



Dog safety in rural China: Children's sources of safety information and effect on knowledge, attitudes, and practices



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ABSTRACT

Dog bites are a significant pediatric public health challenge in rural China. This study evaluated the effect of various sources of dog-safety information on children's knowledge, attitudes, beliefs and practices with dogs. A total of 1925 children (grade 3–6) between 6 and 15 years old in four rural regions across China participated between May and September 2012. Results showed that teachers and especially parents were effective information sources for children to learn about dog safety. Learning from peers and children teaching themselves were ineffective education strategies. Multi-source learning (from both parents and teachers) did not differ from single-source learning (from parents but not teachers) but did exceed learning from teachers but not parents or no learning from adults. Older age was associated with greater safety knowledge but also riskier practices with dogs. Girls generally held more safety knowledge, less risky attitudes/beliefs and safer practices than boys. Neither age nor gender interacted with information sources on outcome measures. In conclusion, parents appear to play a major role in educating children in rural China on dog safety. Future dog safety interventions might focus on changing cognition and behavior as well as delivering basic knowledge to youth through teachers and especially parents.

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1. Introduction

In modern China, 150 million children under age 14 live in rural areas. These children face a number of public health threats, including risk of dog bite injuries because of the large number of unsupervised guard dogs kept by rural families and the prevalence of rabies among those dogs (Deng et al., 2004; Guo et al., 2007; Si et al., 2008). Therefore, educating children in rural China about dog safety is crucial.

Ecological theories of health behavior suggest children learn health-related factual knowledge, perceptual attitudes and beliefs, and behavioral habits from multiple sources, including parents, teachers, peers, books and the internet, and via their own personal

experiences. In other domains of pediatric public health, such as obesity prevention, parents and teachers generally serve as significant and effective role models to improve children's health behavior (Lindsay et al., 2006). It is also suggested that multi-source influences, such as input from both parents and teachers, exert more power in shaping children's health behaviors than any single-source influence (Sallis et al., 2008).

To date, very little research considers how children in rural China learn about dog safety and which sources of information may be more or less effective. The present study evaluated these questions. A culturally-appropriate questionnaire on dog safety was developed and administered to 1925 children across 4 sites in rural China. We tested four hypotheses: (1) parents and teachers are more effective sources of teaching children dog safety compared to peers and self-learning; (2) children who learn from both parents and teachers learn more about dog safety than children who learn from any individual source; (3) teachers have a greater influence on dog safety in older children whereas parents have a greater influence on dog safety in younger children; and (4) children are equally influenced by different information sources regardless of their gender.

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2. Materials and methods

2.1. Participants

A total of 1925 children [$M=11.10$ years, $SD=1.36$; Range: 6–15 years; 44.7% girls ($n=860$) and 55.2% boys ($n=1063$)] were recruited between May and September 2012 from the largest primary school in each of four towns in rural China: Baishan Town in Hefei City, Anhui Province ($n=441$), Luanzhou Town in Tangshan City, Hebei Province ($n=569$), Hongtang Town in Ningbo City, Zhejiang Province ($n=525$), and Heping Town in Lanzhou City, Gansu Province ($n=390$). All children in grades 4, 5, and 6 were invited to participate; because it was a smaller school, children in grade 3 also were invited to participate in Heping Town. About 95% of eligible children participated; failure to participate was almost always driven by absence from school on the day the survey was conducted. Very few (<1%) of children who were present at school when surveys were distributed had parents who refused consent. In the survey 95% of the sample self-reported Han ethnicity, with 4% identifying with one of several minority ethnic groups present in China and 1% refusing to self-report ethnicity.

2.2. Measures

A questionnaire on child–dog interactions was developed using six steps: (a) thorough review of scientific literature and internet for appropriate content areas on child–dog interaction safety, (b) Preparation of items in English by principal investigator [Shen], (c) expert review, face validity review, and editing of items by two senior members of research team, one of them native Chinese [Xiang] and the other familiar with Chinese culture [Schwebel], (d) translation and back-translation from English to Chinese by social scientists fluent in both languages (small differences in translation were resolved through discussion), (e) expert review, face validity review, and editing of items by senior researcher based in China and immersed in culture [Li], (f) Final review and approval by primary investigators [Shen, Schwebel, Xiang]. The full questionnaire is available from the authors upon request.

The final questionnaire included three scaled scores: knowledge, attitudes/beliefs, and practice. The knowledge scale consisted of 23 questions concerning safe ways to engage with dogs. It was scored as percentile correct, ranging from 0 to 100, with higher scores indicating better mastery of safety knowledge. An example item is as follows: *What should you do when your dog develops a pattern of aggressive or undesirable behaviors? (a) kill the dog; (b) seek professional advice; (c) punish the dog; (d) let the dog loose; (e) don't worry about it.* The attitudes/beliefs scale consisted of 12 items answered on 5-point scales. The items addressed children's attitudes and beliefs of invulnerability toward child–dog interactions. An average of responses to the 12 items was used for analysis (range = 1–5), with higher scores indicating riskier attitudes and beliefs and therefore greater levels of perceived invulnerability toward child–dog interactions. An example item is *"I can run faster than unknown dogs so as to avoid their biting me."* The practice scale consisted of 8 items answered on 5-point scales (range = 1–5), with higher scores indicating higher frequency of self-reported risky behavior with dogs. An example item is *"Play with puppy dogs when their mother is present."*

Psychometrics of scales were strong. Cronbach's alphas for the attitudes/beliefs and practice scales were 0.77 and 0.76, respectively. We did not compute Cronbach's alpha for the knowledge scale because different domains of safety knowledge on dogs may be theoretically expected to be unrelated to each other.

Children also answered a few other items, including brief items concerning their age, gender, ethnicity, and their frequency of being exposed to dogs in daily life (1–6, with 1 being never exposed to

dogs and 6 being exposed to dogs every day). Finally, a multiple-choice item asked children about the sources of information where they learned about dog safety, *"Who taught you knowledge about dogs generally? (choose all that apply)."* Five options were provided: *"teachers"*, *"parents"*, *"peers"*, *"I taught myself"*, and *"never been taught before"*. *"Teachers"* means children received dog-related safety education either privately or in classroom by teachers in their primary school. In Chinese translation, the *"parents"* category encompasses parents, grandparents or other caregivers in the family. *"Peers"* refers to any child at a similar age as the participating child him/herself. *"I taught myself"* referred to as *"self-taught"* in this paper, indicates that children learned about dog safety on their own without the direct influence of people around them, for example, via books, television programs or through personal experience. The *"never been taught before"* is mutually exclusive with all other options and indicates the participating child reports never learning dog-related safety.

2.3. Procedure

The study protocol was approved by IRB committees at both University of Alabama at Birmingham (USA) and Anhui Medical University (China). Written informed consent was obtained from participating children and their parents/legal guardians, as well as from principals of participating schools.

Participating children completed the questionnaire in their school classrooms under the supervision of classroom teachers. Study personnel gave detailed guidance to teachers both verbally and in writing concerning questionnaire administration to assure valid and consistent administration across sites. The questionnaire took children approximately 40 min to complete.

2.4. Statistical analyses

Descriptive statistical analysis was performed first to assess the frequency of exposure to dogs, safety knowledge, attitudes/beliefs of invulnerability and risky practice with dogs in the entire sample. To test the first hypothesis, whether parents and teachers are more effective learning sources of dog safety information than peers and self-learning, independent sample *t*-tests were performed to compare children who responded 'Yes' and those who responded 'No' to each source of learning information about dog safety (parents, teachers, peers and self). Three outcome measures were considered: safety knowledge, attitudes/beliefs of invulnerability, and risky practice with dogs.

To test the second hypothesis, whether children who learned from both parents and teachers learned more about dog safety than children who only learned from any one individual source, the sample was re-grouped into four mutually exclusive categories: children who received dog safety information from both parents and teachers, from parents but not teachers, from teachers but not parents, and from neither parents nor teachers. A one-way Analysis of Variance (ANOVA) followed by Least Significant Difference (LSD) as a post hoc test was performed comparing the four groups on the same three outcome measures as in the first hypothesis.

To test the third hypothesis, if age interacted with information source on children's knowledge, attitudes/beliefs, and risky practice with dogs, participants were categorized into two age groups: 'younger children' (age 10 and below, 44.5% of the sample) versus 'older children' (above age 10, 55.5%). A Multivariate Analysis of Variance (MANOVA) was performed. The independent variables were age group ('younger children' and 'older children') and information source. The dependent variables were children's safety knowledge, attitudes/beliefs of invulnerability, and daily practice with dogs. Frequency of exposure to dogs served as a

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