

A Model Program Improves Children's Knowledge of How to Stay Safe around Dogs

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Abstract: A model dog bite prevention program was assessed for its ability to improve fourth grade students' knowledge of factors known to influence safety around dogs. Students in an urban elementary school participated in either a program which focused on bite prevention or a program which focused on knowledge of the characteristics and history of common dog breeds. Both before and after participating in their respective program, students completed an instrument which measured knowledge of safety around dogs. Results indicate that students who participated in the bite prevention program knew more about safety around dogs after participation (a) than they themselves knew before participating in the program and (b) than did students who had not participated in the dog breed program but instead participated in the other dog-related program. Future studies can assess the ability of bite prevention programs to reduce not only students' knowledge, but also to prevent actual bites.

I. A Model Program Improves Children's Knowledge of How to Stay Safe around Dogs

Pets are an important, positive component to the lives of many children (e.g., Bryant, 1990; Covert, Whiren, Keith, and Nelson, 1985; Endenburg and Baarda, 1995; Juhasz, 1985; Robin and ten Benschel, 1985; Siegel, 1995; Van Houtte and Jarvis, 1995). Nonetheless, many children are bitten by one of the most common pets: dogs (Beck, Loring, and Lockwood, 1975; CHIRPP, 1998; Center for Disease Control and Prevention, 2003; Daniels, 1986; Delise, 2002; Gilchrist, Gotsch, Anest, and Ryan, 2003; Kahn, Bauche, Lamoureux, et al., 2003; Lockwood, 1997; Ozanne-Smith, Ashby, and Stathakis, 1998; Sacks, Kresnow, and Houston, 1996; Sacks, Lockwood, Hornreich, and Sattin, 1996; Sacks, Sattin, and Bonzo, 1989; Thompson, 1997; Wright, 1985). Beck and Jones (1985), for example, reported that 46% of the children (aged between 4 and 18 years) they interviewed indicated that they had been bitten by a dog at least once in their lives. The rates of dog bites in the US increased at least between 2005 and 2018 (Tuckel and Micharski, 2020), and increased further during the covid-19 pandemic (Dixon and Mistry, 2020). Cohen-Manheim et al. (2018) found that dog bites were twice as common among children as adults. Although very few dog bites are fatal (Delise, 2002; Lockwood, 1997; Weiss, Friedman, and Coben; 1998), these bites represent a large health risk and a general impediment to living peacefully with dogs.

There is good reason to believe that dog bites are largely preventable (Jakeman, Oxley, Owczarczak-Garstecka, and Westgarth, 2020). Kahn et al. (2003) estimated that simple education programs could have prevented 2/3 of all dog bites; a meta-analytic review of programs conducted by Shen et al. (2017) found that programs that included images/videos and/or actual experiences with dogs were especially effective. Most bites occur when the child initiates an interaction with a dog that is in a defensive, protecting, or aggressive position (Avner and Baker, 1989; Beck, Loring, and Lockwood, 1975; CHIRPP, 1998; Daniels, 1986; Delise, 2002; Guy et al. 2001c; Kahn et al., 2003; Lauer, White, and Lauer, 1982; Oxley, Christley, and Westgarth, 2017; Shewell

and Nancarrow, 1997; Wright, 1985). Teaching children to identify and avoid these situations should greatly help to reduce dog bites.

Animal welfare and other organizations regularly conduct dog bite prevention programs with elementary-aged children most likely to be bitten to help them live safely with dogs--and to help let warm relationships with these dogs develop unimpeded. Although bite prevention studies are often based on what years of experience and anecdotal accounts have found to be effective, there are few scientific assessments of the effectiveness of these programs. Spiegel (2000) assessed the ability of the *Be Aware, Responsible, and Kind* dog bite prevention program to change third-grade students' responses to 10 items asking about different aspects of safety around dogs (e.g., leaving nursing, sleeping, or eating dogs alone, that familiar dogs bite most often, to stand still and quiet when approached by an unfamiliar dog, etc.). Spiegel found that for 4 of the 10 items the percent of children responding correctly was significantly higher after participating in the program versus before.

Chapman, Cornwall, Righetti, and Sung (2000) conducted an evaluation of the *Prevent-a-Bite* program. They measured how 7 and 8 year-old students acted in the presence of an unfamiliar dog after participating in either the *Prevent-a-Bite* program (which stressed safe behavior around unfamiliar dogs) or in another education program. The group of children who participated in the *Prevent-a-Bite* program acted significantly more safely around the unfamiliar dog than the control group.

Isparta et al. (2021) investigated the effectiveness of a dog bite prevention program among students aged 3 to 6 years in Turkey. The program included the commonly-taught practice of "being a tree" (to stand still with one's head down and hands held together with arms down around a suspect dog) along with practice meeting a dog under controlled circumstances and lessons designed to promote empathy and to encourage children to attend to the emotions of others, including—of course—dogs. To assess the effectiveness of the program, Isparta et al. administered a brief ad hoc questionnaire both before and after the program; they generally found the program to be effective.

Most recently, Samuels et al. (in review) studied how much information students learned about preventing dog bites during a model program. The bite prevention program--and thus the evaluation--was largely designed to represent the sorts of programs humane educators across North America typically conduct with fourth grade students. To increase the generalizability of any conclusions, the efficacy of the program was measured as it was conducted with children in 11 states and 1 province across North America. Samuels et al. found that students tended to know significantly more about staying safe around dogs after participating in the program than they knew before.

Although the results of the investigations conducted by Chapman, Cornwall, Righetti, and Sung (2000); Isparta et al. (2021); and Samuels et al. (in review) are encouraging, all of these researchers were only able to obtain pretest-posttest scores from the same students: collecting data from standardized, randomized control groups was not feasible on this scale. The lack of comparison with a control group limited the conclusions that can be made about the program. The program, for example, may be no more effective than other humane education programs that teach children about dogs.

The current study met this need for a comparison with a meaningful control group. All fourth grade classes in one elementary school were randomly assigned to participate in either the model dog bite prevention program evaluated in Samuels et al (in review) or in another dog information program. The students who had participated in the bite prevention program were then compared to those who participated in the other dog program to see who knew more about staying safe around dogs.

II. Methods

Participants

Participants were the students of the four, fourth-grade classes at a public, urban, elementary school in the Northeast US. Two weeks before participating in the study, the classes were given passive consent forms to show their parents/guardians. If any parent/guardian did not want their child to participate in the study, they could mark and return the form to the teacher, who would let the researcher know which students were not participating. Non-participating students would have been participate in other educational activities that include

animal content, but did not address safety or welfare issues while the other students completed the ASD both before and after the program. Non-participating students would still be allowed to participate in the program. None of the students' parents/guardians indicated they did not want their child to participate in the study, however.

Materials

To measure what students knew about staying safe around dog, we administered the Assessment of Safety around Dogs (ASD) both before and after participating in the given program. The ASD includes 8 items that assess young children's abilities to interpret canine body language along with 11 supplemental items that measure children's knowledge of dog safety issues (e.g., "If a strange dog comes up to you, what should you do?" and "Is it O.K. to pet a dog when it's sleeping?"). Samuels (in press) investigated the psychometric properties of the ASD, including internal and test-retest reliability, predictive and content validity, and the factor structure through confirmatory factor analysis; he found the 8 central items demonstrated reasonable reliability (Cronbach's coefficient $\alpha = .71$; Guttman's $\lambda_6 = .85$), significantly predicted behavior around dogs, and the intended factorial structure. There are two versions of the knowledge items for the ASD—versions A and B—that have shown similar predictive abilities and that allow more valid test-retest assessments of programs (Samuels, in press).

Students in the experimental group participated in a dog bite prevention program. The dog bite prevention program was designed and tested by a group of leading humane educators from across North America. The program focuses on interpreting dogs' body language and living safely with dogs the child knows. It also teaches students how to handle situations with unfamiliar dogs. As much as possible given the time constraint of one class period, the program links learning to students' previous knowledge, facilitates reflective learning presented through different modalities, and employs student-centered teaching strategies. Samuels et al. (in review) discuss the program's creation and formative (and initial summative) assessment.

Students in the control group participated in *Where in the World Is Rover?*, a humane education program created by the American Society for the Prevention of Cruelty to Animals. *Where in the World Is Rover?* discusses various, common dog breeds, some of their behaviors and characteristics, and from where they originate. The program is designed to improve students' concern for and understanding of dogs, but does not address preventing dog bites.

Procedure

Two weeks before visiting the school, the participating teachers were briefed about the content of the programs and the study procedure. They were also given the informed consent forms. Any questions or concerns they had were answered.

Students who were administered version A during the pretest were administered version B during the posttest, and vice versa. In order to match a student's pretest responses to that same student's posttest responses, the students were each given two stickers with the same number on each. Each student in a given class had a different number. The student placed one sticker on their pretest version of the ASD, and then placed the other sticker on the posttest version of the ASD.

The day before the students participated in the given program, we visited each class to obtain pretest ASD scores. Classes had not yet been assigned to groups when the students completed the pretest ASD. We asked the children to read along and not speak while completing the ASD. When finished, any questions the students or teacher had were answered.

The following day, each class was visited and participated either in the dog bite prevention program (the experimental group) or the dog characteristics program (the control group). Two classes were assigned to participate in the experimental group, two in the control group. Classes were randomly assigned to a group with the constraint that we matched overall sample size between groups as best we could.

The day after participating in their given program, the students completed the posttest ASD. Again, we guided the children through the instrument and ensured that the children did not talk while completing it.

III. Results

All students completed the ASD. However, all ASD items must be responded to in an comprehensible way in order to calculate an ASD score, and not all students completed all items intelligibly. Pretest ASD scores were available for 74 of the 93 participants; posttest scores were available for 80 participants. Both pre- and posttest scores were available for 55 of the students. Table 1 presents descriptive statistics for all of the available students. Table 2 presents the statistics for those participants for whom both pre- and posttest scores were available. The sample was comprised of 47 girls, of whom 28 had both pre- and posttest scores, and 46 boys, of whom 27 had both pre- and posttest scores. The classes were culturally diverse with a high minority representation, however we did not ask children their ethnicities.

Table 1

Descriptive Statistics of All Available Student ASD Scores by Teacher.

Teacher N	Pretest				Posttest			
	Missing	N	Mean	S.D.	Missing	N	Mean	S.D.
Control 1	17	7	10.18	1.55	18	3	10.67	2.20
Control 2	18	6	11.28	2.02	24	0	12.13	2.09
DB 1	16	4	11.88	1.67	17	3	14.65	2.34
DB 2	23	5	11.70	1.77	21	7	14.43	1.96

Table 2

Descriptive Statistics of Students for Whom Both Pretest and Posttest ASD Scores Were Available.

Teacher N	Pretest				Posttest			
	Missing	Mean	N	S.D.	Missing	Mean	N	S.D.
Control 1	15		9	10.00	1.56	6	10.33	2.13
Control 2	13		11	11.38	2.22	11	12.08	2.33
DB 1	14		6	11.79	1.76	6	15.07	2.02
DB 2	15		13	11.87	1.77	13	14.80	1.52

Consistent with previous studies (Beck and Jones, 1985), roughly half of the children—46 out of 93—reported that they have been bitten by a dog. In addition, 38 of the students reported that they had at least one dog in their home; 53 did not live with one or more dogs, and 2 did not respond to whether they lived with dogs.

The mean ASD pretest score for versions A and B were 11.17 (S.D. = 1.88) and 11.48 (S.D. = 1.80), respectively. A two-tailed *t*-test did not find a significant difference between these pretest means for versions A and B ($t(1,72) < 1$, n.s.). The mean ASD posttest scores for versions A and B were 12.80 (S.D. = 2.66) and 13.07 (S.D. = 2.65), respectively. Again, a *t*-test failed to find a significant difference between these posttest means ($t(1,78) < 1$, n.s.).

Of those students for whom both pre- and posttest scores were available, the mean ASD pretest scores for the experimental and control groups were 11.77 (S.D. = 1.71) and 10.74 (S.D. = 1.87), respectively, and the mean posttest scores were 14.53 (S.D. = 2.11) and 11.50 (S.D. = 2.23), respectively. We assessed the significance of the differences between these means with a 2 (Program: Experimental vs. Control) x 2 (Gender) x 2 (Dog(s) vs. No Dog(s) at Home) x 2 (Have vs. Haven't Been Bitten) ANCOVA where pretest ASD scores were the covariate. In addition to main effects, the model contained interactions between the program variable and each of the other variables (Program x Gender, Program x Presence of dog at home, and Program x Having been bitten). The overall ANCOVA was significant ($F(8, 46) = 8.22, \eta^2 = .59, MSE = 31.62, p < .05$). The main effect for the program ($F(1, 46) = 23.05, MSE = 88.73, p < .05$) and the pretest covariate ($F(1, 46) = 10.63, MSE = 40.93, p < .05$) were both significant. No other main effects nor any interactions were significant (all $F_s < 1$).

Discussion

Samuels et al. (in review) found that children who participated in the model dog bite prevention program knew more information about being safe around dogs than they knew before participating. The current study extends the validity of Samuels et al.'s study by finding that the dog bite prevention program teaches children dog safety information better than a humane education program that teaches general information about dogs and their behavior and characteristics. It therefore appears that the model program can help children learn how to stay safe around dogs. It remains to be seen, however, if they actually do remain safe. It is both unsurprising and unfortunate that young children--those who are among the least prepared to control their impulses or understand all necessary aspects of a situation--are those who are bitten most often. It's also a shame that these young children are often bitten on their faces and hands (Gilchrist, Gotsch, Anest, and Ryan, 2003; Guy et al., 2001c; Kahn et al., 2003; Ozanne-Smith, Ashby, and Stathakis, 1998; Patrick and O'Rourke, 1998; Thompson, 1997; Weiss, Friedman, and Coben, 1998; Wright, 1985). Therefore, it is important to follow the lead of Chapman, Cornwall, Righetti, and Sung (2000) and demonstrate that children actually act more safely around dogs after participating in a bite prevention program. Unfortunately, the dogs that are responsible for most bites are those children interact with in their homes, and bites are most frequent when adults are not around (Kahn et al., 2003). In other words, it is in the situations in which children are most difficult to observe and study that bites are most likely to happen. A possible solution for this challenge is to collect data from local hospital emergency departments, through random phone interviews, etc. both before and after conducting either a dog bite prevention program or a control program with that population of children--and perhaps also conducting bite prevention programs with the children's parents, neighbors, etc.

It is worth noting that although child-oriented dog bite prevention programs are surely important to help children live safely with dogs, there are several factors beyond that which children can control that are also quite important. Among the predictors of dog bites that only adult-oriented education programs can address easily include poorly socializing (Delise, 2002; Gershman, Sacks, and Wright, 1994), training (Delise, 2002; Wright 1985), or breeding (Delise, 2002) dogs; allowing dogs to express dominance over possessions or places (Guy et al., 2001a); and purchasing/adopting dogs for fighting, protection, or image enhancement (Delise, 2002). In addition, sexually intact dogs (CDC, 1997; Delise, 2002; Gershman, Sacks, and Wright, 1994; Sacks, Lockwood, Hornreich, and Sattin, 1996; Wright, 1985; but see Guy et al., 2001b), recently-acquired dogs (Delise, 2002), packs of dogs (Delise, 2002; Lockwood, 1997); male dogs (Beck, Loring, and Lockwood, 1975; Borchelt, 1983; Daniels, 1986; Gershman, Sacks, and Wright, 1994; Line and Voith, 1986; Patrick and O'Rourke, 1998; Wright, 1985; but see Guy et al., 2001a), dogs that have previously shown aggression (Gershman, Sacks, and Wright, 1994; Guy et al., 2001c) or excitability (Guy et al., 2001a), and some breeds (Beck, Loring, and Lockwood, 1975; Kahn et al., 2003; Lockwood, 1997; Patrick and O'Rourke, 1998; Sacks, Sattin, and Bonzo, 1989; Thompson, 1997; Wright, 1985) tend to be over-represented in bite incidents and thus may require especial care. Not surprisingly, it is dangerous to leave a dog alone with cribbed or sleeping newborn babies (CDC, 1997; CHIRPP, 1998; Delise, 2002; Sacks, Lockwood, Hornreich, and Sattin, 1996; Sacks, Sattin, and Bonzo, 1989).

Dogs and other pets are an important part of many children's lives (Melson, 2001). For example, children with pets tend to have higher self-esteem and autonomy (Covert, Whiren, Keith, Nelson, 1985; Davis and Juhasz, 1985), to be better socially integrated (Endenburg and Baarda 1995), and to have more human-directed empathy as adults (Paul and Serpell, 1992) than children who do not have pets in their homes. Educating children how to live with them safely should help them get the most they can out of this valuable relationship.

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Footnotes

1 Affiliated with the American Society for the Prevention of Cruelty to Animals at the time this research was conducted.

2 Competing interests: Dr. Samuels led the design of the model dog bite prevention program being evaluated in this study. The authors of Samuels et al. (in review) are those who created this program and/or helped in its evaluation. The program itself is public domain, and Dr. Samuels made no money and received no rewards from the creation of the program or the conduction of this study. Although the author did not receive any monetary or other rewards for creating the program or collecting the data, the program was created and the data collected while the author was all working at a animal welfare organization.