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Teaching Safe Dog-Greeting Skills with Parents and Children

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Abstract

Dog-bites pose a significant problem for children's and dogs' abilities to live an enhanced life. The majority of dog-bite incidents are to children between the ages of 5 and 9 years old and often dogs are euthanized for the crime (Wilson, Dwyer, & Bennett, 2003). There is limited research on a behavior analytic dog-bite prevention intervention that is both effective and generalizable to the natural environment. Yankelevitz et al. (2019) examined a six-step dog-greeting protocol to teach children how to greet unfamiliar dogs appropriately, but following acquisition the dog-greeting skills generalized poorly to the natural environment. The purpose of the present study was to evaluate if caregiver involvement when teaching children the same six dog-greeting steps would aid in the generalization of the skill to the natural environment. Mothers were trained using behavioral skills training (BST) and taught their children the six-step greeting protocol to mastery. Overall, all parents behavior met mastery criterion of 100% across all phases, despite one parent requiring a booster session. Parents also increased their child-dog supervision during both in-home and community observations compared to prior the intervention. Children met the mastery criterion of 80% for all phases and the rate and duration of unsafe dog approach behaviors both in the home and community observations decreased after intervention.

Keywords: behavioral skills training, pyramidal training, caregiver training, dog-safety skills, dog-greeting skills

Introduction

Dog bites are a significant problem that affects both children's and dogs' abilities to live enriched lives. According to the Centers for Disease Control and Prevention (CDC), almost five million dog bites occur yearly in the United States (as cited by Dixon, Mahabee-Gittens, Hart, & Lindsell, 2012). Children between the ages of 5 and 9 years old are more likely to be bitten by a dog than adults. Although the majority of the dog bite incidents are nonfatal, these incidents are a significant safety issue that could be prevented (Shen et al., 2017). Dog bite incidents can leave children with vital injuries and often increases the dogs' chance of being euthanized (Wilson, Dwyer, & Bennett, 2003). Typical community-implemented dog bite interventions tend to fault the dog for the incident and implement euthanasia or enforce dogs to be fenced (Wilson, Dwyer, & Bennett, 2003). These interventions are not an effective way of treating the dog-bite epidemic. The suggested reasons why dogs tend to bite younger children are discussed in several pediatric and pediatric psychology journals. Some factors make children more susceptible to dog bites, such as their physical height, lack of environmental awareness, and impulsive behaviors (e.g., touching a dog without permission; Mathews & Lattal, 1994). Moreover, one of the pediatric journals assessed children's temperament traits (e.g., shyness or impulsivity) and evaluated whether those temperaments affected interactions with dogs (Davis, Schwebel, Morrongiello, Stewart, & Bell, 2012). Results indicated that impulsive children took greater risks with the dogs, even after controlling for child/dog characteristics. Unfortunately, limited research and information are presented from a behavior analytic standpoint.

In applied behavior analysis (ABA), the environment and its conditions play a significant role in the occurrence and nonoccurrence of behavior; this is true for both human and animal behavior. Mathews and Lattal (1994) conducted a behavioral analysis of dog bites where they

discussed the importance of understanding the environmental and behavioral conditions surrounding dog-bite incidents. Dog-child learned interactions play a significant role in the likelihood of being bitten. The behavioral history of a dog shapes its aggressive or submissive responses similar to how a child's learned interactions shape their future behavior. Parents or peers could shape a child's previously learned interactions with dogs by reinforcing or modeling inappropriate dog interactions, such as hugging dogs or otherwise invading a dog's personal space. Lack of supervision and inappropriate modeling of these interactions with the dog may place younger children at a higher risk of dog bites due to their limited experience or skills regarding appropriate dog interactions (Arhant, Beetz, & Troxler, 2017). Mathews and Lattal suggested developing and implementing behavior analytic interventions that target both the child's and parents' behaviors to aid in the prevention of dog bites. Often these interventions include instruction and behavioral analytic techniques to shape and modify behavior. Mathews and Lattal concluded that there is a lack of interventions that target dog-bite incidents and the need for a fundamental intervention to target the dog-bite epidemic is vital. Mainly, a dog safety protocol that teaches both parents and children proper dog safety skills could be the answer. Thus, the development and implementation of appropriate interventions that target dog safety are warranted.

Preventing dog bites requires the development of appropriate and functional dog safety skills that have not been introduced to younger children or their parents. Thus, determining what children already know about dog-safety skills could be beneficial. Dixon, Mahabee-Gittens, Hart, and Lindsell (2012) evaluated how much children know about preventing dog bites and if parents were interested in a dog safety education program for their children. The authors presented the children and parents with surveys and simulated scenario tests (written and

pictorial) that were influenced by the CDC dog-bite prevention recommendations as well as those of the American Academy of Pediatrics (AAP). For example, one written scenario asked, "One of your family members has a new dog; do you pet it?" and the provided answer options were “yes” or “no”. Similarly, for the pictorial scenarios in which a picture of a black dog sitting in front of a doghouse was presented, the question was, "Should you pet the dog?” The results from this study indicated that 43% of younger children (i.e., 5-9 years old) failed the dog scenarios test with older children (i.e., 10-15 years old) having a greater likelihood of passing. The majority of parents passed the dog scenario test and, according to the parents, 70% of children had not received any dog safety skills even though 88% of parents were interested in receiving them (Dixon et al., 2012).

Although children seem to have lack of dog safety skills even adults seem to not be able to discriminate dog body signals well enough without training (Meintz, Brelsford, & De Keuster, 2018). There is a significant lack of dog safety skills in younger children, especially when it comes to when to pet a dog or how to greet a dog appropriately. If a younger child approaches a strange dog with its owner, the child is more likely to pet the dog and increase their chances of being bitten (Yankelevitz, Williams, Knerr, & Sheppard, 2019). The importance of the dog-bite epidemic requires an evidence-based dog safety intervention that can decrease the chances of younger children being bitten.

Review of the Literature

Dog Safety Interventions

The most common dog safety interventions utilize videos, internet websites, and software programs to teach children how to interact safely with dogs (Shen et al., 2017). Schwebel, Morrongiello, Davis, Stewart, and Bell (2012) evaluated the efficacy of a software program

named “The Blue Dog” that was created to teach children how to interact safely with dogs via interactive computer-based animated scenarios. For example, one scenario showed the dog sleeping and the child was presented with the choice to either pet the dog or leave it alone. They conducted a pre- and post-intervention assessment of the Blue Dog program and randomly assigned subjects to either the dog-safety or fire-safety condition. The authors evaluated what the subjects learned from the dog safety software program with three different scenarios, such as a picture, a dollhouse simulation, and an unfamiliar dog interaction. Results indicated that the dog safety program resulted in improvements in basic knowledge on how to interact safely with dogs (Schwebel et al., 2012). The Blue Dog software did not aid in the generalization of skills to the dollhouse simulation or with the unfamiliar live dog (Schwebel et al., 2012). Although these results suggest that The Blue Dog training increased knowledge of dog safety skills, the skills did not generalize to the unfamiliar dog, thus indicating that completion of the program may not aid in preventing a child from being bitten by a dog in their natural environment. Schwebel et al. addressed this potential limitation and mentioned the possibility of involving parents and considering how their involvement and supervision might change the generalization of the dog safety skills.

Following that suggestion, Morrongiello et al. (2013) evaluated parents' reactions and supervision of their children in the proximity of an unfamiliar dog after both parent and child had taken The Blue Dog prevention program. The authors recruited 55 typically developing parent-child dyads. They conducted a pre-and post-intervention software to assess whether exposure to The Blue Dog would change parents’ behaviors. The authors evaluated what the parents learned from the software by having the parent and child enter a room with an unleashed therapy dog. The authors then observed the parents' supervision behaviors and child-dog interactions. Results

indicated that The Blue Dog did not improve parents' dog safety skills or supervision practices with their children (Morrongiello et al., 2013). On the other hand, the parents encouraged their children to touch and interact with the unfamiliar dog despite their unknown status (e.g., history of biting people).

Thus, regardless of parental participation, The Blue Dog clearly is not an effective intervention that can be utilized to decrease the dog-bite epidemic. These results suggest the fundamental importance of creating an evidence-based dog safety protocol that targets both parent's and children's proper dog safety skills. Shen et al. (2017) conducted a meta-analysis of cognitive/behavioral interventions that have been utilized to educate children about dog safety. The authors found 12 published studies, only two of which (Chapman, 2000; Coleman, 2008) utilized a live dog in the context of the intervention. Most of the studies utilized videos, computer software, role-play, and written manuals. Results of the meta-analysis indicated that the available cognitive/behavioral interventions were somewhat effective in increasing children's dog safety knowledge and the two live dog studies were most effective in increasing safe behaviors around dogs (Shen et al., 2017). Although these results suggest some effectiveness of the dog safety interventions available, none of them examined generalization and maintenance of dog safety skills to the natural environment. Furthermore, there was a lack of published studies that included parental participation and information on dog safety interventions from a cognitive-behavioral standpoint.

The previous research on dog safety skills has centered on teaching children safe behaviors around dogs, but limited research has focused on teaching one set of dog safety skills (e.g., how to safely greet a dog). Moreover, no studies evaluated behavior analytic interventions for the prevention of dog-bite incidents. Yankelevitz et al. (2019) was one of the first studies to

introduce a behavior analytic intervention for the prevention of dog bites from unfamiliar, leashed dogs. The authors created a six-step protocol to teach children how to appropriately greet and behave safely around dogs. One of the main components utilized in the training sessions was TAGteach, a clicker-training method based on ABA principles used to aid in providing auditory feedback at the precise moment the individual performs the behavior correctly (Yankelevitz et al., 2019). Once the correct behavior was performed, the authors would press the clicker button to make a sound and the individual was provided with immediate positive reinforcement. The authors utilized a toy dog for the training sessions and included the use of therapy dogs after the intervention to test for generalization of greeting dogs safely. Results indicated that TAGteach produced 100% accurate responding for all children with the toy dog, but there was a lack of generalization to the therapy dog until the skills were specifically trained in the natural environment with therapy dogs (Yankelevitz et al., 2019). Additionally, all three children included in the study required additional feedback and prompting after TAGteach training with the dogs but the skills eventually generalized to new settings and dogs. These results suggest that teaching children how to greet dogs safely can be successful but the skills generalize poorly to the natural environment.

Caregiver Training

Applied behavior analysis is unparalleled among other professions due to its reliance on having others implement behavior analytic procedures that are important to the effectiveness of interventions (Lerman, LeBlanc, & Valentino, 2015). Behavior analysts have created and utilized caregiver-training practices to aid in the acquisition, maintenance, and generalization of intervention implementations with many different populations (Lerman et al., 2015). The previously discussed bite-prevention research has examined children's dog safety skills and the

effectiveness of various training approaches in teaching dog-bite prevention. Although the research utilized children as their primary subjects, many mentioned or suggested the involvement of parents (Schwebel et al., 2012; Morrongiello et al., 2013; Yankelevitz et al., 2019). In ABA, parent involvement and parent training play a significant role in the success, generalization, and maintenance of behavior-change interventions.

Marcus, Swanson, and Vollmer (2001) evaluated the effects of a parent-training model that taught the parents of children with behaviors maintained by socially mediated reinforcement how to utilize ABA interventions. This was conducted to aid in decreasing problem behaviors using a differential-reinforcement-of-alternative behavior procedure. Results indicated that parents could be trained successfully to implement complex behavior-reduction procedures and that their children's behaviors improved due to the parents' performance (Marcus et al., 2001). Moreover, in follow-up observations, long-term maintenance was demonstrated and generalization of skills was exhibited. Often, parent training focuses on ABA interventions that increase or teach appropriate behaviors such as incidental teaching and mealtime protocols (Hsieh et al., 2011; Pangborn et al., 2013). Behavioral skills training (BST) and pyramidal training are two effective training strategies to use with caregivers (Shayne et al., 2013; Miles et al., 2009; Kuhn et al., 2003).

Behavioral skills training. Behavioral skills training (BST) is an effective ABA intervention utilized to teach untrained or new skills. The primary components of BST are instructions, modeling the behavior, rehearsal in situ, and corrective feedback (Miltenberger, 2012). Caregivers play a significant role in BST research and often are taught to implement a variety of behavior analytic interventions to aid in increasing socially significant behaviors (Marcus et al., 2001; Hsieh et al., 2011; Pangborn et al., 2013). For example, Lafasakis and

Sturmey (2007) trained parents to implement discrete trial teaching (DTT) to their children with developmental disabilities using BST. Results demonstrated that, after BST training, parents' use of DTT improved and their children's correct responding increased. Moreover, improving the correct implementation of DTT aided in the generalization of correct parent teaching to new behavior analytic programs (Lafasaks & Sturmey, 2007). Behavioral skills training has also been utilized to teach caregivers specific functional assessment procedures and social skills (Shayne et al., 2013; Dogan et al., 2017). Overall, BST research has focused on teaching common behavioral interventions and problem behaviors, but there are no published examples of applications of BST to teach dog safety skills.

Pyramidal training. Pyramidal training is a train-the-trainer model/approach that involves a skilled professional training one individual to train another individual on how to implement the same procedure/skill (Kuhn et al., 2003; Parson, Rollyson, & Reid, 2013; Conklin & Wallace, 2019; Erath et al., 2020). In pyramidal training, the trainer should always meet a mastery criterion when implementing the behavior analytic procedures before being able to teach the procedures to someone else (Lerman et al., 2015). Moreover, the behavior analyst often must teach the trainer how to implement BST with the client. The primary components of pyramidal training include the behavior analyst teaching the trainer by describing the intervention, using modeling, practice with role-playing or in situ situations with others, corrective feedback, and data collection training (Andzik & Cannella-Malone, 2017).

There has been much research conducted on pyramidal training and its effectiveness in teaching caregivers/staff to teach their children, staff, students, or clients how to perform specific skills or procedures (Jones et al., 1977; Page et al., 1982; Shore et al., 1995; Neef, 1995; Schlosser et al., 2006; Andzik et al., 2017). Pyramidal training has also been taught in different

settings. For example, Jones, Fremouw, and Carples (1977) utilized pyramidal training to successfully teach teachers how to implement a classroom management skill program by having the primary teachers train other teachers. Page, Iwata, and Reid (1982) evaluated pyramidal training to teach institutional direct care staff on how to conduct appropriately behavioral programs and succeeded. Moreover, pyramidal training has been utilized to teach direct-care staff working with clients that exhibited intensive maladaptive behaviors (e.g., self-injurious behaviors) and results suggested that direct-care staff behavior improved and clients' problem behaviors decreased (Shore, Iwata, Vollmer, Lerman, & Zarcone, 1995). Lastly, Neef (1995) conducted a study that replicated a pyramidal model for parent training by peers (e.g., parents trained other parents) and compared it to training by a typical instructor. Results indicated that both the parent training by peers and regular parent training increased appropriate acquisition of skills. As is the case with BST, the pyramidal training model has not yet been used for any kind of dog-bite prevention interventions.

Pyramidal training combined with BST. Pyramidal training combined with BST is a model in which both training methods are utilized together to teach certain procedures or skills (Parson, Rollyson, & Reid, 2013; Conklin & Wallace, 2019; Erath et al., 2020). Parson, Rollyson, and Reid (2013) developed an evidence-based staff training guide for practitioners to utilize when training staff/others on behavioral interventions. They described a BST structure that included basic components of training protocols with aspects of pyramidal training. For example, the authors described a typical BST structure (instruction, modeling, rehearsal, and feedback) while highlighting the importance of training others to train the procedure/skill to mastery (Parson et al., 2013). The researchers further demonstrated the application and effectiveness of the combined training by successfully teaching staff to conduct two different

behavior analytic procedures (most-to-least prompting and signing skills). Lastly, Conklin and Wallace (2019) conducted a study that combined pyramidal parenting training using BST. The authors trained caregivers to use a DRA procedure with a combined pyramidal and BST model that included the primary trainers training the other caregivers to mastery (Conklin & Wallace, 2019). The results of this study demonstrated the efficiency and ability of caregivers being able to teach others a procedure to mastery criterion. A combination of a pyramidal BST training model has not yet been used for any kind of dog-bite prevention interventions including caregivers.

Statement of the Problem

Although Yankelevitz et al. (2019) were the first to demonstrate how to teach dog safety skills using a behavior analytic approach, the dog-greeting skills generalized poorly beyond a controlled setting. Therefore, more research is needed to assess generalization and maintenance of these skills in the natural environment to decrease the frequency of dog bites. Additionally, the results obtained from Yankelevitz et al. suggested prompting from parents to aid in children's safe-greeting dogs safely behaviors, indicating parental/caregiver involvement needs to be examined. One of the main reasons dog-bite prevention programs have not been successful could be due to the lack of parent training utilized with the interventions. Applied behavior analysis can help with the dog-bite epidemic by creating a dog safety prevention protocol that includes parents/caregivers. The study conducted by Yankelevitz et al. on greeting dogs safely would provide an excellent start for the caregiver training aspect. Mainly, creating a study that trains caregivers to teach their children how to greet dogs safely could aid in facilitating generalization and maintenance of the skill to the natural environment. Furthermore, no studies to date have examined the use of BST for behavior involving dog safety. Thus, the purpose of

the current study was to conduct a partial replication of Yankelevitz et al. (2019). However, to extend the literature on parent/caregiver training, parents served as the primary subject, the child as the secondary subject, and the behavior analyst taught the parents to teach their children how to safely approach unfamiliar leashed dogs using BST instead of the TAGteach procedure utilized by Yankelevitz et al. (2019) due to the extensive evidence supporting BST as a caregiver training procedure. This will extend the literature on parent training effectiveness and be the first study to use pyramidal BST for behavior directed toward dogs.

Method

Subjects and Setting

The current research was conducted with caregivers and their typically developing children. Parents were the primary subjects and their children were the secondary subjects. There were three parent-child dyads that were recruited by contacting parents of children receiving services at the practicum sites of an ABA graduate program located in Central Florida. The children ranged in age from 4 to 9 years and had at least one dog living in the home. The primary subjects were three mothers with credentialing in behavior analysis (BCBA- or RBT-level) and the secondary subjects were their respective children. Luna was the mother of Rio, a 9-year-old boy; Belle was the mother of Jim, a 9-year-old boy; and Eden was the mother of Eve, a 4-year-old girl. Sessions were conducted in the subjects' homes, neighborhoods, and/or local parks to aid in generalization across settings. Subject dyads were included if, based on the initial assessments, the children exhibited any unsafe behaviors in the home with their pet dog or failed to demonstrate any safe dog-greeting steps with a therapy dog.

Materials and Therapy Dogs

The initial training sessions were conducted with a life-sized Boston terrier toy dog, about 12 in. tall, with a leash attached that was held by a research assistant. Sessions were recorded with a video camera on a tripod. A miniature construction light was utilized during evening sessions as needed.

Two certified therapy dogs were utilized across specific phases. Two dogs (a golden retriever and black Labrador) were recruited from the Alliance of Therapy Dogs. Dog handlers accompanied all dogs during sessions to ensure the safety of both human and animal subjects.

Experimental Design

A multiple baseline design across parents was utilized to evaluate the effects of BST to teach parents to implement/teach six dog-greeting steps with their children. The first two parents' data (Luna and Belle) were collected concurrently and the third subject's data (Eden) were collected nonconcurrently because she was recruited at a later time.

Data Collection

Researchers collected data from the videos recorded during all sessions/trials. There were six different phases conducted and each phase consisted of one to several trials. Sessions were conducted once per day for a maximum of 30 min; each session consisted of at least one trial.

Procedure

1. Baseline probes with therapy dog and pets (baseline probes). Two different baseline probe sessions were conducted, a community probe and a home probe. The first probe session involved observing each parent's and child's behaviors while greeting an unfamiliar, leashed therapy dog in the community. This observation was conducted once; parents were asked to act as they normally did around their children in this scenario. The objective of this

probe was to assess both the parent's and child's baseline level of safe dog-greeting steps. During this baseline observation, parent's supervision behaviors were rated on a scale of 1 to 5 (depicted in Table 1) that was adapted from the website Family Paws Parent Education (2014) and the rate and duration of children's unsafe dog approach behaviors were recorded according to this scale.

The duration and rate of children's unsafe dog approach behaviors were also recorded in each trial. This measure was collected during certain probe sessions and the operational definition is described below. Children were required to meet both 80% mastery of dog-greeting steps and exhibit no unsafe dog-approach behaviors to meet the criterion for phase change. Children's unsafe dog approach behaviors were operationally defined as any grabbing or pulling of tails or ears, climbing or trampling on dog, putting face up to dog's face, approaching dog when sleeping, hugging dog, running and shouting loudly around dog, touching dog without permission, taking dog toys when dog is playing, and/or approaching dog when eating.

The second baseline probe session involved observation of the parent's and child's interactions with their own dog living in the home. This was conducted once and parents were asked to interact as they normally did with their dog and children in the same room. Similar to the other probe condition, parent's supervision behaviors were rated according to the scale in Table 1 (Family Paws, 2014) and the rate and duration of children's unsafe behaviors were calculated.

2. Behavioral skills training baseline with parent using toy dog (BST baseline). Following the probe sessions, each parent was asked in a role-play context to demonstrate, to the best of her ability, how she would teach her child (played by a research assistant, or RA) to greet an unfamiliar dog using the Boston terrier toy dog. The researcher asked the parent to pretend

the RA was her child and to show how she would teach her child (i.e., the RA) to greet the toy dog. Sessions in Baseline had a 30-min cap and consisted of at least three trials. During each baseline trial, the parent had one opportunity to emit four correct BST steps (depicted in Table 2). Baseline were set to be 3, 4, or 5 for parents depending on the order the subjects participated in the study. The percentage of correct BST steps was calculated by dividing the number of correct steps performed by the total number of possible steps and multiplying by 100.

3. Dog approach training trials with parent using BST and toy dog (Dog approach training with parent). In this phase, the dependent measure for the parents was performance of the dog-greeting steps (depicted in Table 3). During each trial, the parent had one opportunity to emit six correct dog-greeting steps. This measure was collected to ensure parents were able to correctly use the dog-greeting steps before teaching their children the same steps. The BST training procedure described below was utilized by the researcher to train the parents. Sessions were conducted with a life-sized toy dog (see Figure 1) when the child was not present. The BST procedure included four steps: 1) instruction, 2) modeling, 3) rehearsal, and 4) feedback (see Table 2). Instruction required the researcher to provide the rationale for safe dog-greeting steps, when to use the steps, and what the six steps were. Modeling required the researcher to demonstrate all six steps correctly (with help from another RA playing the part of the dog's owner) and provide opportunities to answer any questions. Rehearsal required the parent to practice the prior modeled steps to mastery with the researcher and RA. Lastly, immediate corrective feedback (within 10 s) of an incorrectly completed step was provided to the parent each time she practiced the dog-greeting steps and praise was provided throughout.

Parents completed the dog-greeting steps until they met a mastery criterion of 100% of steps correct across two sessions on two different days. The percentage of steps for dog-greeting

were calculated by dividing the number of correct steps performed by the total number of possible steps and multiplying by 100.

4. Behavioral skills training for parent-implemented BST with RA and toy dog (Parent-implemented BST with RA). The dependent measure for parents was percentage of BST steps correct per trial. In each trial the parent had one opportunity to emit all four components of BST (see Table 2). The parents were required to correctly perform all four BST steps with a mastery criterion of 100% across two sessions on two different days. Sessions were conducted with a toy dog (Figure 1) when the child was not present. The researcher and two RAs were present during the entire session to aid in the role-play context. The researcher utilized pyramidal training with BST to teach the parent the BST procedure. Instruction required the researcher to provide the parent with a copy of Table 2 and instruct the parent on how to correctly use the BST steps to teach the six dog-greeting steps. Following the instruction component, the parent observed the researcher and RA model/role-play the BST steps depicted on Table 2. The researcher played the role of the parent and the RA played the role of the child. After the researcher demonstrated the BST steps, the parent switched roles with the researcher and practiced the BST steps demonstrated with the RA playing the role of the child. Lastly, corrective feedback (within 10 s) of an incorrectly completed step was provided to the parent each time she practiced the four BST steps and praise was provided throughout.

During this treatment phase there was a 30-min cap, multiple trials conducted each session, and parents had one opportunity to emit four correct BST steps each trial. Parents completed the BST steps until they met a mastery criterion of 100% of BST steps correct across two sessions on two different days. The percentage of correct BST steps were calculated by

dividing the number of correct steps performed by the total number of possible steps and multiplying by 100.

5. Parent-implemented BST with child using toy dog (Parent-implemented BST with child). The dependent measure for the children in this phase was percentage correct dog-greeting steps (see Table 3). During each trial, the child had one opportunity to emit all 6 steps. The children were required to correctly perform at least 80% of the steps before moving on. Parent-child dyad sessions were conducted with a toy Boston terrier in a naturalistic setting (e.g., outside of the home in a park or on a sidewalk in the neighborhood). Parents were instructed to teach their children the safe dog-greeting steps by using the four-step BST training procedure described above, but this time the parent took the place of the researcher and the child took the place of the RA. The parent's was measured as percentage correct BST steps completed when teaching her child the safe dog-greeting steps. There were multiple trials conducted each session. During this phase, the researcher provided feedback only and parents had one opportunity to emit four correct BST steps each trial. The percentage of safe dog approach steps completed by the child was measured and training continued until a mastery criterion of 80% was met across two sessions on two different days. During each trial the child had one opportunity to emit six correct dog-greeting steps. The percentage correct of dog-greeting steps were calculated by dividing the number of correct steps performed by the total number of possible steps and multiplying by 100.

6. Dog probe/Dog Test. Following BST with Child, the parents' behaviors were assessed once (as a probe for generalization of their skills learned with a toy dog) with their child in the presence of a therapy dog. The therapy dog's handler was asked to remove the dog's therapy vest prior to the session and to hold the dog's leash. The parent's percentage of correct BST

steps were measured and the parent's supervision behaviors were rated similarly to the initial baseline probe condition (Family Paws, 2014). The child's safe dog-approach behaviors were also observed during the parent implemented BST components to measure whether the child used the previously mastered safe dog-greeting steps. Furthermore, the child's rate and duration of unsafe dog approach behaviors were assessed to measure whether they would engage in any unsafe behaviors around the therapy dog. The child's safe dog approach behaviors were measured by calculating the percentage of correct steps utilized when greeting the dog. Children were required to meet both 80% mastery of dog-greeting steps and exhibit no unsafe dog approach behaviors to meet the criterion to phase change.

If the child exhibited no unsafe behaviors and 80% mastery of dog-greeting steps, then a final observation similar to baseline probes was conducted with the dogs living in the home. This was conducted to see if, after training, there was any transfer or generalization of some appropriate greeting steps such as petting a dog on its side instead of the head. Parents were required to meet 100% mastery of BST steps to meet criteria to phase change to the final in-home observation. Similar to baseline probe sessions, each parent's supervision behaviors were rated and the child's unsafe behaviors were recorded (Family Paws, 2014). Alternatively, if parents did not meet 100% mastery of BST steps during the dog probe, parents were exposed to a BST booster session and the Dog probe was reimplemented.

Inter-observer agreement (IOA). A second observer independently scored 45% of trials across all phases (BST baseline, BST with RA, BST with Child, and Dog Probe/Test) on the parent and the child. Inter-observer agreement was calculated by using a trial-by-trial basis for each session by diving the number of agreements by the total number of agreements plus

disagreements and multiplying by 100. Inter-observer agreement scores for parent's correct implantation of BST with child were a mean of 98% for Luna, 99% for Belle, and 97% for Eden. Inter-observer agreement scores for children were 100% for all phases.

Treatment integrity. Treatment integrity data was collected from all video recording by an independent observer for 33% of trails. Data were collected on the researcher's correct implementation of BST training with the parents. Treatment integrity scores were 97% for the researchers.

Social Validity Survey

A social validity survey was provided upon completion of the study similar to that used by Yankelevitz et al. (2019) in which caregivers were asked to complete a brief questionnaire to evaluate the utility of the dog-greeting skills selected and whether the intervention resulted in socially significant outcomes. Statements regarding importance, practicality, and satisfaction were rated on a Likert scale ranging from strong agreement to strong disagreement. The results of the survey are depicted on Table 4.

Results

Parent Data

Figure 2 depicts the parents' (Luna, Belle, and Eden) percentage of correct BST components across the different phases and generalization steps (BST with Mother, BST with RA, BST with Child, and Dog Probe). Overall, parents met mastery criterion of 100% across all phases with one parent requiring a booster session, so it was not necessary to conduct the proposed phase where the mother was to implement BST with her child in the presence of a therapy dog. Moreover, all parents increased their supervision of child-dog interactions for both in the home and community observations.

During Baseline, parents did not demonstrate any of the four BST components or any of the targeted dog-greeting steps. All parents were then trained to master the dog-greeting steps prior to being trained on the BST components. In BST with RA, parents learned to exhibit the BST components correctly. After mastery of these steps, BST with Child was implemented. Parents mastered all BST steps with their children and were able to move onto the Dog Probe. One parent (Luna) did not meet criterion initially so a booster session was implemented in which she remastered the BST components and the she passed the final Dog Probe session. Belle and Eden passed the Dog Probe and did not require a booster session.

Table 5 depicts the parent supervision ratings for both in the home and community observations, before and after intervention (Family Paws, 2014). Before intervention, Luna exhibited proactive supervision (Rating 4) in the home and reactive supervision (Rating 3) in the community setting. After intervention, Luna exhibited active supervision (Rating 5) in both the home and community setting. Before intervention, Belle exhibited passive supervision (Rating 2) for both in the home and community setting. After intervention, Belle exhibited proactive supervision (Rating 4) in the home and active supervision (Rating 5) in the community setting. Lastly, before intervention, Eden exhibited active supervision (Rating 5) in the home and proactive supervision (Rating 4) in the community setting. After intervention, Eden exhibited active supervision (Rating 5) in both the home and community setting.

Child Data

Figure 3 depicts the children's (Rio, Jim, and Eve) percentage of correct dog-greeting steps across the parent training phases and generalization steps (Baseline, BST with Child, and Dog Test). Overall, all of the children met the mastery criterion of 80% for all dog-greeting training phases and generalization steps. Moreover, children's rates and durations of unsafe dog-

approach behaviors for the observations in the home and community decreased after intervention. None of the six dog-greeting steps generalized to the dyads' in-home pet dogs, but that was expected due to the purpose of the dog-greeting steps being stated as for use only when greeting unfamiliar dogs in the community.

During Baseline, Rio and Jim did not exhibit any of the safe dog-greeting steps. Alternatively, Eve exhibited one of the safe dog-greeting steps independently. The children were trained by their mothers (Luna, Belle, and Eden) using a toy dog until mastering 80% or more of the steps (i.e., although children were expected to master 80% of the steps, all parents continued to test their children until 100% mastery was exhibited). All of the children did meet or exceed the 80% criterion in all phases such as the BST with Child and Dog Test. However, Rio was exposed to an additional booster session due to Luna requiring BST booster training in the Dog Probe phase. Jim did meet 80% or more but took longer than the previous child to master the six dog-greeting steps. Eve also took slightly longer to master the six dog-greeting skills than the 1st child.

Table 6 depicts the rate and duration of unsafe dog-approach behaviors for both in the home and community observations, before and after intervention. Before intervention, Rio exhibited 0.2 unsafe behaviors per min (Duration = 2.48 min) in a 45-min observation period while he interacted with the family's pet dog. During the community probe with a therapy dog, Rio exhibited 3.76 unsafe behaviors per min (Duration = 58 s) in a 1.33-min observation. After intervention, Rio exhibited an in-home rate of 0.03 unsafe behaviors per min (Duration = 3 s) in a 30-min observation. During both community tests (before and after Booster) with the therapy dog, Rio exhibited 0 unsafe behaviors in 4.07- and 3.06-min observations, respectively.

Before intervention, Jim exhibited 1.57 unsafe behaviors per min (Duration = 2.47) in a 36-min observation period while he interacted with the family's pet dog. During the community probe with a therapy dog, Jim exhibited of 0.93 unsafe behaviors per min (Duration = 39 s) in a 2.16-min observation. After intervention, Jim exhibited an in-home rate of 0.22 unsafe behaviors per min (Duration = 47 s) in a 31.55-min observation. During the community test with the therapy dog, Jim exhibited 0 unsafe behaviors in a 4.39-min observation respectively.

Lastly, before intervention, Eve exhibited 0.93 unsafe behaviors per min (Duration = 1.73) in a 30.12-min observation while she interacted with the family's pet dog. During the community probe with a therapy dog, Eve exhibited of 0.89 unsafe behaviors per min (Duration = 5 s) in a 2.28-min observation. After intervention, Eve exhibited an in-home rate of 0.13 unsafe behaviors per min (Duration = 69 s) in a 30.15-min observation. During the community test with the therapy dog, Eve exhibited 0 unsafe behaviors in a 5.17-min observation respectively.

Discussion

The purpose of this study was to extend the literature on parent training effectiveness related to safe dog-greeting skills for children and evaluate whether using pyramidal BST would aid parents and children in learning and better generalizing the dog-greeting skills. The intervention was effective in teaching parents the correct use of BST for training dog-greetings steps. Furthermore, the parents were able to use BST to teach their children the dog-greeting steps to high accuracy regardless of the age or gender of their children. Consistent with previous research, the current study suggests that BST is an effective teaching model and can aid in generalizing skills to untrained environments (Shayne et al., 2013; Miles et al., 2009; Kuhn et al., 2003; Miltenberger, 2012). Due to the effectiveness of BST, all subjects learned the skills with a

toy model used in the place of a real dog and those skills generalized to a therapy dog in probe sessions. Moreover, parents' supervision of their children interacting with dogs increased after intervention. Similarly, children's unsafe dog-approach behaviors decreased after training with BST in the home with their own pets and in the community observations with the therapy dog. These results suggest that parental involvement and supervision when it comes to dog-safety is critical to not only teach safe dog-greeting but also dog safety overall. When children were being monitored closely by the parents, fewer unsafe dog approach behaviors tended to occur. Furthermore, even though no dog-greeting steps generalized to the in-home pets, the children exhibited fewer unsafe behaviors with their own pets following the training.

The study by Yankelevitz et al. (2019) and the current study shared certain similarities. For example, both studies utilized the same six dog-greeting steps, tested the knowledge of their subjects, and targeted dog safety skills from a behavior analytic standpoint. Alternatively, instead of the TAGteach intervention utilized by Yankelevitz et al., the current study focused on parental involvement, parent training, and pyramidal BST. Thus, the results of this study cannot be directly compared to the results of the prior study due to the use of different interventions. Thus, we cannot make any conclusion regarding whether TAGteach or pyramidal BST is more effective in training children the safe dog-greeting steps. On the other hand, we can conclude that parents were successfully taught to teach their own children the six dog-greeting steps in the current study. It remains an empirical question as to which intervention might be more efficient and effective at teaching children safe dog-greeting skills.

Several limitations of the current study warrant consideration. First, even though pyramidal BST was effective in training parents to implement BST with children, the structure of the Dog Probe/Test could have tested the children's dog-greeting steps with therapy dog more

effectively. For example, because the Dog Probe tested the parents' generalization of the BST components, the child observed the parent modeling the correct behavior while implementing BST. This was the case because the primary subjects were the parents and we were interested in whether pyramidal BST training could teach them to effectively teach their children dog-greeting steps. However, instead of probing the parents' skills during the dog probe, we could have simply tested whether the children would independently demonstrate the six dog-greeting steps

Second, the results of parental supervision rating and the child's rate/duration of unsafe dog approach behaviors in the home warrant some caution. The supervision ratings were created by Family Paws Parent Education (Family Paws, 2014), a company that aids in increasing dog safety with younger children and parental supervision during child-dog interactions. However, there is no research supporting the utilization of these supervision ratings. Future research should evaluate if these supervision ratings accurately depict the rating of parental child-dog supervision. Additionally, although the rate and duration of unsafe behaviors decreased in home post-intervention, it is not clear if the presence of the main researcher during the observation could have exhibited stimulus control over the child's and parent's behavior because the researcher was present for all phases and trials throughout the entire study. After further consideration, it may have been prudent for a different individual to conduct the in-home observations.

Lastly, all subjects had difficulties mastering "waiting for 2 s", one of the six dog-greeting steps developed by Yankelevitz et al. (2019). Everyone missed this step or did not wait the full 2 s when training was being conducted. In fact, most of the reductions of performance accuracy were due to this single step. This was probably because waiting 2 s seemed unnatural

when the child was greeting the therapy dog. Thus, this particular step could be replaced with waiting for a shorter time (e.g., 1 s) before slowly walking up to the dog.

Overall, however, this study was one of the first studies to evaluate a pyramidal BST structure and highlight the importance of parental involvement when it comes to teaching children dog safety skills. We hope it will contribute to the existing literature by providing further evidence for an effective safe dog-greeting procedure that will aid in lowering the chances of a child being bitten.

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Table 1

Parent Supervision Rating (Lowest to Highest)

Rating	Description
1. Absent supervision	No supervision of dog-child interaction. Parent is not present in the room or near the vicinity of dog-child interaction. Parent is not attentive of dog-child interactions, has left the dog and child alone in the same room with no safety preparations for more than 1 min. There are no antecedent preparations for safe dog-child environment (e.g., placing dog behind child fence or kennel).
2. Passive supervision	No supervision of dog-child interaction. Parent is present in room but often leaves and is not watching or supervising dog-child interactions. Minimal supervision is present with environmental objects, responsibilities, or guest distracting parents. There are no antecedent preparations for safe dog-child environment.
3. Reactive supervision	Minimal supervision of dog-child interaction. Parent is present in room and responds only when dog or child interaction becomes too close. There are no antecedent preparations for safe dog-child environment.
4. Proactive supervision	Some supervision of dog-child interaction while parent is reading or doing small task in close proximity of child. Parent is alert and provides prompting of dog-child interaction when needed. Parent is present in the room with minimal distractors. Dog and child are appropriately separate. Antecedent preparations for safe dog-child interaction are present.
5. Active supervision	One-on-one dog-child supervision with hands-on prompting. Parent is alert and has no distractors and is consistently close and monitoring dog-child interaction. Antecedent preparations of dog safety are taken.

Table 2

Behavioral Skills Training Steps and Definitions

Steps	Operational Definition
1. Instruction	Parent will state the name of the skill (safe dog-greeting skills), provide one reason why the skills is important (e.g., these are important steps to help us not get bitten by an unfamiliar dog), and when to use the steps (use these steps when greeting dogs). Parent will then state all six dog-greeting steps in order and say, "we are going to learn these steps now" and proceed to modeling step.
2. Modeling	Parent will state to the child that they will demonstrate the six dog-greeting steps. Parent will demonstrate six dog-greeting steps correctly two times. Parent will explain the importance of using these skills in the correct order and proceed to the rehearsal step.
3. Rehearsal	Parent will state to the child "it is time to practice the six dog-greeting steps with the toy dog". The parent will observe the child practice the six dog-greeting steps until it is demonstrated correctly at least a couple of times.
4. Feedback	Parent will provide feedback within 10 s of the behavior (dog-greeting steps). The feedback (corrective or praise) should be delivered while the child is practicing and demonstrating the six dog-greeting steps. If the child demonstrates incorrect steps or misses a step, the rehearsal (practice) step will be repeated.

Table 3

Safe Dog-Greeting Steps

Steps	Description
1. Ask permission	Ask the handler for permission to pet the dog
2. Wait 2 seconds	Wait for approximately 2 seconds
3. Step to the side	Move slowly to the side of the dog
4. Pet the shoulder	Extend hand and pet the dog's side or shoulder
5. Bring hand to side	Move hand back to the side of body
6. Step back	Take one step away from the dog

Table 4

Social Validity Survey Questions and Results

Question	Parent 1	Parent 2	Parent 3
1. My child's knowledge regarding appropriate, safe dog-greeting behavior has increased.	Agree	Strongly Agree	Strongly Agree
2. My child behaves more safely around unfamiliar dogs after participating in this research/training.	Agree	Agree	Agree
3. My child behaves more safely around dogs at home (or other familiar dogs) after participating in this research/training.	Neutral	Agree	Neutral
4. This research/training resulted in negative effects on my child's behavior around dogs.	Strongly Disagree	Strongly Disagree	Strongly Disagree
5. I believe the dog-greeting steps listed above are child-friendly and easy to follow.	Neutral	Strongly Agree	Agree
6. I believe my child experienced discomfort while participating in this research/training.	Neutral	Strongly Disagree	Strongly Disagree
7. I enjoyed being part of my child’s learning experience.	Agree	Strongly Agree	Strongly Agree
8. It is important for children to be informed about how dogs can be approached safely	Strongly Agree	Strongly Agree	Strongly Agree
9. I am pleased that this research/training was implemented early in my child's life.	Agree	Strongly Agree	Agree

10. The skills taught in this research/training are valuable to my child in a variety of settings.	Agree	Strongly Agree	Agree
11. I would recommend participation in this research/training to other parents for their children.	Yes	Yes	Yes
12. Do you think being involved in the teaching procedures aided in increasing your child's dog safety skills?	Yes	Yes	Yes

Table 5

Parent Supervision Rating Scores

	In-Home (Pet dog)		Community (Therapy dog)	
	Before intervention	After intervention	Before intervention	After intervention
Name	Parent rating	Parent rating	Parent rating	Parent rating
Luna	4	5	3	5
Belle	2	4	2	5
Eden	5	5	4	5

Table 6

Rate and Duration of Unsafe Dog-Approach Behaviors

	In-Home (Pet dog)				Community (Therapy dog)			
	Before intervention		After intervention		Before intervention		After intervention	
Name	Responses per min	Total duration	Responses per min	Total duration	Responses per min	Total duration	Responses per min	Total duration
Rio	0.2	2.48 min in a 45 min observation	0.03	3 s in a 30 min observation	3.76	58 s in a 1.33 min observation	0	0 in a 4.07 and 3.06 min observation
Jim	1.57	2.47 min in a 36 min observation	0.22	47 s in a 31.55 min observation	0.93	39 s in a 2.16 min observation	0	0 in a 4.39 min observation
Eve	0.93	1.73 min in a 30.12 min observation	0.13	69 s in a 30.15 min observation	0.89	5 s in a 2.28 min observation	0	0 min in a 5.17 min observation

Table 7

Sequence of Conditions

Order	Luna	Belle	Eden
1	Baseline probes (1)	Baseline probes (1)	Baseline probes (1)
2	BST baseline (2)	BST baseline (2)	BST baseline (2)
3	Dog approach training with parent (3)	Dog approach training with parent (3)	Dog approach training with parent (3)
4	Parent-implemented BST with RA (4)	Parent-implemented BST with RA (4)	Parent-implemented BST with RA (4)
5	Parent-implemented BST with child (5)	Parent-implemented BST with child (5)	Parent-implemented BST with child (5)
6	Dog probe/Dog test (6)	Dog probe/Dog test (6)	Dog probe/Dog test (6)

Figure 1. The life-sized Boston terrier toy dog that was utilized during certain phases such as the BST with caregiver using toy dog and BST with child using toy dog.

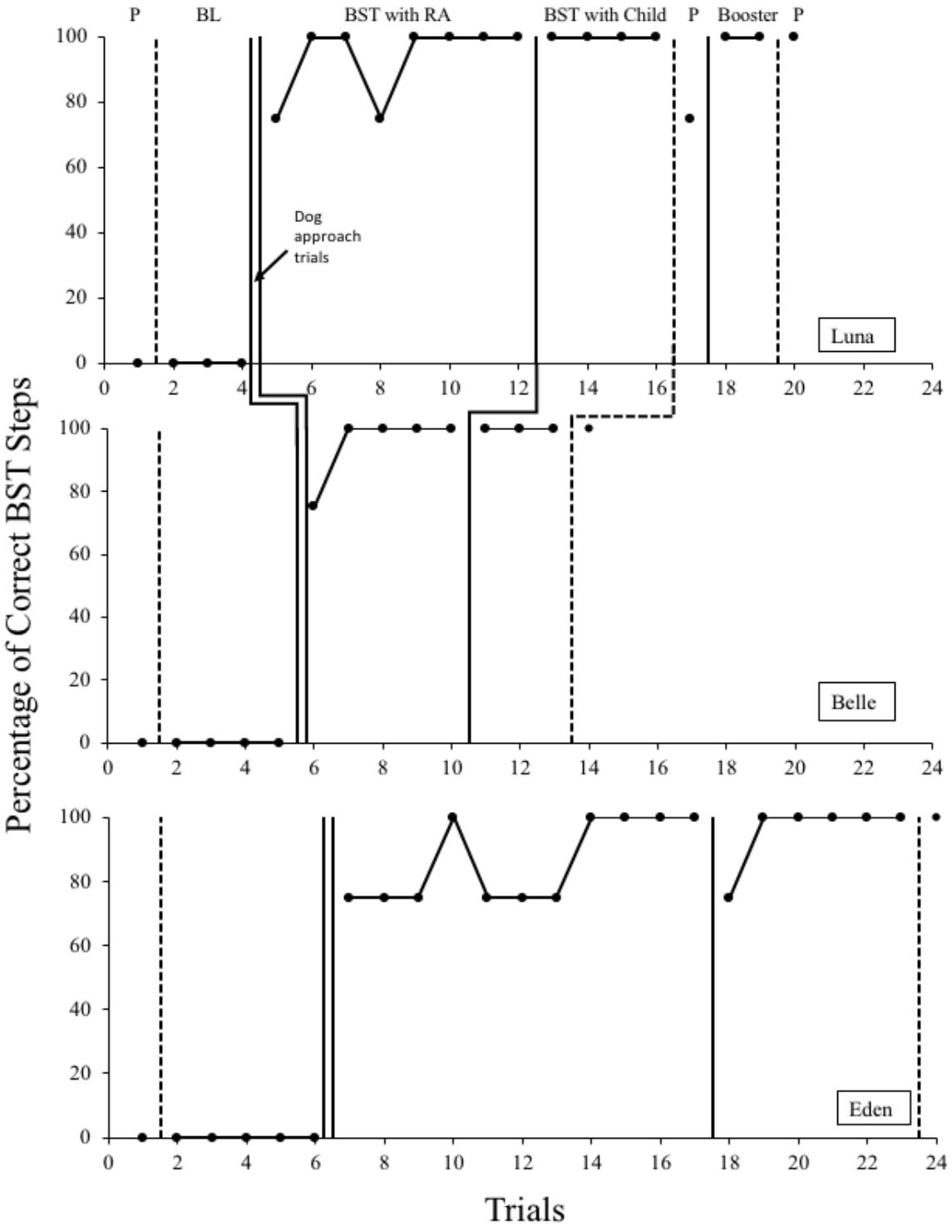

Figure 2. This graph depicts the parent's percentage of correct BST steps across phases and generalization steps. Each label is placed on top of the appropriate phase. The letter P stands for Dog probe. The first two graphs depict concurrent sessions (Luna and Belle) and the last one (Eden) was nonconcurrent.

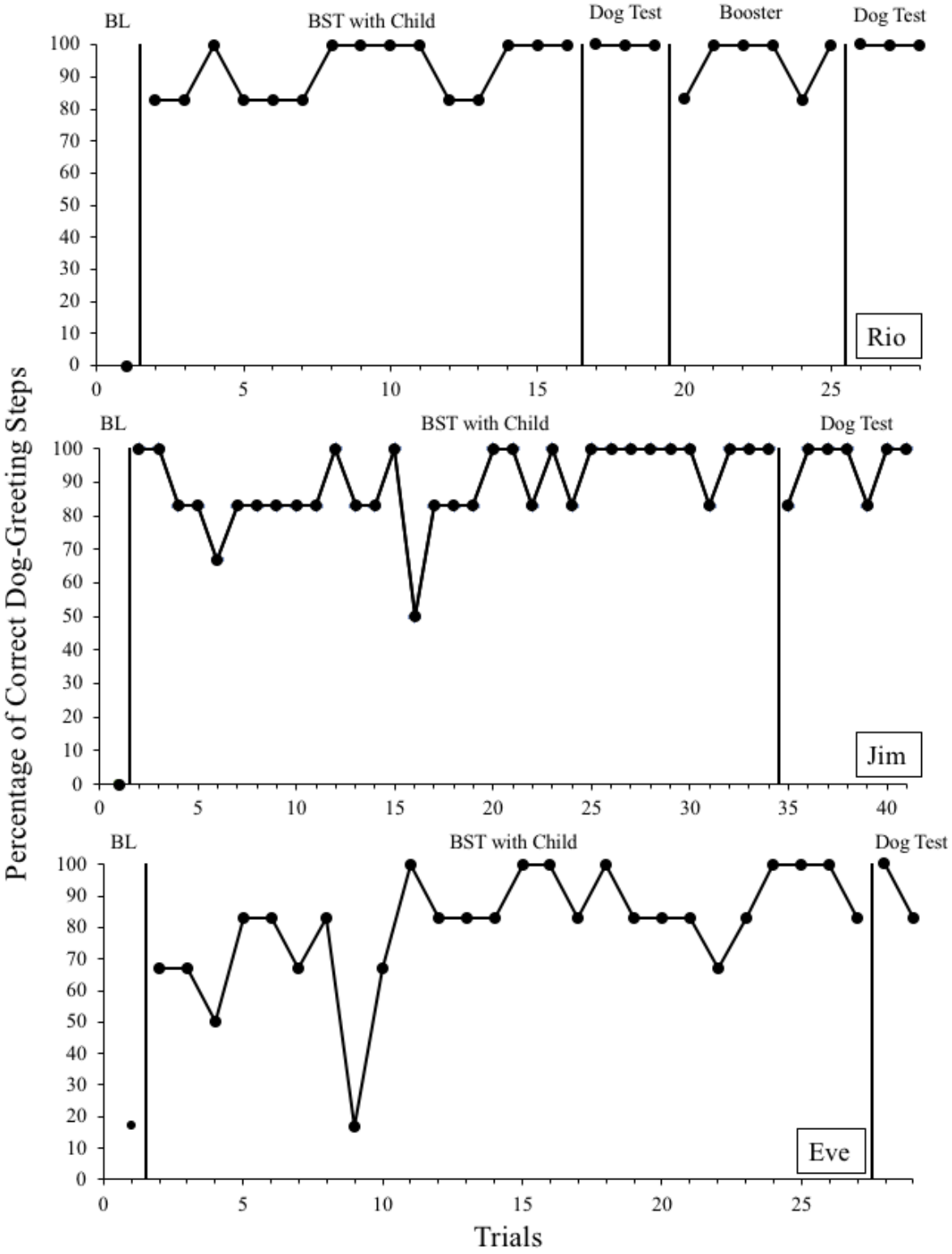

Figure 3. This graph depicts the data outcome for Rio, Jim, and Eve. The percentage of correct dog-greeting steps (circle) on the y-axis.

Appendix

Dog-Greeting Social Validity Survey

Thank you for participating and allowing your child to take part in our study entitled "Teaching Safe Dog-Greeting Skills to Parents and Children," in which we taught you to teach your own child to complete the following steps when approaching an unfamiliar, leashed dog:

1. Ask the owner if you can pet the dog.
2. Wait 2 seconds.
3. Step to the side of the dog.
4. Pet the shoulder of the dog.
5. Withdraw your hand slowly.
6. Take one step backward.

We would be very interested in your perception of you and your child's experience. Please complete this short survey. All results will be anonymous. Thank you!

In the Qualtrics Survey, the responses for Questions 1-10 will be chosen from the following 5 options: ***Strongly Disagree, Disagree, Neutral, Agree,*** *or* ***Strongly Agree.***

1. My child's knowledge regarding appropriate, safe dog-greeting behavior has increased.
2. My child behaves more safely around unfamiliar dogs after participating in this research/training.
3. My child behaves more safely around dogs at home (or other familiar dogs) after participating in this research/training.
4. This research/training resulted in negative effects on my child's behavior around dogs.
5. I believe the dog-greeting steps listed above are child-friendly and easy to follow.
6. I believe my child experienced discomfort while participating in this research/training.
7. I enjoyed being part of my child's learning experience.
8. It is important for children to be informed about how dogs can be approached safely.
9. I am pleased that this research/training was implemented early in my child's life.
10. The skills taught in this research/training are valuable to my child in a variety of settings.
11. I would recommend participation in this research/training to other parents for their children.

Questions 12 & 13 will be open-ended responses.

12. Do you think being involved in the teaching procedures aided in increasing your child's dog safety skills?
13. Is there anything else you would like to tell us about how your child's behavior around dogs has changed after his or her participation in this research/training?