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A PILOT STUDY TO EVALUATE AN ELEMENTARY SCHOOL-BASED DOG BITE PREVENTION PROGRAM¹

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ABSTRACT

The primary objective of this program evaluation was to determine if a school-based education program is an effective means of informing elementary school-aged children enrolled in second through fourth grades about dog bite safety — the awareness of proper behavior when in the company of dogs to prevent bites, injuries, or fatalities. The pilot program, featuring written materials and a video, was developed to teach dog bite safety, and questionnaires were designed to assess the program. Students ($n=486$) from seven schools from Montgomery and Prince George's Counties in Maryland, USA participated. Pre- and post-program questionnaires assessed students' interactions, encounters, and relationships with dogs, as well as use of program materials, and changes in understanding about dog behavior, body language, and bite avoidance. The program results appeared to be highly effective in helping children understand how to prevent or avoid potentially threatening situations involving dogs. The program was most effective at teaching children that: (1) neighborhood and family dogs are most likely to cause dog bite-related injuries, (2) they should never run away from a dog, and (3) they should never touch a dog that is sleeping or eating. For most groups, there was also an increased level of recognition of canine body language. Almost half of the participants indicated that they had been bitten in the past, and over 80% knew the attacking dog. Finally, the findings suggest that an age-appropriate dog bite safety program delivered in an elementary school setting can be effective in producing awareness about preventing dog bite-related injuries. Future investigations should concentrate on monitoring actual changes in child behavior. © 2000 International Society for Anthrozoology

INTRODUCTION

Dog bites constitute a major childhood public health problem in the United States. Recent reports estimate that over half of the 4.5–4.7 million Americans bitten by dogs each year are victims under 14 years of age (Sacks, Kresnow and Houston 1996; Insurance Information Institute 1996; Weiss, Friedman and Coben 1998; Lockwood and Sinclair, personal communication, 1999, Humane Society of the United States). About 60–75% of all dog bite

related-injuries (DBRIs) involve people less than 20 years of age, with peak incidence (25–30%) in elementary school-aged children (5–9 years of age) (Beck, Loring and Lockwood 1975; Fleisher and Boenning 1981; Sacks, Sattin and Bonzo 1989; Gershman, Sacks and Wright 1994). Children are disproportionately the victims, often bitten at a rate (%) two to three times their population make-up in a given area (Morton 1973; Beck, Loring and Lockwood 1975; Spiegel unpublished data). Children are at least three times more likely than adults to sustain one of the 800,000 injuries severe enough to require medical attention each year (Sacks, Kresnow and Houston 1996).

About 1–2% of all DBRIs requiring care lead to hospitalization, resulting in 10,000–13,400 hospitalizations per year (Callahan 1980; Marcy 1982; Weiss, Friedman and Coben 1998). In the United States, severe injuries almost exclusively affect children, many resulting in some form of tissue loss (i.e., lip, nose, cheek) (Palmer and Rees 1983; Wiseman, Chochinov and Fraser 1983;

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Brogan et al. 1995). As many as 73–82% of DBRIs occur to the head, neck, and facial area of children (Wiseman, Chochinov and Fraser 1983; Brogan et al. 1995; Weiss, Friedman and Coben 1998). The general population, however, suffers the majority of their injuries to the less vulnerable extremities (Beck, Loring and Lockwood 1975; Gershman, Sacks and Wright 1994; Ndon, Jach and Wehrenberg 1996; Weiss, Friedman and Coben 1998). Each year, between 70–80% of the 15–18 fatally wounded victims are children <ten years of age (Winkler 1977; Pinckney and Kennedy 1982; Sacks, Sattin and Bonzo 1989; Sacks et al. 1996). In addition to the physical and emotional harm that results from dog bites, there are significant financial implications. An estimated \$102.4 million is paid to emergency departments each year for new DBRIs, with over half of the payments for children less than 20 years of age (Weiss, Friedman and Coben. 1998). Each year, \$1 billion is paid out by U.S. insurance companies for DBRIs; \$12,000 is the average claim; and one third of all liability claims associated with homeowners insurance are dog bite-related (Insurance Information Institute 1994; Anonymous 1995).

Pet owner surveys indicate that there are approximately 52.9–58.2 million dogs kept as pets in the United States (APPMA 1996; AVMA 1997). Most children enjoy the company of pets, especially dogs and cats (Siegmond and Biermann 1988; Bryant 1990; Melson, Schwarz and Beck 1997). The popularity of dogs increases the risk of injury within the childhood population, who are often unaware of the inherent danger of handling pets. Between 80–95% of all animal bites are inflicted by dogs each year (Brobst, Parrish and Clack 1959; Ford 1983; Feder, Shanley and Barbera 1987; Greene, Lockwood and Goldstein 1990). Most of the attacks occur in, around, or in the vicinity of the dog owner's home, often when a dog is confined or tethered (Beck, Loring and Lockwood 1975; Winkler 1977; Hanna and Selby 1981; Pinckney and Kennedy 1982; Daniels 1986; Avner and Baker 1991). Contrary to popular opinion, 80–85% of attacking dogs are owned by a neighbor or are the family dog (Kizer 1979; Beck, Loring and Lockwood 1975; Sacks, Sattin and Bonzo 1989; Castelein, Klouda and Hirsch 1996).

Children are at tremendous risk of being bitten by a dog due to their small stature. Face-to-face proximity, eye-to-eye proximity, underdeveloped motor skills, level

of competition with a family pet, desire to hug or kiss dogs, lack of experience or knowledge, and high-pitched voice tones (which can sometimes trigger a predatory canine response) are all potential risk factors. While some predisposing factors or characteristics, such as size, stature, and voice tones, are irreversible risk factors, other behaviors may be modified through effective intervention.

Since unintentional injuries are the leading cause of death and disability to children less than 14 years of age (Anonymous 1997), schools participate in various programs geared toward avoiding threatening and potentially dangerous situations, such as fire safety, "stranger danger," proper techniques for carrying school bags, assault prevention, HIV/AIDS awareness, and illicit drug and alcohol education. Despite the high incidence of dog bites to children, few schools incorporate this important public health and humane education topic into the curriculum. Numerous studies, specialists, and humane organizations have suggested that the implementation and evaluation of public education and preventative school-based educational programs, complete with role playing and educational games be considered a priority, and provided anywhere dog bites pose a serious threat (Morton 1973; Beck, Loring and Lockwood 1975; Kizer 1979; Beck and Jones 1985; Sacks, Sattin and Bonzo 1989; Avner and Baker 1991; Mathews and Lattal 1994; Brogan et al. 1995; Weiss, Friedman and Coben 1998; Lockwood and Sinclair, personal communication, 1999, Humane Society of the United States). To date, no other published report has evaluated the effectiveness of a school-based dog bite prevention program.

METHODS

Program and Questionnaires

The BARK (Be Aware, Responsible, and Kind) Dog Bite Prevention Program appears to be the first program to provide a systematic, scientific evaluation of a dog bite prevention (school-based) program. Beginning in July 1997, the written educational materials, video, questionnaires, and program structure were designed or refined to most effectively inform the children in the pilot program area on how to avoid and prevent threatening situations that often lead to attacks. The educational materials included: (I) a workbook, consisting of three parts (I. Dogs can be great friends!, II. How to be safe with dogs, and III. Dogs use body language) used to guide students during the actual

Table 1. The ten multiple choice questions used in the study and the correct responses.

(1)	Question: Which type of dog is most responsible for dog bite-related injuries? Answer: Neighborhood and family dogs.
(2)	Question: If you were approached by a friendly looking dog that was on a leash with a person walking her, would you: Answer: First ask the person walking the dog if you can pet her?
(3)	Question: Would it be safe to pet [this] a sleeping dog? Answer: No, I would not pet [this] a dog while she is sleeping.
(4)	Question: If a strange dog runs toward you, what should you do? Answer: Stand still and remain very quiet.
(5)	Question: Which one of the dogs shown below do you think is probably scared? Answer: Illustration – dog that has her ears back and tail between her leg and is shaking
(6)	Question: Which picture below shows a safe way to pet a dog? Answer: Illustration – happy dog with the boy in front and letting the dog sniff his fist
(7)	Question: Which picture below do you think shows a safe time to meet a dog? Answer: Illustration – dog on a leash with the owner and the girl asking to pet the dog
(8)	Question: Which picture do you think shows the right way to act around a strange dog? Answer: Illustration – the girl is standing like a tree because a strange dog approached her
(9)	Question: Do you think it would be safe to pet the mother dog nursing her puppies? Answer: No, because a nursing dog needs time to be alone with her puppies.
(10)	Question: Would you pet a dog who is eating [pictured]? (illustration of an eating dog) Answer: No, because he may bite me.

Illustrations were provided with all of the questions (i.e. #9- a picture of a dog with puppies nursing).

dog bite prevention lesson; (2) an activity book, consisting of ten activities, one of which was a self-test, and (3) a coloring book (Delay and Ramsbottom 1995), consisting of 19 pages of illustrations. The latter two books were distributed after the actual dog bite prevention lesson, served as supplemental reinforcing materials, and contained sections geared toward teachers and parents/guardians. The 15-minute dog safety video (Manelli 1996), chosen after an extensive review of numerous similar videos, further illustrated the lessons taught in the workbook.

There were two questionnaires illustrated and worded for age-appropriateness that were read aloud when administered to students. Children provided written responses on the questionnaires that contained eight (pre-questionnaire) or nine (post-questionnaire) mutually exclusive binomial questions (yes/no), ten multiple-four-choice questions (see Table 1), and one open-ended question. Responses to the multiple-choice questions provided the bulk of the results for the evaluation, and responses to the background ques-

tions provided demographic information, a sample description, dog bite incidence rates and frequencies, and other information. Data provided by these questionnaires specifically allowed for: (1) background information about children's interactions, encounters, or relationships with dogs [pre/post] to be gathered, (2) determination of the participants' use of the materials and information provided, as well as their enjoyment of the program [post], and (3) an assessment of children's increased understanding of dog behavior, body language, and how to prevent DBRIs [pre/post].

The three-session program, outlined in Table 2, was implemented in a classical quasi-experimental pre-/post-evaluation design. The questionnaires were administered during sessions I and III, generally two weeks before and after the educational lesson. These sessions lasted approximately 10–15 minutes each. Session II, lasted for approximately 60 minutes and consisted of several activities, including: (1) an introduction by the investigator, (2) an interactive discussion of dog bite safety using the workbook, (3) the viewing of a video, (4) role

Table 2. Outline of the Be Aware Responsible and Kind (BARK) dog bite prevention program

Session I	<p><u>Pre-Questionnaire</u>^a: Administered about two weeks in advance of the dog bite safety lesson, and required a 10–15 minute time period. Contained eight mutually exclusive binomial questions, 10 multiple-four-choice questions, and an open-ended question.</p> <p>Responses provided:</p> <ol style="list-style-type: none">(1) background information about children’s interactions, encounters, or relationships with dogs, and(2) an assessment of children’s understanding of dog behavior, body language, and how to prevent DBRIs
Session II	<p><u>Education</u>: Dog bite safety lesson was provided two weeks after session I and two weeks prior to session III. This session required 55–60 minutes and consisted of several activities.</p> <p>Activities provided:</p> <ol style="list-style-type: none">(1) an introduction by the investigator (i.e., teaching the concept of BARK),(2) an interactive discussion of dog bite safety using the workbook^b,(3) the viewing of a 15-minute video^c,(4) role playing with two life-sized toy dogs (i.e., “stand like a tree” or “lay like a log or rock” if a dog comes running up to you), and(5) a conclusion including the distribution of supplemental materials^d.
Session III	<p><u>Post-Questionnaire</u>^a: Administered about two weeks after the dog bite safety lesson, and required a 10–15 minute time period. Contained nine mutually exclusive binomial questions, ten multiple-four-choice questions, and an open-ended question.</p> <p>Responses provided:</p> <ol style="list-style-type: none">(1) additional information about children’s interactions, encounters, or relationships with dogs,(2) participants use of the materials and information, as well as if they enjoyed the program, and(3) an assessment of children’s increased understanding of dog behavior, body language, and how to prevent DBRIs

The open-ended question on the pre- and post-questionnaires was not used for the evaluation and each individual question and answer choice was read aloud.

^aThe questionnaires were designed and compiled by the author for this specific evaluation.

^bThe *BARK Dog Bite Prevention Workbook* was designed and compiled by the author for this specific program.

^c*Learning to be safe with animals: Dogs, Cats & Kids*, a video produced by Donald Manelli & Associates, Inc., 1996, was a special 15-minute version refined for this specific program.

^dThe *Dog Bite Safety Activity Book* was designed and compiled by the author, and the *Be Bite-Free! Coloring Book*, designed by Delay, G. and Ramsbottom, A. for the Society for the Prevention of Cruelty to Animals of Texas, 1995, was refined and updated by the author, for this specific program.

playing with two life-sized toy dogs (i.e., “stand like a tree” or “lay like a log or rock” if a dog comes running up to you), and (5) a conclusion including the distribution of supplemental materials. The school visitations lasted from September 1997 to January 1998, and the evaluation lasted through April 1998.

Participants

The program evaluation was conducted in elementary schools located in Montgomery and Prince George’s Counties, Maryland. The local public school system and private schools were invited to participate in the program via a letter

describing the intervention. Schools were not chosen specifically because of a dog bite problem; and there was no indication that the population enrolled in the program evaluation had a different risk than any similar-aged populations in similar geographical areas. The setting was the classrooms in which the educational lesson was provided and the evaluation tools were administered.

Participants were second through fourth grade students attending the seven schools that chose to participate in the program. There were 486 participants providing responses on the pre- and post-questionnaires.

Students on the pre-questionnaire had a mean age of 8.05 years (range 5–12; $SD=1.17$; $n=464$ known age). Post-questionnaire respondents had a mean age of 8.18 years (range 6–12; $SD=1.19$; $n=453$ known age). Fifty-two percent of the pre-questionnaire and 50.4% of the post-questionnaire respondents were male. The grade-level distribution for the pre-questionnaire indicated that 80.4% were enrolled in second through fourth grades, with 13.4% enrolled in Montessori school mixed-grade classes. For the post-questionnaire, 83.3% were enrolled in second through fourth grades, and 9.3% were enrolled in the mixed-grade classes. None of the students openly opposed participating in the anonymous program evaluation. Six of the seven schools were located in Montgomery County, Maryland.

Analysis

Statistical tests for this program included those for determining descriptive and vital statistics (frequencies, standard deviations, means, tables, graphs). Samples were treated as independent. This was determined to be an acceptable means of analysis (Abbey and Liang, personal communication, 1997, Biostatistics Department, Johns Hopkins School of Public Health), especially since treating samples as such, in general, reduces the strength and power of a statistical test, thereby making it even more difficult to achieve significance. Chi-square tests were performed, differential percentages or percentage point changes for changes in students' responses (dependent variables) were obtained, P-values of < 0.05 established the level of statistical significance, and 95% confidence intervals were also calculated. Data were assessed by categories that included school, age, and grade level, and then analyzed using SPSS 7.5 for Windows Graduate Pack (SPSS 7.5 1997).

RESULTS

The students were asked the following questions regarding ever being bitten by a dog and the conditions in which those bites occurred: (1) Have you ever been bitten by a dog?, (2) If YES, did you know the dog?, and (3) If YES, did you bleed or get bruised? Data analysis from the post-questionnaire showed that 47.3% of the participants responded in the affirmative to being bitten by a dog, and most (80.7%) of the victims knew the dog that bit them. The frequency of children bleeding or becoming bruised from the bite was 60.5%. In addition, life-time dog bite incidence rates were

calculated for each group. Comparing second graders ($n=128$) to fourth graders ($n=127$), the rate increased from 414.1/1,000 to 527.6/1,000. For children of ages seven ($n=100$) to nine ($n=115$), the rate increased from 350/1,000 to 530.4/1,000. Incidence rates gradually increased as students grew older.

Slightly less than half (pre-questionnaire: 42.8%; post-questionnaire: 47.5%) of the students participating had a dog, and 79.4% of those students who did not have a dog indicated that they wanted one. Almost 70% of the students reported having a pet, other than a dog, at home. The majority of students liked to play with dogs (91.2%), and most children simply loved dogs (88.3%). Despite the fact that almost half of the students had been bitten, only 7% of the entire sample reported being afraid of dogs. Less than one third (32.4%; $n=75$) of the children who had previously been bitten ($n=231$), indicated having a fear of dogs. Fear did not appear to be gender-specific, nor did the likelihood of being bitten. However, the children who owned a dog were about two times more likely to be bitten by a dog.

At the time of the post-evaluation, among second through fourth graders, there were upward trends for choosing the correct responses for all of the multiple choice questions as compared to the initial responses provided prior to the dog bite education lesson. There were particularly large changes in frequency (differential percentage) of choosing the correct answer ($p<0.001$) for questions addressing: (1) which type of dog is most likely to cause a DBRI (i.e., family or neighborhood dogs), (2) whether or not it is safe to pet a sleeping dog, (3) what to do if a strange dog approaches or runs up to them, and (4) whether or not to pet a dog that is eating. Other areas of dog bite safety were addressed as well, most of which showed large and often significant increases, such as: (a) how to interpret dog body language, (b) the importance of asking permission to pet a dog, (c) the proper and safe way to pet a dog, (d) how to detect threatening situations (i.e., a tethered dog or a dog in a car), and (e) the importance of leaving a nursing dog alone.

Table 3 shows that the percentage of third graders choosing the correct response to the question about which type of dogs are most likely to cause a DBRI, increased from 9.1% to 54.0% [44.9% point change; 95%CI: (35.6%, 54.2%); $p<0.001$]. In the question about whether or not it is safe to pet a dog that is eating, the percentage of third

Table 3. Grade-specific percentage point increases in comprehension levels for 4 of the 10 multiple choice questions

(1) Question: Which type of dog is most responsible for dog bite-related injuries?						
Answer: Neighborhood and family dogs.						
Grade	Pre-Q (n)	Post-Q (n)	Pre-Q (% correct)	Post-Q (% correct)	% Point Increase	95% Confidence ^a Interval (%)
Second	123	128	10.6	41.4	30.8	(20.7, 40.9)
Third	143	150	9.1	54.0	44.9	(35.6, 54.2)
Fourth	125	127	5.6	65.4	59.8	(50.6, 69.0)
(2) Question: Would it be safe to pet [this] a sleeping dog? (illustration of a sleeping dog)						
Answer: No, I would not pet [this] a dog while she is sleeping.						
Grade	Pre-Q (n)	Post-Q (n)	Pre-Q (% correct)	Post-Q (% correct)	% Point Increase	95% Confidence ^a Interval (%)
Second	123	128	65.0	95.3	30.3	(20.7, 39.9)
Third	143	150	51.7	90.0	38.3	(28.8, 47.8)
Fourth	125	127	54.4	86.6	32.2	(21.7, 42.7)
(3) Question: If a strange dog runs toward you, what should you do? (Illustration of a dog running)						
Answer: Stand still and remain very quiet.						
Grade	Pre-Q (n)	Post-Q (n)	Pre-Q (% correct)	Post-Q (% correct)	% Point Increase	95% Confidence ^a Interval (%)
Second	123	128	75.6	94.5	18.9	(10.3, 27.5)
Third	143	150	75.5	92.0	16.5	(8.2, 24.8)
Fourth	125	127	76.8	95.3	18.5	(10.2, 26.8)
(4) Question: Would you pet a dog who is eating [pictured]? (illustration of an eating dog)						
Answer: No, because he may bite me.						
Grade	Pre-Q (n)	Post-Q (n)	Pre-Q (% correct)	Post-Q (% correct)	% Point Increase	95% Confidence ^a Interval (%)
Second	123	128	45.5	80.5	35.0	(23.8, 46.2)
Third	143	150	50.3	81.3	31.0	(20.7, 41.3)
Fourth	125	127	50.4	86.6	36.2	(25.6, 46.8)

The sample size consists of second through fourth graders, and the remainder of the sample with known grade do not fall into these groups.

Some of the questions have been modified for the purposes of this paper, and a complete list of questions is available from the author.

^aThe level of significance for all of the above is $p < 0.001$.

graders choosing the correct answer increased from 50.3% to 81.3% [31.0% point increase; 95%CI: (20.7%, 41.3%); $p < 0.001$]. In addition, the correct responses provided by second and fourth graders increased from 80.5% to 96.1% ($p < 0.001$) and 80.8% to 99.2% ($p < 0.001$), respectively, for choosing the correct answer to the question regarding body language. On the

pre-questionnaire, students often confused the warning signs of a scared dog versus an angry dog. In addition, children were much more likely to respond that they would run from a dog on the pre-questionnaire (second graders: 14.6%; third graders: 18.9%, and fourth graders: 18.4%) as compared to the post-questionnaire (second graders: 1.6%; third graders: 0.7%; and fourth graders:

1.6%). At post evaluation, similar results were noted for seven- through nine-year-olds, with eight-year-olds being the group most positively affected by the prevention program.

Students were questioned regarding the usefulness of the program. Data analysis indicated that 66% of the students worked on the supplemental materials supplied after the intervention (session II). As children worked on these books, it was intended that their knowledge of the subject matter would increase. Over 70% of the students responded that they had discussed the program or shared the materials from the program with their families. Children were asked if they applied any of the methods or safety techniques that they learned since the dog bite safety lesson was provided, and 48.6% of the students responded positively to this question. Lastly, over 90% of the sample responded that they enjoyed the program.

Another question tested the students' ability to recall what the acronym "BARK" meant. This was the official name of the program. The frequencies of children recalling the entire acronym were: (1) 44.5% for second graders, (2) 61.3% for third graders, and (3) 78.7% for fourth graders. In addition to these group recall frequencies, about 60% of the entire sample recalled what BARK stood for, and almost 80% recalled at least some portion of the acronym. Finally, based on optionally-identifiable returned teacher evaluation forms ($n=18$), the teachers expressed a high degree of satisfaction with the program as indicated by average scores of 1.0 to 1.4 (scale: 1, highest to 5, lowest) for nine questions about the program. They indicated that the components of the program were age-appropriate, easily understood, appealing, and comprehensible. In addition, all of the respondents expressed an interest in this program or similar for the future.

DISCUSSION

The majority of the participants indicated that they were positively affected by the BARK Dog Bite Prevention Program. Older participants were most influenced by the program, based on increases in correct questionnaire responses. The results suggest that a carefully planned and properly delivered dog bite safety program in schools can be effective in producing awareness and accompanying behavior changes. The areas of dog bite safety that were addressed, and showed less significant change or none at all, were due to the fact

that a higher percentage of the children knew the information prior to the intervention; thus, there was less room for improvement. Nonetheless, all of the questions showed an increase in frequency to choose the correct response. In addition, this provides evidence for the types of information already known by children and indicates the types of questions which should be revised in a future version of this program or similar.

The frequency of children having been bitten by a dog, and that the majority of the victims knew the dog, agrees with the literature (Beck, Loring and Lockwood 1975; Beck and Jones 1985; Sacks, Sattin and Bonzo 1989; Castelein, Klouda and Hirsch 1996). The frequency of children bleeding or becoming bruised from a bite appears to be slightly higher than one might expect. This may be because some bite cases are treated in the home and go unreported. The higher dog bite incidence rates for children in higher grade levels could be due to cumulative effects with increasing age, or less "supervised" exposure to dogs in older children. Also, the result that children living with dogs were more often bitten, is most likely due to more exposure.

The high frequency of respondents indicating that they did color in the coloring book or work on the exercises in the activity book, indicates that these materials were age-appropriate and of interest to the participants. Considering that it was approximately two weeks after the dog bite safety lesson, and almost half of the students indicated that they practiced a preventative technique taught, the children appeared to be remembering and applying important lessons learned and modifying their risk-taking behaviors as a result of the program. The recall frequencies for what BARK stands for, reported by group and as a whole, were impressive. In addition, after collecting the post-questionnaires, the classes were asked as a group what BARK stood for, and every class would shout the words out. This provides children with something similar to the fire safety tip (saying): "stop, drop, and, roll" or for emergencies "dial 9-1-1."

This program evaluation was limited in several ways. Annual dog bite incidence rates, which are more informative than lifetime incidence rates, were not obtained. However, it was believed that children of this age or grade level, especially the younger groups, would have difficulty in recalling spe-

cific events within a one-year time period. Variation among participating schools in terms of the patterns of responses on the questionnaires were probably due to sample population characteristics, classroom environments, and the time of the school day that the questionnaire was administered. In addition, the high response rate, indicating that the students did color in or work on the distributed materials, may be in part due to the teachers' encouragement or insistence. However, classroom time is limited, and it is doubtful that much, if any time was allotted specifically for the completion of these materials in school.

It is difficult to administer questionnaires to such a young age group. Aside from the various developmental levels of children participating in one classroom, which posed a challenge, the reliance on children for honest responses to questions in a test-taking setting is a potential limitation in this study. Test-taking biases, such as answering in a way to please people, is a possibility. However, as the teachers were not involved with this process and the questionnaires were anonymous, this problem may be minimal. It is believed that the children answered these questions with integrity and to the best of their ability.

Some other limitations included time constraints both in the planning process of the program and the provision of the program. Recruiting schools was an arduous task, and it was difficult to control for differences between schools that chose to participate and those which chose not to. All of the former were enrolled in the program, thereby providing the potential for participant bias, selection bias, convenience sampling, and overall, "volunteerism." All seven schools were private, which may limit the degree to which findings can be applied to other populations.

As previously mentioned, several studies, specialists, and humane organizations have suggested that public education and preventative school-based educational programs be developed, implemented, and evaluated. While dog bite prevention programs and materials have been in existence and circulation for decades, none appear to have been assessed or evaluated for their effectiveness. The effectiveness of any program or promotion of any venue of interest must be shown in order to gain the appropriate support necessary to fully provide the benefit of a program and/or information. Further investigation is

needed to confirm and support the findings obtained from this pilot program, especially in other areas of the country, public school systems, and among more diverse populations. If program evaluations indicate that dog bite safety can be taught effectively in schools, there is a greater chance that schools will participate and students will be exposed to this important area of injury prevention. Future use of this program or similar should include the monitoring of actual behavior changes. This may be conducted in a longitudinal program evaluation format. Students would be contacted in the second grade with subsequent follow-up programs and surveys designed to collect pertinent information, which would include accurate calculations of the annual incidence of dog bites. These surveys would help to determine retention rates and program effectiveness over time.

The BARK Dog Bite Prevention Program appears to be an effective school-based means of educating children about dog bite safety. Results suggest that the optimal age for the program is eight years of age and the optimal grades are probably third and fourth. The children not only became significantly more familiar with important methods for, and techniques on, how to react in various threatening situations, but they also enjoyed the program. Teacher's indicated a high degree of satisfaction with the program and expressed an interest in this program or similar for the future.

The results of this pilot program will enable others to understand the importance of dog bite safety in the classroom, and that the investment of time and resources may be eminently worthwhile. It is in the best interest of school systems to provide this type of injury prevention program to the population's most vulnerable age and grade brackets. These suggestions all require parental cooperation and local schools' willingness to participate, community backing, and the availability or provision of significant funding for necessary injury prevention programming. In addition to effective dog bite prevention programs (targeting children), there must be greater public awareness, increased promotion of responsible dog ownership, enforced impartial laws, and enhanced animal control systems. This would help to reduce the problem of severe and deadly dog bite injuries to children, as well as help to safeguard the long-standing, beneficial, and rewarding relationship between dogs and humans.

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