three of the texts included dogs (Bernstein, Friedmann & Malaspina, 2000; Johnson, Oodental, & Meadows, 2002; Kramer, Friedmann, & Bernstein, 2009), while a single experience included fish as support (Edwards & Beck, 2002). Two references included robotic dogs (Aibos) in their research (Kramer, Friedmann, & Bernstein, 2009; Melson et al., 2009).

Interest in the ethical treatment of the animal companion. Finally, it should be underlined that two texts were focused on the ethical considerations concerning the AAIs (Beck, 2000; Serpell, Coppinger, & Fine, 2000).

DISCUSSION

The present study provides information on many indicators related to the evolution of AAIs literature over the last two decades, allowing us to check the degree to which the challenges highlighted in previous reviews have been addressed.

Scientific productivity around AAIs has made little progress over the last two decades, with an annual mean of a little more than 10 references in PsycINFO. This can be interpreted in two different ways: either the increased popularity of these interventions in the media has not resulted in greater research efforts, or research has been published in media sources with limited readership and/or low impact. Whichever explanation we choose, the work of providing AAIs with a solid empirical base continues to receive relatively limited attention, as noted in previous reviews (Fawcett & Gullone, 2001; Fine & Beck, 2010; Katcher and Beck, 2010; Marino, 2012; Serpell, 2010, among others).

Taking into account the different types of reference, our findings are difficult to understand from a scientific point of view. The number of theses/dissertations and book chapters is very large (around one-fifth of the total in each case), but the percentage of their authors who also sign journal articles, the main means for scientific communication, is very low. This phenomenon may be easier to understand from a pragmatic approach to the field: while the investigation of the AAIs is complex, the high demand for developed interventions may make them seem more attractive to professionals than research, thus creating a gap between the two. Aubrey H. Fine constitutes a paradigmatic example in this regard, since he participated in 12 chapters of the book (in both editions of his handbook, perhaps the best known reference in the area), but does not participate in any scientific article reviewed by professional colleagues.

In the light of such data, the localization of research groups and scientific journals is of great interest, since they represent a starting point to help us define coherent courses of action based on the same theoretical perspective, and because they can be maintained over time. The analysis of productivity allowed us to isolate three professional teams (or hidden schools), as well as a few principal documentary sources (with four journals providing over 25% of articles published in last two decades).

The overwhelming predominance of publications from the US, and in English, is striking. Naturally, a bias derived from the method used in the analysis should be

Table 9. Classification of contents stated in the abstracts of the five most prolific authors, about the type of intervention, interest in the human-animal interaction (HAI), type of study, need for empirical studies, and areas of intervention.

Reference	AAT	AAA	AAI	AAE	HAI	Theoretical	Empirical	Research need	Area of Intervention
Baum, Johnson, & McCabe (2006)	-	-	-	-	X	X	-	-	-
Beck (2000)	X	-	-	-	-	X	-	-	-
Beck & Katcher (2003)	-	-	-	-	X	X	-	X	-
Bernstein, Fredman, & Malaspina (2000)	X	*	-	-	-	-	X	-	Social abilities
Edwards & Beck (2002)	X	*	-	-	-	-	X	-	Dementia
Fine (2006)	X	-	-	-	-	X	-	X	-
Fine & Beiler (2008)	X	-	-	-	-	X	-	X	-
Fine & Mio (2006)	X	-	-	-	-	X	-	X	-
Fine, Dennis, & Bowers (2011)	X	-	X	-	X	X	-	X	-
Fine, Lee, Zapf, <i>et al.</i> (1996)	X	-	-	-	-	X	-	-	Disability
Friedmann (2000)	-	-	-	-	X	X	-	-	-
Friedmann & Tsai (2006)	X	-	-	-	X	X	-	X	-
Gorczyca, Fine, Spain, <i>et al.</i> (2006)	-	X	-	-	X	X	-	-	AIDS Health
Johnson (2011)	X	X	X	-	-	X	-	-	-
Johnson & Meadows (2010)	-	X	-	-	-	-	X	-	-
Johnson, Meadows, Haubner, <i>et al.</i> (2008)	-	X	-	-	-	-	X	-	Oncology
Johnson, Oodental, & Meadows (2002)	-	-	X	-	X	X	-	-	-
Katcher (2000)	X	-	-	-	X	X	-	-	-
Katcher & Beck (2006)	-	-	-	-	X	X	-	-	-
Katcher & Teumer (2006)	X	-	-	X	-	-	X	-	ADDH Autism Emotional disorders
Katcher & Wilkins (1998)	X	-	-	X	-	-	X	-	ADDH, Behavioral disorders
Katcher & Wilkins (2000)	X	-	-	X	-	X	X	-	ADDH
Kramer, Friedmann, & Bernstein (2009)	-	X	-	-	-	-	X	-	Dementia
Melson & Fine (2006)	X	-	-	-	-	X	-	-	-
Melson, Khan, Beck, <i>et al.</i> (2009)	-	X	-	-	X	-	X	-	-
Prothman & Fine (2011)	X	-	-	-	X	X	-	X	-
Serpell, Coppinger, & Fine (2000)	X	-	-	-	-	X	-	X	-
Timmins & Fine (2006)	X	-	-	-	-	X	-	-	-
Tsai, Friedmann, & Thomas (2010)	X	*	-	-	-	-	X	-	Health
COUNT	19	6/9*	3	3	10	20	10	7	-

Notes: ADDH= Attention deficit disorder with hyperactivity; X/-=Included/not included in abstract; *= Alternative classification proposed by the research team.

considered, since PsycINFO is produced by the American Psychology Association (for example, 100% of the listed dissertations were submitted in US); however, this is the most important source of bibliographic information on Behavioral Sciences to date, and without it, references may be quite hard to find. In this respect, the discreet appearance of other countries and languages should be understood as an indicator of weakness and, therefore, as a signal of the need to make their research efforts more visible to the international scientific community.

In a second set of conclusions, the present study offers interesting insights into the contents of literature on AAIs. In the first place, we were able to verify that the terminological confusion pointed out by Kruger and Serpell (2010) persists. This was corroborated by the simultaneous use of two or more labels (AAI, AAT, AAA, AAE) in one-fifth of the texts analyzed. Beyond such confusion, several references included the generic term (AAI) exclusively, while in other texts the choice was the use of labels such as dog facilitated therapy, human-animal interaction, etc. which made it very difficult to anticipate which type of work had been done in each case. Similarly, the label AAE appeared 11 times, indicating an incipient professional interest in a type of intervention that had not been taken into account by the most accepted classification (Delta Society, 2008; Kruger & Serpell, 2010). These data reveal that there is still no terminological consensus within the area.

The analysis of methodology field indicated that most of the references that included this information (slightly over 50% of texts) were empirical. However, this finding contrasts with the fact that the most prolific authors chose to publish texts with theoretical content. This is even more striking when we take into account that many of these authors have a bearing on the urgency of devoting efforts to empirical research, a paradox that shows a new gap which is difficult to understand from a purely scientific point of view. On the other hand, the presence of longitudinal studies was anecdotal, even among the 106 empirical works submitted; this fact leads us to think that there is limited follow-up on intervention experiences.

With regard to issues of interest for AAI professionals, the data obtained from the descriptors allowed us to highlight a few frequently used labels, partly parallel for both the keywords and subject headings fields. In conjunction with the data discussed throughout this text, three readings of interest can be offered: the predominance of animal assisted therapy in the field of health over other forms of intervention; the use of dogs as assistants, in the cases in which only one animal was used; and interest in the intervention in dementia, which also coincides with what has been pointed out in previous reviews (Filan & Llewellyn-Jones, 2006; Perkins *et al.*, 2008).

Naturally, this study has limitations: first, the use of PsycINFO as the only source of information may skew the data in favor of American literature written in English, and therefore, it may be of interest to compare this information with other databases (like Cinhal, Medline, Eric, etc.). Second, it is necessary to take into account the update latency of any bibliographic database, since it can take several months to list articles, and even more in the case of other types of references (for example, the third edition of Fine's Handbook, published in 2010, did not appear in the search performed). Third, selecting only references which included "animal assisted" derivatives may have skewed

the number of texts analyzed, provided alternative labels (such as hippotherapy or equine-facilitated psychotherapy). Fourth, the large amount of data lost when we analyzed the descriptors (key concepts and subject headings) and the methodology fields suggests that we should be cautious about the conclusions drawn from them. And finally, we should ask whether using the most prolific authors to select the sample of texts to be analyzed is the best possible method. However, two strengths of the chosen procedures can be highlighted: first, all the conclusions offered are based on objectifiable data, compared to the general evaluations provided by the previous texts; and second, the analysis strategies described can be easily replicated, which allows us to verify the changes that may occur in the area in the future.

In short, this review provides different indicators of the level of development and performance of the area, and yields broad insight into the literature published in connection with animal-assisted interventions. Thus, the lack of sustained growth, the slow emergence of empirical texts intended to show the utility of AAIs, the small number of doctoral theses followed by article publishing, and the tendency of the most prolific authors to discuss issues related to AAIs (instead of investigating the development and improvement of interventions) indicate that the challenges identified over the last decade persist in most cases. In this context, the regular updating of this bibliographic and bibliometric review should serve to monitor progress and, where appropriate, to correct the direction of the AAIs' development in the near future, with the aim of helping to sustain orderly scientific growth.

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