

Social Effects of a Dog's Presence on Children with Disabilities

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ABSTRACT Productive and positive interactions between dogs and humans have been documented in studies using dogs trained as companion animals and as assistants for people with disabilities. In this study, the effects of the presence of a dog on social interactions between three 5–9-year-old children with developmental disabilities and their teacher at an elementary school were analyzed. A single-case experimental design with repeated measures and with replicated effects across participants was employed to assess changes in interactions from baseline to an intervention condition. During baseline, interactions were assessed in the social environment of a room adjacent to the classroom, which had a toy dog and other play materials, during time with the teacher. The experimental change introduced sequentially and systematically across the participants was the additional presence of an obedience-trained dog, a German Shepherd/Labrador Retriever cross. Interactions between the children and their teacher were examined during morning sessions using reliable direct observation interval recording procedures. All participants demonstrated an increase in overall positive initiated behaviors (verbal and non-verbal) toward both the teacher and the dog. The children also showed an overall decrease in negative initiated behaviors. In addition, observational ratings showed positive generalization of improved social responsiveness by the children in their classroom following the completion of the experimental sessions. This study supports the position that children with developmental disabilities benefit from the use of skilled dogs as teaching assistants and therapeutic adjuncts.

Keywords: developmental disabilities, dogs, generalization, school, social effects



Dogs are versatile creatures, both as friends and as workers. Historically, they have been bred to perform many duties such as hunting, herding, protecting livestock and property, and hauling sleds. More recently, dogs have been trained as companion animals and assistants for people with disabilities. This growing interest has

included research on the effects of the presence of animals as adjuncts to therapy. Reports of the positive effects of animals in therapeutic situations include children (Hansen et al. 1999); individuals with physical (Eddy, Hart and Boltz 1987), emotional (Kaminski, Pellino and Wish 2002) or psychiatric impairments (Marr et al. 2000); individuals with developmental disabilities (Limond, Bradshaw and Cormack 1997) or pervasive developmental disorders (Redefer and Goodman 1989; Martin and Farnum 2002); the elderly (Fick 1993; Crowley-Robinson, Fenwick and Blackshaw 1996); adults with substance abuse (Marr et al. 2000); and prisoners (Walsh and Mertin 1994). Even though these studies show positive outcomes, the scientific basis of the conclusions is variable, with only a few quantitative studies with sound experimental designs reported.

The effects of pet therapy and play therapy on 70 hospitalized children with chronic medical disorders were examined by Kaminski, Pellino and Wish (2002). A mood rating scale completed by the parent/caregiver contained items relating to the dimensions of happy, scared, lonely, and relaxed. The pet therapy group was reported to be significantly happier than the play group after therapy. In addition, reliable behavior observations revealed that the children in the pet therapy group also displayed significantly more positive affect and touching than the play therapy group.

In a similar analysis, Martin and Farnum (2002) used a within-participants, repeated-measures design to assess prosocial interactions (behaviors reflecting engagement with the environment) and nonsocial interactions (behaviors such as hand flapping and ignoring questions) during three conditions: with a ball, with a stuffed dog toy, and in the presence of a live dog. Therapy sessions occurred three times a week and lasted 15 minutes each. Ten children diagnosed with pervasive developmental disorder, ranging in age from 3 to 13 years, participated in the study. Children who were exposed to a real dog were more focused and aware of their environments (looking at object, therapist, or dog) and displayed a more playful mood (indicated by laughing and giving treats) when in the presence of a therapy dog. Children were also more likely to talk to or about the dog when in the presence of the dog.

An important systematic study was conducted by Limond, Bradshaw and Cormack (1997), in which eight children with Down's syndrome, ranging in age from 7 to 12 years, participated in 14-minute sessions. The effects of the presence of a dog were analyzed each session during two counterbalanced experimental procedures. Present in the first condition was a handler and an imitation dog similar in size, color, and texture to the live dog, along with two toys. The second condition was the same, except that it involved the handler with a real dog, who was a 7-year-old, male, black Labrador Retriever. In each condition, the handler encouraged the child to perform activities involving the test dog (real or imitation), but the child was free to interact in any way with the dog, the toys, or the handler. The results indicated that the children directed their gaze at the real dog for a significantly longer duration than they did to the therapist, imitation dog and toys, or other objects in the room. Furthermore, the children did not respond to the therapist as often in the imitation-dog condition as they did in the real-dog condition.

In a systematic replication of research noted above, the purpose of the present study was to objectively assess for robust effects of the presence of a dog on the positive and negative, verbal and non-verbal, social responsiveness of individual children with developmental disabilities. During sessions with the special education teacher at school, this research was conducted using a single-case experimental design with repeated measures and with replicated effects across participants (Kazdin 1982).

Methods

Participants

Three children, two males and one female, between the ages of 5 and 9 years attending an Exceptional Student Education (ESE) kindergarten through second grade classroom of a public elementary school participated. The children were diagnosed as having mental retardation, two also with Down's syndrome (Kirsten and Georgie) and one with hearing impairment (Owen) (all participant names are pseudonyms). Each child displayed the ability to communicate using verbalizations of a few words. Written informed consent was obtained from parents prior to conducting this study, consistent with approval from the University of South Florida Institutional Review Board and the County Schools.

A certified ESE teacher with a Masters degree in Special Education conducted the sessions. The dog chosen for this study was an 18-month-old, male, German Shepherd/Labrador Retriever cross named Arrow. Arrow was obedience-trained and concurrently enrolled in therapy dog training. He had more than one years' experience interacting with children in a special education classroom.

Setting

Experimental sessions were conducted in a room adjoining the participants' classroom. The children were allowed access to the room prior to the study to insure it was not a novel environment. The room was approximately 6 × 3 meters with three side-by-side windows on one wall. The room contained cabinets, bookshelves, educational materials, chairs, and toys.

A video camera was set up on one of the shelves facing the child and teacher. It was turned on before the child entered the room and turned off after the child left the room. The child and teacher sat on the floor, across from each other, with the child facing the camera. The camera was concealed among other items on the shelf and had a cloth draped over it to decrease the child's reactivity to being videotaped.

Dependent Variables

The social behaviors observed were categorized as positive/negative, verbal/non-verbal, and initiations/responses. Positive verbal statements were defined as those utterances indicating pleasure or interest in the situation (e.g., "happy," "fun," "more," "yes") or requests for help (e.g., "help" opening bag containing dog treat). Negative verbal statements were defined as those utterances indicating displeasure or disinterest in the situation (e.g., "No," "Uh Uh," "Stop").

Positive non-verbal behaviors were defined as those behaviors indicating pleasure or interest in the situation; for example, smiling, laughing, touching the dog by petting, hugging or kissing, clapping hands, nodding head, complying with a request non-verbally, blowing kisses, sharing or handing things to the teacher, throwing/handling treats to the dog, holding the leash, or walking the dog. Negative non-verbal behaviors were defined as those behaviors indicating displeasure or disinterest in the situation; for example, turning body or face away from the teacher, crying, frowning (corners of lips turned down), hiding face, attempts to or actually leaving the room, property destruction (throwing things, knocking things off shelves/table, playing with computer if these actions would cause damage if uninterrupted), or no response to dog-related questions or task suggestions.

Interactions were assessed as either child-initiated toward the teacher or the dog (e.g., child interacted without prompting) or teacher-prompted interactions toward the teacher or the dog (e.g., child responded to a request to perform a task with the dog or answered a question when asked).

Data Collection

Each child participated in 8-minute sessions, five days per week, with the teacher. The sessions commenced upon arrival at school following breakfast, at about 0900 hours. During experimental sessions, a partial interval recording was used to measure the dependent variables. This consisted of ten seconds for observation, followed by five seconds for recording the relevant behaviors. Most sessions were scored during the session by a trained observer who was a school guidance counselor with a master's degree, was experienced with the behavior of children with developmental disabilities, and was blind to the experimental predictions. The observer sat in the far corner of the room and remained unobtrusive and passive. When it was not possible for the observer to be present, the videotapes were reviewed and subsequently scored by the observer. Observers were cued at the end of each timed interval using a cassette tape that signaled the elapsed time. Session data were reported as the percentage of intervals in which each targeted behavior occurred (number of intervals in which the behavior was scored divided by the total number of intervals \times 100%).

Inter-Observer Reliability Assessment

Inter-observer agreement was assessed by having a second trained observer present during sessions to take an independent record of the behaviors that were the dependent variables. The reliability observer was present for 65% of the sessions for Kirsten, in 68% of Georgie's sessions, and for 44% of Owen's sessions, distributed across all experimental conditions. Inter-observer agreement was calculated by dividing the number of agreements on behaviors by intervals by the number of agreements on behaviors by intervals plus disagreement intervals, and multiplying by 100.

Experimental Procedures

Teacher Training: A protocol for interactions specifying the content of the interactions with the child was given to the teacher to follow. Training included direct instructions on baseline and intervention session procedures and the operational definitions of the targeted behaviors; demonstration of baseline and intervention session procedures; role plays demonstrating two examples of each behavior (positive verbal and non-verbal behaviors, negative verbal and non-verbal behaviors, and initiations and responses); guided feedback on baseline and intervention session procedures; and corrected role play on baseline and intervention session procedures. Role plays, feedback, and corrections were repeated until the teacher could accurately demonstrate the procedures independently with 95% proficiency for two role-play scenarios.

Baseline: Baseline sessions consisted of the presence of the teacher in the room along with toys, one of which was a toy dog. The teacher gathered the following items and placed them on the floor for the session: a toy Koosh ball, a toy car, a stuffed toy dog, a dog leash, dog biscuits in a bag, a brush, and a dog toy. The teacher then went to the classroom and walked the child back to the session room.

Once in the room, the teacher asked the child to be seated in the designated area and the child was prompted: "Let's play with the dog today." The teacher waited 10 seconds for the child to initiate interactions with the toys or with the teacher. A predetermined guideline for interactions was used in the sessions which included questions relating to the dog such as "What color is the dog?," "Do you remember the dog's name?," and tasks related to the dog such as "Give the dog a treat" and "Brush the dog."

If no interactions with the toys or with the teacher were initiated within 10 seconds, the teacher asked the child a dog-related question from the protocol. The teacher waited 10 seconds for a response. If no response was made, the teacher asked the child to do a task from the protocol. If there was still no response, the teacher asked the child the next dog-related question from the protocol. Questions and tasks were alternated throughout the session and were not repeated within the session.

Sessions were discontinued if the child engaged in an attempt to leave the room, physical aggression toward the teacher or dog such as grabbing, hitting, or kicking, or property destruction. At the end of each session, the teacher led the child back to the classroom.

Intervention: Following stabilization of baseline data, the second condition was introduced. The procedures for these sessions were identical to the procedures for the baseline condition, with the exception of the additional presence of the real dog, Arrow.

Prior to beginning each session, Arrow was brought to the session room while the children were out of the classroom, to avoid disruptions. Intervention sessions ended with the teacher saying "The dog is tired, it's time to say goodbye." The teacher then led the child back to the classroom and returned for the dog.

Experimental Design

Consistent with the usual and accepted practices of applied behavior analysis, a multiple baseline design across participants was utilized to demonstrate the effects of the presence of a dog on the social interactions of the participants, as measured by the dependent variables. Repeated measures baseline data were taken on all three participants. In this study, stabilization of data within conditions and changes across experimental conditions were assessed by examination of the data path characteristics of the level, trend, variability, and overlap of data sequences and patterns of at least six sessions (Parsonson 2003). Intervention with participant one began with the stabilization of baseline data. Upon the effective intervention for participant one and the demonstration of stable baselines for participants two and three, intervention was then applied to participant two. Again following the stabilization of all data, intervention was applied to participant three. Experimental control in this replicated case design is demonstrated by establishing that changes in the data of each participant systematically followed the sequential interventions at different times after variable lengths of baseline, which controls for history, maturation, and testing (Kazdin 1982).

Classroom Ratings

Classroom-based qualitative assessments of the dependent variables were completed following each intervention session 30 minutes after the child returned to the classroom. Based upon the same behavior definitions as used in the intervention sessions, both the classroom teacher and her instructional assistant provided qualitative ratings on a 5-point scale, where 1 referred to "not at all," 3 was "sometimes," and 5 was "most of the time." Eight questions were answered about classroom behavior following each session: 1) Did the child initiate positive verbal statements? 2) Did the child initiate negative verbal statements?; 3) Did the child initiate positive non-verbal behaviors?; 4) Did the child initiate negative non-verbal behaviors?; 5) Did the child respond to a request or answer a question when asked using positive verbal statements? 6) Did the child respond to a request or answer a question when asked using negative verbal statements? 7) Did the child respond to a request or answer a question when asked using

positive non-verbal behaviors? and 8) Did the child respond to a request or answer a question when asked using negative non-verbal behaviors?

Social Validity

An assessment of the social validity (Wolf 1978) of the appropriateness of the procedures, the social importance of the goals, and the social value of the effects was conducted using a qualitative questionnaire administered to the teacher and instructional assistant following the completion of the study. Questions were answered with a rating from 1 (strongly agree) to 6 (strongly disagree). The statements rated were as follows: This intervention was easy to use; I would recommend this intervention to other educators and parents; I liked the procedures used in this intervention; It is important to increase the social responsiveness of students with their teacher; It is important to learn new interventions to change the behavior of children with mental retardation; It is useful to examine how a child's interactions with a dog can lead to positive outcomes; I would use this intervention in the classroom setting again because it is effective; The presence of a dog led to an improvement in the social interactions of the children with their teacher; and This intervention was valuable for the child.

Results

Within the multiple baseline design across participants, Figure 1 presents overall child initiated positive interactions during baseline and intervention. Positive initiated verbal interactions were low but stable in all three participants during the baseline condition. Positive initiated verbal interactions had a mean of 1% and a range of 0–6% for Kirsten, a mean and range of 0% for Georgie, and a mean of 4% and a range of 0–13% for Owen.

With Kirsten, as the intervention progressed a moderate increasing trend in positive initiated verbal interactions was noted (mean 4%; range 0–16%). After the beginning of the intervention with Georgie, consistent with the sequential interventions of a multiple baseline design, he demonstrated an immediate and substantial increase in positive initiated verbal interactions (mean 24%; range 3–50%). After intervention, Owen's positive initiated verbal interactions also showed a consistent increase when the dog was introduced (mean 14%; range 3–28%).

Positive initiated non-verbal interactions were low, with some initial variability for Kirsten in the baseline condition (mean 11%; range 0–57%). Positive initiated non-verbal interactions were initially at a higher level of occurrence but displayed a clear downward trend in the baseline condition for Georgie (mean 33%; range 0–65%). Positive initiated non-verbal interactions for Owen were at a higher and stable level during the baseline condition (mean 63%; range 38–75%). When the intervention was introduced, positive initiated non-verbal interactions increased substantially for all three participants: Kirsten to mean 72%, range of 41–97%; Georgie to mean 99%, range 91–100%; and Owen to mean 76%, range of 59–88%.

The mean rating of each dependent variable is presented in Table 1. Mean ratings comparing baseline and intervention sessions showed that there was an increase in positive initiations, verbal and non-verbal, toward the teacher and the dog, on all of the assessments except with one participant, where the baseline level of non-verbal initiations with the teacher was already over 50% of intervals. Overall positive initiations toward the teacher increased from a baseline mean of 13.5% to an intervention mean of 22.8%, whereas positive initiations toward the dog increased from a baseline mean of 5.7% to an intervention mean of 37.8%.

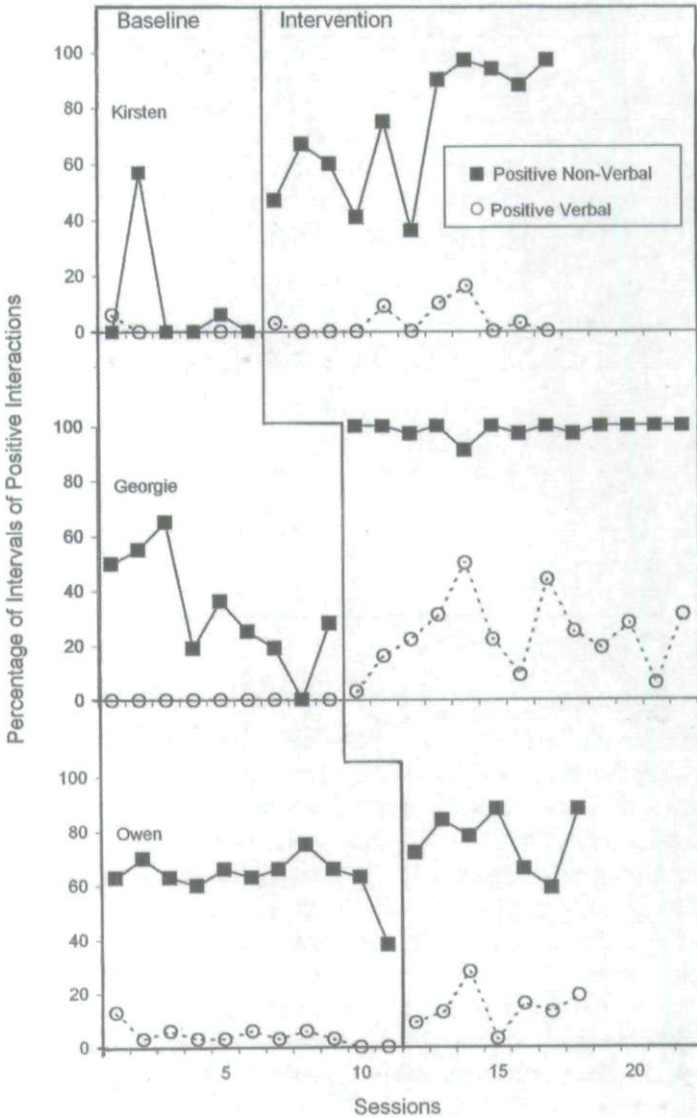


Figure 1. Multiple baseline across participants of overall positive interactions initiated toward the teacher and the dog.

With regard to negative initiations, only Kirsten had a high level of negative interactions, which were primarily non-verbal interactions with the teacher, with a baseline mean of 86%. These reduced to an intervention mean of 11% negative initiated non-verbal interactions. Also with Kirsten, there was an increase in negative initiated non-verbal interactions with the dog, from a baseline mean of 0% to an intervention mean of 5%. A similar increase in negative initiated non-verbal interaction with the dog was seen with Owen, whose baseline mean of 0% increased to an intervention mean of 13%.

Table 1. Baseline and intervention mean session percentages of each dependent variable for each participant.

Dependent Variable	Kirsten		Georgie		Owen	
	BL	INT	BL	INT	BL	INT
Positive Initiated Verbal Interactions with Teacher	1%	2%	0%	4%	4%	11%
Positive Initiated Non-Verbal Interactions with Teacher	11%	22%	11%	48%	54%	50%
Positive Initiated Verbal Interactions with Dog	0%	1%	0%	20%	0%	3%
Positive Initiated Non-Verbal Interactions with Dog	0%	62%	22%	94%	12%	47%
Negative Initiated Verbal Interactions with Teacher	2%	0%	0%	0%	0%	0%
Negative Initiated Non-Verbal Interactions with Teacher	86%	11%	1%	0%	0%	2%
Negative Initiated Verbal Interactions with Dog	0%	0%	0%	0%	0%	1%
Negative Initiated Non-Verbal Interactions with Dog	0%	5%	0%	0%	0%	13%

Note: BL = Baseline; INT = Intervention

Inter-Observer Agreement

The mean percent inter-observer agreement score for the measured dependent variables for each of the participants ranged from 77–100%. The range of the inter-observer agreement scores were as follows: positive initiated verbal interactions with the teacher was 94–100% for Kirsten and Georgie and 88–100% for Owen; positive initiated verbal interactions with the dog was 94–100% for Kirsten and Georgie and 97–100% for Owen; positive initiated non-verbal interactions with the teacher was 91–100% for Kirsten, 22–100% for Georgie, and 41–100% for Owen; positive initiated non-verbal interactions with the dog was 97–100% for Kirsten, 50–100% for Georgie, and 84–100% for Owen; positive verbal responses with the teacher was 94–100% for Kirsten and Georgie and 100% for Owen; positive verbal responses with the dog was 100% for Kirsten and Owen and 97–100% for Georgie; positive non-verbal responses with the teacher was 100% for Kirsten and Owen and 97–100% for Georgie; positive non-verbal responses with the dog was 100% for Kirsten and Owen and 88–97% for Georgie; negative initiated verbal interactions with the teacher and negative initiated verbal interactions with the dog had a range of 100% for all three participants. Negative initiated non-verbal interactions with the teacher had a range of 71–100% for Kirsten and 100% for Georgie and Owen; negative initiated non-verbal interactions with the dog had a range of 100% for Kirsten and Georgie and 94–100% for Owen; negative verbal responses with the teacher had a range of 88–100% for Kirsten and 100% for Georgie and Owen; negative verbal responses with the dog, negative non-verbal responses with the teacher, and negative non-verbal responses with the dog each had a range of 100% for all three participants.

Classroom Ratings

The mean rating of each dependent variable during daily classroom observations after experimental sessions is presented in Table 2. Mean ratings comparing baseline and

intervention sessions showed that there was an increase in positive dimensions on 92% of the assessments, with an overall increase in means from 2.5 to 3.2. There was a decrease in negative dimensions on 83% of the assessments, with an overall decrease in means from 2.4 to 2.1.

Table 2. Means of daily ratings during classroom generalization assessment following each session.

Dependent Variable	Kirsten		Georgie		Owen	
	BL	INT	BL	INT	BL	INT
Positive Initiated Verbal Interactions with Teacher	1.67	2.18	1.56	2.85	1.82	4.00
Positive Initiated Non-Verbal Interactions with Teacher	1.83	2.27	2.89	3.23	2.45	2.71
Positive Initiated Verbal Interactions with Dog	2.83	2.36	3.56	4.31	2.64	3.86
Positive Initiated Non-Verbal Interactions with Dog	2.83	3.20	3.00	3.62	2.91	3.71
Negative Initiated Verbal Interactions with Teacher	3.17	1.91	1.22	1.00	1.73	1.71
Negative Initiated Non-Verbal Interactions with Teacher	3.17	3.45	1.56	1.38	3.00	2.86
Negative Initiated Verbal Interactions with Dog	3.17	2.64	1.11	1.38	2.55	1.86
Negative Initiated Non-Verbal Interactions with Dog	3.33	2.40	1.56	1.31	3.45	3.00

Note: BL = Baseline; INT = Intervention

Social Validity Ratings

The social validity data, all with ratings of 5 or 6, showed that both the teacher and teacher's assistant found the intervention to be appropriate, easy to use, and socially significant. They also strongly agreed that the intervention was effective and led to improved interactions with their teacher.

Discussion

The purpose of this research was to assess the social effects of the presence of a dog on the verbal and non-verbal interactions of children with developmental disabilities toward their teacher and toward a dog at school. The study showed that the presence of the dog during sessions increased positive initiated interactions toward the teacher and the dog for all three participants. Also, when there was a high rate of occurrence of negative interactions, those decreased with the intervention. In addition, social validity assessment established positive ratings of procedures, goals, and effects in this research. Furthermore, qualitative evaluation showed generalized improvements in interactions with the teacher in the children's classroom following sessions with the dog.

The multiple baseline design across three participants was used to demonstrate the effects of the treatment in an experimentally controlled manner. The controlled outcomes were determined by systematically introducing the intervention to different participants, at different points in time, and showing the changes in behavior occurred systematically after intervention and not at any prior time (Kazdin 1982).

This study supports the research by Limond, Bradshaw and Cormack (1997) and Martin and Farnum (2002), in which prosocial behaviors were measured under conditions including the presence of a real dog. However, this study differs in design, diagnosis of participants, procedures, and operational definitions. Although operational definitions of positive behaviors vary across studies, laughing, giving treats, and talking to the dog were included in both of the previous studies. As with the Limond, Bradshaw and Cormack (1997) and Martin and Farnum (2002) studies, this study demonstrated an increase in those behaviors for all participants when in the presence of the dog.

The present study also examined the generalization of effects across settings (Stokes and Baer 1977). Qualitative ratings in the classroom showed improvements, although it is important to recognize that objective and reliable observations of behavior in the classroom were not completed. Although unanalyzed in terms of the factors controlling generalization, there was an important common salient stimulus present in both the intervention setting and the classroom, that is, the teacher. Further evaluation of variables controlling the occurrence of generalization and outcomes in the natural environments of the children is warranted (Stokes and Osnes 1989). Certainly, the presence of a dog may lead to stimulus generalization, but an effective and well maintained program will probably require active support and intervention by teacher or therapist to provide additional consequences typically present in an interaction, in order to support generalization (Redefer and Goodman 1989).

Another area for future study is to look at interactions with the teacher regarding specific tasks, that is, academics, to determine if the child's academic tasks improve either as a result of the sessions or as a result of the increased positive communication with the teacher resulting from these procedures. One parent reported that her child had begun talking much more at home during the intervention stage of this study. Future studies could look at the effects of the intervention and generalization of the behaviors across various settings and times of day.

When working with children with developmental disabilities it is important to discover various ways of teaching them effectively. This study is significant in demonstrating that the presence of a dog can increase communication between a teacher and a child with developmental disabilities. These changes occurred in interaction with the teacher, separate from interactions with the dog, and also without the teacher increasing the number of task suggestions or questions directed toward the children during the intervention condition. This increased communication can then be focused on social development, as well as on educational tasks and learning. It would be beneficial to use dogs in schools as assistants to the school counselor, psychologist, or speech and physical therapists to assist in increasing communication, speech, or motor skills. Dogs can also be used as an assistant in the classroom in teaching a specific task such as daily living skills, or as part of a curriculum such as reading, writing, story time, circle time, etc. A dog can act as the subject for creative writing, for reading stories about dogs, or can participate with children in group activities, with the dog being counted as a member of the group. This may increase participation for the children in some activities. It may not be beneficial to have a dog present throughout the school day, however, as this would be exhausting for the dog and disruptive to the children. It should also be noted that some cultural customs and some children's experiences may preclude them from being participants who may benefit from these procedures.

The present study has limitations. The sample size is small, with three participants who were examined in detailed repeated measures in time series in the typical manner of single-case experimental design. Even though this allows assessment of generalizability through replication across participants, the research is in need of further replication. Effects across participants

were variable, although the general patterns of the data and outcomes were consistent. In these studies, a robust effect is evident visually by examination of graphs allowing assessment of reliability of effects when the probability of a Type 2 error is higher than that of a Type 1 error.

In conclusion, there are few systematic studies to date on the effects of the presence of dogs on social interactions (Hart 2006). Much of the current literature is anecdotal in nature, whereas the present study documented effects of reliable data within a controlled experimental design. This study supports previous findings that the presence of a dog can increase communication and positive non-verbal behaviors, which will enable children with developmental disabilities to recruit reinforcement from their natural environments. This study adds to the growing research literature showing that children with developmental disabilities may benefit from the use of dogs as teaching assistants and adjuncts to therapy.

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