Early Childhood Educ J (2016) 44:637–651
DOI 10.1007/s10643-015-0747-9

The Impact of a Therapy Dog Program on Children's Reading Skills and Attitudes toward Reading

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Published online: 2 November 2015

Abstract An existing school program in which therapy dogs are integrated into the reading curriculum was analyzed to determine the effect on student reading. Previous literature suggests an improvement in both reading skills and attitudes towards reading when students read in the presence of a therapy dog. Using a mixed method model, the researchers analyzed standardized reading test scores of 169 students in kindergarten through fourth grade and conducted interviews with educators and dog owners. A series of *t* tests conducted by grade indicated a significant difference, but only in kindergarten where the children in the dog reading group achieved higher end-of-year reading scores than a control cohort. A follow-up analysis of covariance controlling for mid-year reading scores confirmed that these differences were not related to preexisting reading levels. Interview results agreed with earlier studies noting improvements in reading and writing skills as well as attitude and enthusiasm for reading across all grade levels but with greatest gains for Special Education, ESL, and children who struggle with reading. Archival data from subsequent years is being collected and will seek to replicate the findings in kindergarten and to examine the cumulative effect of the reading program.

Keywords Reading · Therapy dogs · Animal-assisted reading program · Students · Elementary school · Program evaluation

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The use of trained therapy dogs has a long history in therapeutic and educational settings. Screened for basic obedience and a calm demeanor, these dogs provide emotional support to a variety of clients ranging from hospital patients to school children (Jalongo et al. 2004). Benefits have been reported as improvement in physiological measures (Odendaal 2000), academic abilities, and emotional well-being as well as reduction of stress, anxiety, and loneliness (Jalongo et al. 2004; Pet Partners 2015). This paper will review the scope of therapy dog use, but concentrate fully on the implementation of therapy dogs in school-based reading programs. As such, this paper begins with a review and summarization of the existing literature on the integration of dogs into the reading curriculum. Additionally, a specific program in a suburban elementary school is examined for improvement in student reading skill as well as attitudinal change. The researchers did not implement this program, but obtained archival records of standardized reading test scores for 169 students in kindergarten through fourth grade and conducted interviews with teachers, staff, and dog owner volunteers.

Distinction Between AAA and AAT

Several terms have been used to describe the use of animals for therapeutic benefit. The most commonly used terms—Animal-Assisted Therapy (AAT) and Animal-Assisted

Activities (AAA)—both describe the use of certified animals and trained volunteers, but differ in the structure and purpose of the visits. Altschiller (2011, p. 99–100) provides the following definitions adapted from Delta Society, where AAT is defined as:

> … a goal-directed intervention in which an animal that meets specific criteria is an integral part of the treatment process. These programs are usually directed and delivered by human health or human services professionals with specialized expertise and within the scope of practice of their profession. Animal-assisted therapy is designed to improve human physical, social, emotional, and cognitive (e.g., thinking and intellectual skills) function and animals may be formally included in activities such as physical, occupational, or speech therapy….In AAT, specified goals and objectives are determined for each patient and their progress is evaluated and documented.

While AAA is defined as interventions that:

> …provide opportunities for motivation, education, or recreation to enhance quality of life. Animal-assisted activities are delivered in various environments by specially trained professionals, paraprofessionals, and volunteers, in association with animals that meet specific criteria….They are not tailored to a particular person or medical condition. Visit content is spontaneous and visits are as long or as short as necessary.

Thus, there are two key differences: (1) the requirement of a trained professional for AAT, whereas AAA often utilizes volunteers; and (2) the structure of the visit—whether the focus is a general one, such as companionship during AAA, or whether it highlights specific and individualized treatment, goals, and documentation during AAT.

The American Kennel Club (AKC) notes significant advances in the use of therapy dogs since the 1980s. Their website recognizes well over 100 different dog therapy certification programs in the United States alone (AKC 2015).

Therapeutic Interventions

Medical settings such as general hospitals, psychiatric wards, pediatric hospitals, hospice, and nursing homes have reported the benefits of animal interventions (Bright and Beautiful 2013; Therapy Dogs International (TDI) 2013). Jalongo et al. (2004) recounted the perspectives of professional nurses regarding the use of Animal Assisted Therapy (AAT) with children in a hospital setting. The overriding benefit of the animals' visit was the children's positive response at a time when they were being challenged by physical and psychological pain. Animal visitors create a sense of normalcy (Therapy Dogs International (TDI) 2013), calming patients and offering a distraction from the discomforts of illness and treatments. These visits may include AAA or AAT types of interventions. The decision to use the less structured AAA or the specific focus of the AAT depends on several factors including the reason for the visit, the needs of the client, and the training of the dog handler. Stanley-Hermanns and Miller (2002) provide a step-by-step process for establishing an AAT program at a hospital. They cite examples from a program at Mount Sinai Hospital in New York where patients were more motivated for physical therapy when the exercises involved activities with a dog such as petting or combing the animal or throwing a ball. The elderly and the homebound often benefit from the simple companionship of an AAA visit. The calming presence of the dog in an unstructured conversational visit alleviates feelings of depression and loneliness and can provide comfort in times of grief (TDI 2013).

A detailed example of an AAT is provided by Dietz et al. (2012) who supplemented traditional therapeutic interventions with trained therapy dogs. Their successful program used dogs in the psychological treatment of children who were victims of sexual abuse. Children were assigned to one of three therapeutic conditions: therapy, but no dogs; therapy with dogs; therapy, dogs, and stories connecting dogs to the session's therapy topic. These stories were developed by the research team, written from the dog's perspective, covered the topic for a specific session, and were followed by questions designed to transition to the therapeutic topic for that session. Trauma symptoms (i.e., anxiety, depression, anger, PTSD, dissociation, and sexual concerns) were reduced more in the two groups that had dogs relative to the control group. The greatest reduction in symptoms was evident in the group of children whose therapy had the highest level of integration with the dogs: the group with the dogs and stories that incorporated the dogs.

Martin and Farnum (2002) investigated the impact of AAT on behavioral aspects of children with Pervasive Developmental Disorder (PDD). Children with PDD have difficulty interacting and communicating with others. The presence of a therapy dog is extremely helpful because the child can interact with the animal without having to verbally communicate. Children learn to bond with the dog, and then afterwards can connect with people more easily. These researchers noted that–when weekly therapy sessions were conducted in the presence of a live dog (compared with a stuffed animal or ball)–the children appeared happier, displayed an increased focus on task, were less likely to wander off topic, and were more likely to respond to therapist requests.

Applying similar reasoning to another disorder that also displays problems with communication and social

interaction, O'Haire et al. (2013) investigated the behavior of autistic children in the presence of a different animal: guinea pigs. Autistic children are frequently mainstreamed into classrooms with typically developing (TD) peers. However, the opportunities hoped for in this inclusive environment often are not realized. Displays of problem behaviors coupled with infrequent social interaction frequently lead to isolation and poor relationships with both peers and teachers. This AAA intervention consisted of two 20-min unstructured, child-directed pull-out sessions per week when children could interact with the guinea pigs in small groups. The authors found that the children with autism both displayed more social behaviors and received more social approaches from their TD peers during the guinea pig sessions compared with a control session using a toy.

Esteves and Stokes (2008) investigated the impact of a dog intervention in a classroom setting, but with a focus on behavioral and social interaction rather than academic enhancement in the reading programs described below. These authors conducted a multiple baseline case study with three children diagnosed with developmental disabilities. The presence of a therapy dog was shown to have a positive effect on behaviors both when with the dog and subsequently when the children returned to the classroom. Specifically, the children improved in social responsiveness as shown by increases in positive (verbal and nonverbal) behaviors and decreases in negative behaviors.

In their meta-analysis of the AAT published literature, Nimer and Lundahl (2007) concluded that interventions with animals were effective when used in the treatment of autism-spectrum symptoms, medical difficulties, emotional well-being issues, and behavioral problems. They also noted that young children were most likely to benefit from animal therapy intervention and that dogs were the most commonly used animal. Their research, however, did not consider studies using animals in an educational setting.

Dog Assisted Reading Programs

Dog assisted reading programs have been introduced and studied in a variety of educational settings including public libraries (Hughes 2002; Shannon 2007), school libraries (Newlin 2003), after school programs (Shannon 2007), and individual classrooms (Booten 2011; Friesen 2012; Friesen and Delisle 2012; Griese 2010; Jalongo 2005; Kaymen 2005; Le Roux et al. 2014; Martin 2001; Paradise 2007; Shaw 2013; Smith 2009). The programs range from highly structured sessions with regular meetings and specific goals for participants to informal elective programs with more of a "walk-in" clientele. Some have used entire grades while others targeted specific students with below average reading ability for participation in the program. The research also varies widely in terms of the methodological rigor (pre/post measures, control groups) and dependent variables (standardized test scores, teacher/parent report of student attitudes, anecdotes, and observation of student behavior). However, regardless of the program or method used, the conclusions by the authors have all been in agreement—the use of therapy dogs as an addition to reading programs increases student interest and enthusiasm, improves self-esteem, reduces disruptive behaviors, and leads to improvements in reading and writing skills.

Library Settings

Hughes (2002) notes the success of dog literacy programs at several libraries across the country. She describes one of the first library programs, R.E.A.D. (Reading Education Assistance Dogs) begun by Sandi Martin in Salt Lake City. The program has been replicated as "Sit Stay Read" in Birmingham, Alabama; "Dogs Educating and Assisting Readers, DEAR" in Baltimore; "Reading with Rover" in Bothell, Washington; and "Read to the Dogs" in Portland, Oregon, to name just a few of the numerous state and local programs. Hughes noted the lack of scientifically documented evidence of the programs' success with most information based on anecdotes and observations by library professionals and parents. While not scientific, the benefits are consistent from one program and site to another with reports of increases in self-confidence, enthusiasm for library visits, and interest in stories and reading. However, since the time of Hughes' writing, there have been a few more empirically based studies of library literacy programs (Newlin 2003; Shannon 2007).

Newlin (2003) introduced a reading program in her elementary school library for a select group of 15 second grade students who were reading below grade level. Students met individually once a week to read for about 20 min to the dog and owner. Over the course of the academic year, most of the students improved reading by two grade levels. The overwhelming enthusiasm for the program led to an expansion so that all interested students could participate (those at or above grade level as well as those reading below grade level).

Shannon (2007) conducted research on library and after school programs that employed therapy dogs. She used a brief survey to measure parent attitudes and parental perception of children's attitudes toward the reading program. As often happens in a public library setting, many of the children (73 %) only attended one session, leaving their guardians unsure regarding questions on improved ability to read aloud. Nonetheless, Shannon did note general positive attitudes toward the programs with the majority of respondents indicating that their children enjoyed the

program and would like to participate again. Specific benefits that were reported by the majority of respondents included: a positive attitude toward the dogs, an increase in reading confidence, and a greater willingness to read aloud. These three outcomes were reported at a higher rate in the children who attended two or more sessions, suggesting that increased involvement in such a program would have increased benefits. However, with no controls, one could also argue that children who already like dogs and like reading are more likely to come to the library. One must exercise caution in interpreting these findings. Shannon also reported that two other outcomes (increase in time reading for pleasure and improvement in oral fluency) were reported less frequently for all children, and actually revealed lower percent endorsement by those attending multiple sessions. Thus, her hypothesis—that greater attendance in the program would be associated with greater benefit—received mixed support.

Library-based programs are informal in nature as compared to classroom-based programs where sessions are regularly scheduled and often integrated into other educational or classroom activities. Another distinction is that while many of the school programs focus on struggling readers, the programs at a library or after school program are usually open to all levels of readers. This may have diluted some of the findings by creating a ceiling effect with children who already enjoy and are confident in their reading.

Bueche (2003) notes the programs conducted in library settings are often offered on a "drop-in" basis, are characterized by informality, and are open to all, thus conforming more to the description of AAA. School-based programs often display more of the characteristics of AAT with children being selected by classroom teachers or reading specialists because they are struggling with reading. Structured and regularly scheduled sessions are then conducted with specific goals in mind. However, these programs traditionally are not administered by a trained professional, and thus, most are still considered AAA.

Classroom Settings

Initial studies in this area report both anecdotal and objective data, but often with very small sample sizes, hindering the use of traditional inferential statistics. Kaymen (2005) employed a sample of four students in her study of "SHARE a Book" therapy dog reading program in California. Her research, limited by a small sample, relied on qualitative data to assess the outcomes of the program. Four students, two reading assistants, and one parent were interviewed or completed a survey. Additionally, one student was observed. While all reports provided positive feedback, the findings were largely anecdotal. Like Kayman, Martin (2001) and Heyer (2007, as cited in Shaw 2013) reported positive inferences made from observation; however, they also evaluated reading levels or scores adding quantitative data to their research.

Martin (2001) described the application of R.E.A.D. in a pilot program at a Salt Lake City elementary school. In the initial program, trained therapy dogs were introduced to 10 children ages 5–9 who were reading below grade level. Once a week, each child read one-on-one to the visiting dog and their handler for about 20 min. Martin reported that all children improved in reading with several exceeding their grade level. Teachers also noted improvements in absenteeism, confidence, self-esteem, pride, interest in reading, and hygiene. Students became more involved in other school activities, volunteered to read aloud, and were more participatory in the library. Jalongo (2005) reports on a second group of children who experienced the reading program the following year at the same school, noting similar improvements in reading scores, attendance, overall report card, and use of the library.

Another study with a small sample of students was reported by Heyer in (2007), as part of his master's thesis (as cited in Shaw 2013). A total of six students in Grades 2 through 4 comprised the sample. Three students slightly below reading level served as a control for three other students enrolled in R.E.A.D. for 16 weeks. A comparison of post-test scores suggested that those in the R.E.A.D. program had higher reading scores than those in the control group. Both confidence and interest were observed to improve as well.

While a larger sample of students participated in the reading program she studied ($N = 197$), Shaw (2013) does not report the number of responses to her survey, which was the sole method of data collection. She administered a survey to all students, parents, and teachers and summarized responses from this qualitative data. Shaw reported on an extensive program conducted at a school district in the southwest region of the United States. While all grades, kindergarten through fifth, were involved in the R.E.A.D. program from 2006 through 2011, it is unclear if all students participated or just those with reading difficulties. However, this is the first mention in the published literature of extending a program to include the lower grades of kindergarten and first. Successful outcomes were measured in a post-test only, single group design where teachers, parents, and participating students reflected on the program. Parents and teachers agreed in the gains of increased interest, motivation, confidence, and reading growth, while students reported confidence and comfort in their reading; however, unlike Martin (2001) and Heyer (2007, as cited in Shaw 2013) above, no formal measure of reading growth was reported.

Friesen and Delisle (2012) further observed the use of therapy animals specifically in the education realm. The researchers examined four French–Canadian elementary schools with therapy animal programs in their language arts curricula. As the programs took place in various schools, the format for each student participant varied. However, each student participated in the program once or twice a week for seven to 8 months. Each session was a half hour in length and was conducted either individually or in small groups. Most of the 45 students who participated were not considered to be performing at their grade level and were referred by an educator to be involved in the program. The instructors used the sessions with the dogs to build reading skills, but also to help the students learn and foster different behaviors. For example, there was one student who was having trouble concentrating and therefore was having issues with reading comprehension. During their sessions, the instructor told the student that the dog was having problems sitting down and paying attention, and enlisted the child's help to make the dog pay attention. While the dog was not actually having problems sitting still, presenting this situation to the student got him involved in trying to help the dog concentrate and, in turn, helped the student to concentrate better. Another example was a technique used to help students learn about commas and periods. While reading, whenever there would be a comma or period in the sentence, the instructor would have the student stop reading and pet the dog (a quick pet for a comma and a longer pet for a period). This helped the students to learn when to pause while reading, as well as how long to pause. While these examples provide great insight into the impact of the dog and the children's reading, the evidence is anecdotal, and stronger empirical studies are needed.

Friesen (2012) examined the impact of a dog literacy program in a second grade classroom (N = 18) through the lens of Bakhtin's carnival which views an experience as having a festival atmosphere with a release from routine, an opportunity for playfulness, and a sense of anticipation. Qualitative analyses of interviews (with parents, students, and teachers), videotapes of reading sessions, and field notes revealed a joy and anticipation of weekly reading sessions, playfulness in reading, and the presence of a "soft social bridge" where children on the periphery of social groups increased their interactions with peers as well as the adult mentor (dog handler). This added social benefit has been noted by other researchers such as Levinson (1969).

Unlike several researchers cited above who also used small samples, Griese (2010) was able to apply inferential statistics to her single case reversal replication. Employing a mixed-model design, Griese collected both quantitative and qualitative information on the impact of a reading therapy dog. She measured amount of time reading in a small sample of three children with learning disabilities and a history of reading difficulty. She provided evidence for increased time reading during two intervention sessions compared with baseline and a period of time when the dog was withdrawn. Additional improvements were noted in motivation and the development of an emotional bond with the dog.

The most methodologically stringent studies reported thus far are by Booten (2011), Le Roux et al. (2014), Paradise (2007), and Smith (2009). All four studies introduced a control group for a more rigorous comparison of reading growth. Both Paradise and Smith employed a mixed-model design benefitting from the quantitative data, whereby they were able to apply inferential statistics to fairly large samples, and the qualitative data to obtain rich, in-depth observations. The study by Le Roux et al. 2014 was the only true experiment, randomly assigning students to various reading conditions including reading to a therapy dog.

Booten investigated the impact of a reading dog program on fifth grade students in the same school where one class did not participate in the program and the other fifth grade class did. The procedure differed from that described elsewhere in that the dog visited 3 days and stayed for the entire day. It was unclear if students read individually or in small groups, but each student seemed to read at least once a week to the dog and the dog was present and interacting with the students in other daily routines. Booten measured behavior using an existing schoolwide behavior management plan and reading using the average of weekly reading tests. No statistically significant differences were found for either measure when comparing the students reading to dogs with the control.

The research by Paradise incorporated several measures in her mixed-model approach. Investigating the C.A.R.E. (Canine Assisted Reading Education, C.A.R.E. to Read) program in a Florida school, she was able to demonstrate the efficacy of canine reading programs with reluctant readers in grades one through five. Attitudinal measures completed by teachers reflected similar results to earlier qualitative studies of student increases in motivation, confidence, skills, and excitement for reading. Teachers also reported a "spillover" effect with improved confidence, quality of work, enthusiasm, and participation in other school activities. Two of three quantitative measures supported improvement in reading skills for students participating in the program relative to controls. Measures of specific reading objectives and book level all were significantly stronger in C.A.R.E. participants. Only on standardized test scores did the reading program participants fail to differ from the control.

Smith (2009) analyzed the impact of the Sit Stay Read program that had been introduced into disadvantaged

public schools in Chicago. This highly structured program is distinguished from other animal reading programs by the use of a prescribed format with multiple activities. Dog owners participate in an extensive training program preparing them for a structured classroom experience that includes a half hour of reading and a half hour of writing and illustrating themes from reading. The 8-week program consists of five steps including: model, choral, echo, paired, and guided reading. After 8 weeks, program books are laminated and include a signature page which is used to document when students read their story aloud to family and friends. The program also includes visits by Guest Readers who read dog-themed stories and discuss reading in their professions, and a variety of incentives including a Reading Rewards recognition assembly and a gift of two books for students to read at home.

Smith employed a mixed-model design in her analysis of second graders in school districts characterized as underachieving. Similar to earlier studies she captured the qualitative and more holistic benefits of the program through observation and interviews with faculty, administrators, and student participants. However, she also introduced more standardized measures such as student attendance and change in oral reading fluency over the course of the academic year.

Interviews revealed similar findings to earlier studies of improvements in motivation to read, general behavior, and a sense of excitement among the children. These findings were further supported in significantly greater gains in oral reading fluency in the reading program classes when compared to the control. While no differences were found for gender, the mean gain for girls was greater than that for boys in the program. Additionally, there were no differences in attendance.

In a controlled experiment, Le Roux et al. (2014) randomly assigned poor readers to one of four reading conditions: reading to a dog in the presence of the dog owner (a therapy dog volunteer), reading to an adult, reading to a stuffed animal in the presence of an adult, or a control group. They found significantly higher scores for reading accuracy and comprehension for the dog reading group compared with all other groups. Additionally, the dog reading group reported a higher reading rate than the stuffed animal group. This study used random assignment in addition to ensuring that there were no pre-existing reading differences between the students in the four conditions, thus providing strong support for the positive impact of a therapy dog on students' reading ability.

In conclusion, while studies of dog reading programs in school settings vary widely in their procedure and methodological control, most provide evidence in support of such programs. Initial reports of a mostly anecdotal nature have grown to include rigorous studies with control groups, pre and post measures, and multiple dependent variables. A summary of these studies is presented in Table 1.

Current Study

The purpose of the current study was to examine the effects of a therapy dog program on reading at different grade levels at a suburban elementary school located in central New Jersey. Earlier research investigated reading interventions that focused on students who already demonstrated difficulty in reading or were at risk of such. This program, however, instituted reading dogs for all students in the school from kindergarten through fifth grade.

There is very little research on the use of dog-assisted reading programs with younger grades. While Martin's (2001) program extended to students who were 5-years-old and Shaw (2013) investigated a program that extended to kindergarten, neither employed a control group nor conducted statistical analyses. Only Paradise (2007), in the reported literature, employed a control and showed significant reading differences for younger students involved in the reading program.

The current study is most similar to the methodology applied by Smith (2009) and Paradise (2007) in that we also employed a mixed-model design analyzing quantitative data in the form of standardized reading scores as well as qualitative information gained from interviews with teachers and dog owners. Our sample selection more closely mirrors that of Shannon (2007) whose program implementation in the library was open to all patrons of a library, and Friesen (2012) who similarly invited all students in a second grade class, not just those with reading difficulty. Several classroom studies restricted participation in an intervention program to students who were underperforming in reading or otherwise challenged academically (Friesen and Delisle 2012; Griese 2010; Kaymen 2005; Le Roux et al. 2014; Martin 2001; Paradise 2007). The site we obtained data from implemented a dog reading program for all students in all grades.

A benefit to the current research is that classroom studies traditionally allow for greater control over attendance and format than the library setting. However, the reading program investigated here varied by classroom and thus lacked the uniformity reported by Smith for her study of Sit Stay Read. Thus, this study has greater control than others cited, but is not as rigorous or structured as that reported by Smith or Le Roux et al. 2014. To allow for a cleaner comparison to earlier studies, such as Smith who only focused on second grade and Le Roux et al. 2014 who only focused on third grade, and recognizing that reading is expected to increase developmentally with grade, we analyzed our data by grade level.

Table 1 Comparison of empirical research on benefits of dog-assisted reading programs in elementary schools

Researcher	Grade/ Age	Inclusion criteria	Program characteristics	Control group	N	Measures	Improvements
Martin (2001)	5–9 years	<Reading level	1-1 reading to dog	No	10	Reading level	Reading level
						Observation	Confidence, self-esteem, hygiene, other activities, absenteeism, pride, interest
Kayman (2005)	3rd	Remedial readers	1-1 reading to dog	No	4	Interview, observation, survey	Focus, interest, attitude
Heyer (2007)	2nd–4th	<Reading level	1-1 reading to dog	Yes	6	Reading score	Reading score
						Observation	Confidence, interest
Paradise (2007)	1st–5th	Struggling readers	1-1 reading to dog	Yes	163	Data sheet	Reading skills*, book level*
						Survey	Confidence, motivation, other activities
						Reading score	No difference*
Smith (2009)	2nd	Disadvantaged inner city	Small group structured reading &writing	Yes	250	Oral fluency	Words per minute*
						Attendance	No difference*
			Guest Readers			Interviews	Motivation, calm, general behavior, cooperation
			Reading Rewards				
Griese (2010)	4th–5th	Reading deficit & learning disabled	1-1 reading to dog single case reversal design	No	3	Time reading	Minutes reading*
						Interview	Motivation, Emotional bond
Booten (2011)	5th	All students	Unclear if 1-1 or small group reading to dog; dog in class 3 days a week, all day	Yes	32	Behavior	No differences*
						Weekly reading tests	No differences*
Friesen (2012)	2nd	All students	1-1 and small group reading to dog	No	18	Field notes	Joy, anticipation
						Interviews	Socialization
						Video-Tape	Attentiveness
Friesen and Delisle (2012)	1-3, 5	<Reading level	1-1 and small group reading to dog	No	45	Anecdotal	Literacy skill, pride
Shaw (2013)	K–5th	–	1-1 reading to dog	No	197	Surveys	Confidence, interest, reading ability, comfort, motivation
Le Roux et al. (2014)	3rd	<Reading level	1-1 reading experiment with 4 conditions	Yes	102	Reading score	Rate*
							Accuracy*
							Comprehension*
Current study	K–4th	All students	Small group	Yes	169	Reading score	
			Reading to dog and writing			Interviews	

– indicates the information was not reported. Much of the information on improvements is anecdotal and thus an * has been inserted to identify those studies using inferential tests; unless otherwise noted the * indicates statistically significant improvement in the dog therapy group

H_1: Students who participated in the dog reading program will have higher reading scores than students in the control cohort.

H_3: Qualitative data from interviews with educators and dog owners will support earlier findings of student increases in reading skill and attitudes toward reading.

Method: Experiment 1

Participants

Schoolchildren at a suburban elementary school in central New Jersey from 2010 through 2012 constituted the sample. Students at the school are routinely tested on their

reading skills in the fall, winter, and spring of each school year. As the dog reading program was implemented in February 2012, student scores from the 2010–2011 school year comprised the control group for the study, while student scores from the 2011–2012 school year made up the experimental group. In a standard school year, students from kindergarten through the fifth grade take part in the reading program at the school. However, for the purposes of this study, data from the fifth grade students was removed as they had graduated and therefore all of the necessary scores could not be obtained from school archives for the control group. As a result, the students analyzed for this study ranged in grade level from kindergarten through fourth grade. In addition, records for a small number of students (<3 %) was removed for insufficient data due to student mobility. The cohorts are equivalent in terms of gender and are predominantly Caucasian with Hispanic being the second largest ethnic group. Cohort sizes and demographic information for both years appears in Table 2.

Materials

During the time of this study, the elementary school used the Northwest Evaluation Association's Measures of Academic Progress (MAP) to assess student reading. Developed in 1997, the MAP assessment is a computer adaptive test administered three times a year: fall, winter, and spring. Spring (year-end) reading scores were used to measure the impact of the reading program as the dogs were introduced to the classrooms mid-year and thus, scores earlier in the calendar year would not reflect the influence of the reading program. The ability to control for pre-existing reading level was highly desired considering the quasi-experimental design where the control group was a separate cohort and students were not randomly assigned as in a true experiment. However, the MAP assessment had recently been introduced to the school district and not all grades had completed the Fall 2010 assessment. Thus, winter (mid-year) reading scores were used as a measure of control for pre-existing differences in reading skill. The test publishers report acceptable reliability and validity. Reliability coefficients range from the low .80s to the low .90s. Test validity was demonstrated by a comparison of item content to the content of the reading curriculum. Additional validity was shown by correlating MAP reading scores with other measures of general academic ability with correlations ranging from .66 to .87 (NWEA 2004).

Procedure

Reading Program Description

Reading programs in libraries and schools differ from therapeutic initiatives in their goals, degree of structure, and frequency of meetings. It is useful to contrast the

Table 2 Grade distribution and demographic profiles by cohort group

	Cohort group	
Demographic	Control (2010–2011)	Program year 1 (2011–2012)
Grade (number of students)		
Kindergarten	32	28
1st	30	39
2nd	24	35
3rd	37	27
4th	29	40
Gender		
Male	51.3 %	49.7 %
Female	48.7	50.3
Ethnicity		
Caucasian	74.3	71.6
African American	0.0	0.0
Asian	3.9	6.5
Hawaiian/Pacific Islander	0.7	0.6
Hispanic	17.8	18.9
Other/Multi-Racial	3.3	2.4
ESL		
No	90.1	83.4
Yes	9.9	16.6

various interventions in terms of type—AAT or AAA—as described in Table 3. The Pet Partners (2015) website states that in order to be considered AAT, an intervention must demonstrate specific characteristics. However, in reviewing the many types of animal interventions, the current researchers have found that reading programs vary quite a bit. While still lacking a trained professional, the program described by Smith (2009) approximates the other characteristics of AAT. Other initiatives, such as the program described by Shannon (2007), clearly represent AAA. For reading intervention, it might be useful to consider the designation of AAA/T as a continuum rather than a dichotomous grouping. The program being assessed in the current study, met some of the criteria for AAT—visits were scheduled and of a pre-determined duration to accommodate the classroom schedule; activities were structured and prescribed beforehand. However, the current program failed to meet other criteria of AAT—goals were not individualized in the regular classroom (although in special education classes this sometimes did occur), and notes on student progress were not taken with each visit, but rather, gains were inferred from standardized test scores and ongoing teacher observation.

In the school under study, one teacher implemented and oversaw the dog reading program. She recruited dog and handler pairs by contacting several local dog therapy certification organizations who then put a call out to their members. This ensured that the dogs had been tested; met the physical, behavioral, and temperament criteria to be a therapy dog; and were covered by the organization's insurance policy. Next, she developed a schedule that ensured each classroom would have a dog visit once a week for about an hour. While some dogs visited more than one classroom, care was taken in the scheduling to ensure the dogs were not overtaxed by back-to-back visits. A note explaining the program was sent home and parental permission obtained for each student.

Students in traditional classrooms read to the dogs in small groups (four to six students) formed on the basis of reading level. In the Special Education classroom students usually read to the dogs individually, although occasionally a small group of two would read to the dogs. Typically reading was accomplished in a separate area of the classroom, often on the "reading carpet". All classes also had some writing component that incorporated the dog reading program experience. One fourth grade class created a newspaper which included dog-themed stories allowing students to practice both writing and graphic design. The second, third and fifth grades used journals with the third grade also illustrating the journals. In kindergarten and first grade the dogs were even more fully integrated into the language arts curriculum. These grades used four language arts centers of reading to the dogs, writing about the dogs, illustrating student writing, and participating in vocabulary games with a dog theme (e.g., sorting words written on bones into dog houses). Lower level reading groups in kindergarten would often begin with letter recognition and letter sounds but later in the year would have progressed to reading. In either case, the reading activity would be achieved with the dog present and part of the group.

A student with severe allergies was able to participate remotely through the use of an iPad. Students who were afraid of dogs were invited to read from the periphery of the reading circle. As the year progressed, they gradually moved closer so that by year's end, all students were actively participating, petting, and reading to the dog.

Thus, this program is similar to Smith (2009) in that there was a focus on both reading and writing, and all

Table 3 Differences between Animal-Assisted Activities (AAA) and Animal-Assisted Therapy (AAT)

Characteristics	Animal Assisted Activities (AAA)	Animal Assisted Therapy (AAT)
Delivery	Non-professional, but trained volunteer	Professional health or human services practitioner often in conjunction with trained volunteer
Goals	No specific goals	Specified and individualized goals for each session
Activity	Casual conversation and everyday activities that involve pets visiting people	Activities (e.g., dog grooming, commands, "fetch", walking, etc.) specifically designed to improve physical, social, emotional or cognitive functioning of client
Generalizability	Activities can be used with a wide array of clients	Individualized plan tailored for each client's unique needs
Documentation	Session notes are not necessary	Client progress is documented and evaluated for progress toward goals
Scheduling	Visits are spontaneous	Visits are scheduled at intervals designed to meet the treatment goals of the client
Duration	Variable	Visit length is predetermined to accommodate needs of client

Adapted from Angel Paws (2015) and Pet Partners (2015)

students were included regardless of reading ability. Unlike Smith, the dog owners did not receive training in guided reading, again reinforcing the AAA components of the reading program studied here.

Reading Scores

The MAP is administered to students three times per school year: in the fall, winter and spring. Students' reading scores, as well as demographic information, were obtained from archived data supplied by the school principal. For each student, the reading scores were recorded, as well as demographic information such as grade level, ESL status, and ethnicity. All identifying information was removed from the data prior to entry and analysis. The use of school generated reading scores to measure student progress is recommended by other researchers. In his discussion of the R.E.A.D. program, Altschiller (2011) notes the benefit of using existing test scores as they reduce the chance of bias which may be an issue if researchers design and/or administer their own measures of reading ability.

Method: Experiment 2

Participants

Eligible participants were dog owners or educational professionals involved with the reading program at the elementary school under study. Dog owners were individuals who volunteered their time to visit the school with their certified therapy dogs and participate in the reading program. The dog owners regularly went to the same classroom (typically once a week) during an allotted time as part of the class's reading or language arts period. These individuals sat with their dogs in the classroom while the students read books to them.

Educational instructors were teachers, librarians or other professionals in the school who were involved with the reading program. These individuals invited the dog owners and their dogs into their rooms and integrated them into their reading and language arts curricula. The twelve educational instructors interviewed for the study had been in the field for an average of 11.08 years (ranging from 4 to 25), and had been working at the elementary school for an average of 7.91 years (ranging from 2 to 14). The five dog owners interviewed had been volunteering in a variety of settings (senior centers, nursing homes, libraries, substance abuse centers, community events, and summer camps) for an average of 5 years (ranging from 1 to 9 years). The dogs themselves averaged 6 years of age (ranging from 3 to 10 years).

Materials

Researchers compiled two sets of structured interview questions to be asked during the interview process: one for the dog owners, and one for the educational instructors. The structured interviews included questions regarding the participant's involvement in the program. For the dog owners, questions included basic personal demographics, initial and final reaction to the program, observed benefits and challenges for students, and recommendations for continuance. For the educational instructors, similar questions were asked with additional probes on specific reading and writing gains.

Procedure

Participants expressed interest in being interviewed for the study by completing an informed consent form and providing their contact information on said form. Researchers contacted those interested in participating either by phone or email to schedule an interview. Most interviews were conducted over the phone; however, a few were held in person at the school. After all of the interviews were completed, the research team read through the interview notes and summarized them, identifying major themes, categories, and ideas. Following that, the team read through the interview notes an additional time, coding the interviews based on the categories and themes previously determined.

Results: Experiment 1

Prior to a test of the hypothesis, a series of t tests were conducted to determine if the control group differed from the dog reading program group in winter (mid-year) reading scores. No differences were found for any of the grade level comparisons. Next, a series of t tests determined if the spring (year-end) reading scores differed for the control group relative to the dog reading group. The analyses found a statistically significant difference in kindergarten with the dog reading group ending the year with significantly higher reading scores than the control. Significant differences were not found for the other grades. See Table 4 for detailed statistics and Fig. 1 for a visual representation of these findings. As an added step, an analysis of covariance (ANCOVA) was conducted for the kindergarten controlling for winter reading scores. All assumptions of the ANCOVA procedure were tested and met. After controlling for pre-existing reading levels, the program effect remained with $F(1,57) = 13.07$, $p = .001$, $\eta^2 = .19$, based on adjusted mean spring reading scores of 161.59 for the control group and 168.54 for the dog reading program.

Table 4 Descriptive statistics and *t* tests of Year-End Reading Scores by Cohort Group

Grade	Cohort group		*t*	*p*
	Control (2010–2011)	Program year 1 (2011–2012)		
Kindergarten	160.34	169.96	3.35	.001
	(11.97)	(10.04)		
	32	28		
1st	176.73	179.92	0.91	.365
	(12.44)	(15.74)		
	30	39		
2nd	193.88	193.69	−0.50	.960
	(15.75)	(13.30)		
	24	35		
3rd	205.89	200.67	−1.38	.172
	(14.84)	(15.06)		
	37	27		
4th	213.17	212.48	−0.22[a]	.824
	(7.78)	(15.39)		
	29	40		

Means appear first with standard deviations below in parentheses followed by sample size

[a] Equal variances not assumed. All other *t* tests, equal variances assumed

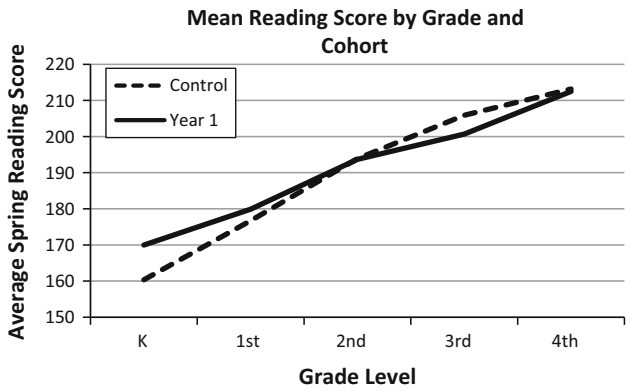

Fig. 1 A series of *t* tests conducted at each grade level revealed a significant difference but only in Kindergarten where the children in the dog reading group achieved higher end of year reading scores than the control cohort

ANOVAs adding the variables of gender, ethnicity, and ESL showed no differences for these demographics when considering participation in the reading program. It should be noted that for ethnicity and ESL status, small cell sizes precluded accurate statistical conclusions.

Results: Experiment 2

Interviews conducted with dog owners and educational instructors were analyzed in order to determine their perspectives regarding the reading program. Table 5 provides a summary of these findings for educational staff and dog owners, respectively. Overall, they cited the motivational, confidence building, and relaxing aspects of the program for the students. Also, having the dogs come into the classroom every week was something that the students looked forward to and made them want to perform well.

When considering attitudes toward the program, all of the dog owners and most of the educators were initially positive. Dog owners reported a few children were skeptical at first and a few teachers expressed concerns themselves. However, by the end of the program, 100 % viewed it favorably, as well as recommending its continuance at the current school and expansion to other schools.

In terms of student gains, both educators and dog owners noted increases in confidence and interest in reading. For example, interviewees reported students wanting to read well for the dog, in addition to developing increased self-esteem and pride over the course of the program. One teacher's assistant noted: "They love it. Absolutely love it. They work hard so that they can get to see the dog. They have to perform. And the dog is used as incentive. If they misbehave, they don't get to see the dog. It really means a lot to them."

Educators additionally noted an increase in focus and ability to stay on task. As might be expected, dog owners and educators varied in terms of specific gains as their roles and opportunity for observation in the program are different. When describing improvement in reading, dog owners noted students' willingness to take risks and try new words when reading aloud. "The dog doesn't judge. It won't say,

Table 5 Results of interviews with educational staff (teachers and paraprofessionals) and dog owners

Topic	Responses of educational staff (teachers and paraprofessionals)	Response of dog owners
Initial opinion of the program	9 were enthusiastic; 3 had doubts including: "skeptical that program would work" "afraid of extra work" "nervous to have dogs in classroom"	All 5 dog owners were enthusiastic having already seen the positive effect of dogs in a variety of AAA/T settings
Reading skills	All staff noted improvements in reading, but 10 of 12 felt those gains were specifically due to the reading program. Areas of improvement included vocabulary, oral fluency, expression, and reduced errors	All dog owners reported an increase in reading skills noting specifically that the students were more willing to take risks, try new words
Writing skills	7 of the 12 staff identified improvements in writing including increases in: Number of ideas Sentence length Amount of writing	Only 1 of the dog owners mentioned writing (an increase in the amount). Most were not involved with the writing aspect of the program
Other benefits	9 of 12 staff noted increases in confidence and self-esteem when reading	All 5 dog owners noted an increase in motivation and interest in reading
	5 of 12 staff noted increased attention and focus; ability to stay on task; overall interest in reading	4 of the 5 dog owners observed an increase in student confidence
Specific students who benefitted	All staff identified student populations who benefitted from the program: 9 of 12 identified benefits to Special Education students 4 of 12 identified benefits to ESL students Others mentioned students with speech disorders, new to the country, shy, or otherwise struggling with reading	3 of the 5 dog owners identified specific students who benefitted from the program: Students from another country with a language barrier Students with speech disorder Struggling/cautious readers
Concerns or challenges	Two staff commented that the dogs could be distracting Three students were initially fearful, but by the end of the program were reading to the dog Students with severe allergies, were able to participate via an iPad Some special education students would not participate Some special education students needed to be taught restraint	2 noted caution needed to be taken when students have allergies. For a severe allergy the students participated via iPad; for milder allergies simply ensured distance from dog in the classroom Some students needed to be taught restraint (e.g., tried to braid dog's ears)
Continue program at school?	100 % agreed	100 % agreed
Expand program to other schools?	100 % agreed	100 % agreed

'You missed a word'….The dog just hangs out and loves all the attention." Educators identified specific areas of improvement such as vocabulary, oral fluency, expression, and error reduction. Only educators offered meaningful insight into writing improvements, noting an increase in number of ideas, sentence length, and amount of writing.

When asked about specific students who gained from the program, the most frequently cited were Special Education students and struggling readers. As one classroom teacher noted, "Special education students were more behaved. They tend to sit longer and read better when the dog is around. In fact, teachers have actually stopped by just to see how impressive it is. In reality, everyone really benefitted but mostly special education students especially those classified with autism." Similar insights were provided by a special education teacher who added, "I also encourage it more for special education. It's a venue that these kids don't normally shine in. And they now love reading to the dog. The dog accepts them no matter what."

Struggling readers included ESL students, children new to the country, students with speech disorders, and students who were extremely shy. A classroom teacher shared,

"Struggling students want to participate more, ESL students have no problem reading to the dog even though they would normally. All students want to interact with the dog. The presence of the dog builds confidence within the students." These insights were confirmed by others including a teacher with special focus on English/language arts who stated, "ESL students are easily embarrassed because they don't know the language as well as others. With the dog, they are able to be proud of their reading ability".

The two groups of interviewees also identified challenges to program implementation. These included the need to teach some of the students restraint in their interactions with the dogs, accommodating students who did not want to participate (although only initially), and creating opportunities for children with allergies to participate via an iPad.

Discussion

The purpose of this study was to examine the effects of a dog-assisted reading program on students' reading skills and attitudes. In regard to reading skill, statistically significant differences were found in reading scores but only for the kindergarten in partial support of Hypothesis 1. These findings lend support to earlier research by Smith (2009) where significant gains in oral fluency scores were observed in second graders relative to a control group as well as Le Roux et al. (2014) who found greater gains in reading accuracy, comprehension, and rate for students who read to a dog. There is some agreement with Paradise (2007) who, while failing to find significant test score differences, did note significance in other objective measures of reading skills. The current findings also support those of Booten (2011) who failed to find differences in her study of fifth graders, suggesting that the greatest improvements may occur with younger readers in earlier grades.

The use of a quasi-experimental design leaves these findings open to alternative explanations. Students were not randomly assigned to the control group or reading program. Because the program was instituted schoolwide in 2011–2012, the prior year's cohort (2010–2011) served as the control similar to the study by Paradise (2007). To account for pre-existing variability in reading skill, an analysis of mid-year reading scores found no differences between the control and dog reading program groups, similar to Le Roux et al. (2014). Further, the differences found in kindergarten remained after statistically controlling for winter (mid-year) reading scores. While these precautions rule out some threats to internal validity, the observed reading score gains can still be influenced by other cohort differences or historical events.

The small sample sizes within grade level contributed to difficulty in establishing statistical significance particularly when adding additional study variables such as ESL and ethnicity. The anticipated addition of a second year of data will allow for the combination of experimental cohorts (combining Years 1 and 2) in the kindergarten and a more powerful analysis compared with the control cohort. This will increase cell size and may allow for the addition of ESL as a study variable, which is supported by the qualitative data derived from the interviews.

One cannot dismiss the possibility of a Hawthorne effect, in that participation in the program itself was perceived as a novelty, brought attention to the school and students, or was simply a break from regular routines. This possibility cannot be ruled out, but might be further investigated should subsequent years of data from the program become available.

Unlike the bulk of earlier research, the current study involved all students in the school rather than restricting the reading program to students who are struggling readers. While Smith (2009) used a broader school population, she described the school as "disadvantaged Chicago Public Schools" (p. iv), suggesting lower than average reading ability. The school studied here, however, achieved proficiency levels above the 70th percentile of peer institutions and at about the median in a statewide comparison (Department of Education 2014). Students reading at expected grade level will evidence a ceiling effect more quickly as they have less statistical opportunity to improve. One must consider that the success of other studies with struggling readers may be prone to a statistical artifact known as "regression to the mean"; extreme scores on an initial test tend to move toward the mean on retesting.

With few exceptions (Booten 2011; Heyer 2007, as cited in Shaw 2013; Le Roux et al. 2014; Paradise 2007; Smith 2009), previous studies did not use a control group. Studies without a control group are open to various alternative explanations such as cohort differences already noted above. More importantly, one expects improvement in reading to occur through normal development and education.

In the school under study, the dog-assisted reading program in the kindergarten and first grade was more fully integrated into the language arts curriculum than in the higher grades. This reinforcement across multiple activities may also have influenced the stronger effect in these lower grades. The study by Smith (2009) employed a highly structured program, Sit Stay Read, where dog handlers were trained in specific reading goals, scripted by week, writing was incorporated, as were guest readers, and a reading rewards program. In their study of the use of a dog with children who were victims of sexual abuse, Dietz et al. (2012) demonstrated the strongest effect under the

condition that most fully integrated the dogs into the therapy session (through both the presence of the dog and the use of stories about the dog that reflected the topic of discussion for that session). While the mere presence of the dog resulted in greater improvement than a control group without the dog, it was the group with the fuller integration that should the most improvement. Perhaps the fuller integration of the program into the setting (be it therapeutic or educational) strengthens the results.

Hypothesis 2 was supported in that the results of interviews with educators and dog owners provided broad agreement with earlier research. Increases in confidence and self-esteem agreed with earlier studies (Heyer 2007 as cited in Shaw 2013; Martin 2001; Paradise 2007; Shaw 2013). Similarly, those interviewed observed increased interest in reading, replicating earlier findings (Heyer 2007 as cited in Shaw 2013; Martin 2001; Shaw 2013). Our failure to find significant test score differences in the higher grades, yet consistent findings of attitudinal change, suggests that future researchers should directly measure student attitudes toward reading in a more formal manner. Reliance on dog owners and educators to report on student attitudes may result in a biased view from individuals who are strongly invested in the program. However, it should be noted that 3 of the 12 educators who were interviewed did begin with negative or skeptical views and changed their opinions by the end of the program to reflect full support.

Further, it may be less likely for any intervention to be effective at higher grade levels due to the establishment of habits and attitudes toward reading. Smith (2009) discovered in her interviews of teachers that most felt the reading program would be ineffective beyond the third grade. Some even expressed hesitation in using the program with students in higher socioeconomic levels, citing the fact that they already had many of the experiences and opportunities afforded by the program. Sit Stay Read (2013) recently extended its program which traditionally includes second through fourth grades downward to now include first grade. Results from this new initiative, the Little Buddies program, will contribute meaningfully to this conversation.

This study had a number of strengths in its overall design and execution. Similar to Paradise (2007) and Smith (2009), the use of a mixed-method design provided the researchers with both quantitative and qualitative information. The reading test scores allowed for an analysis that was objective, while the interviews provided richness and insight not possible in standardized test scores. Additionally, the interviews provided insight into the attitudinal changes in the higher grades which did not evidence test score differences. While the study was not a true experiment as in Le Roux et al. (2014), a relevant control group was obtained and prior reading scores statistically controlled for, which further strengthened the quantitative findings. Much of the prior research of dog-assisted reading programs used small sample sizes, lacked control groups for comparison, and measured success anecdotally or through third party interview (teachers, parents).

The current study provided qualitative and quantitative evidence for the use of dog-assisted reading programs, especially in the lower grades and with struggling readers. Because this study was a program evaluation, strict methodological control was not possible. However, the results taken in the context of prior research on dog-assisted reading programs suggest many benefits. From a practical perspective, given that the dog owners are volunteers, the cost to the school is minimal. While additional research has been suggested and should be pursued, the current findings suggest continuance, if not expansion, of such programs.

Acknowledgments Editorial staff at *Early Childhood Education Journal* for their suggestions on an earlier version of this article. TAPLab (Testing, Assessment and Psychology) at The College of New Jersey (TCNJ) for data entry, interview, insights, analysis. Faculty and professional staff at the elementary school for opening their classrooms for observation and participating in interviews. Special thanks to school principal, Anthony Abeal, for his support and enthusiasm for the project as well as hours spent in obtaining data. Special thanks to office staff for assistance with obtaining data. Special thanks to Kindergarten teacher, Ashley Thompson, for initiating the program at the elementary school, and serving as a tireless liaison between the research team and the school. Dog owners for their participation in the program and time spent in interviewing. Dogs (Ali, Apollo, Bailey, Belle, Bernie, Bob, Charley, Cooper, Jade, Lexi, Lilly, Molly, Penny, Rena, Sassy, Seamus, and Valentine), without whom this program would be impossible.

Funding The authors declare that this research did not receive funding.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest. The lead author is a therapy dog volunteer. She has volunteered at senior citizen assisted living centers, a developmentally challenged adult summer camp, and the reading program at the school under study.

Ethical Protocols This is an original piece of research that has not been published elsewhere, nor is it currently submitted elsewhere for publication consideration. Further, all relevant IRB and school approvals were obtained and protocols followed in this study.

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