

Impact of a chapter book and collectible cards describing the lives of seven veterinarians on third-grade students' career aspirations and expectations

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OBJECTIVE

To determine the impact of exposure to a chapter book and collectible cards describing the lives of 7 veterinarians on career aspirations and expectations of third-grade students.

DESIGN

Survey.

SAMPLE

176 third-grade students from 6 schools in Indiana.

PROCEDURES

Students responded to a questionnaire by stating their career aspirations and expectations before and within 8 days after classroom exposure to the chapter book and collectible cards.

RESULTS

As a group, significantly more students answered that they would like or expect to be a veterinarian when they are an adult after exposure to the book and cards. By gender, more boys, but not girls, answered that they would like or expect to be a veterinarian after exposure to the book and cards. Additionally, more White students and more rural students answered that they expected to be a veterinarian after exposure to the book and cards.

CONCLUSIONS AND CLINICAL RELEVANCE

Results indicated that young children's career aspirations and expectations can be influenced, at least in the short term, by exposure to educational materials about veterinary medicine when delivered as part of a classroom curriculum. (*J Am Vet Med Assoc* 2016;249:501–506)

Current efforts to broaden participation in the veterinary profession typically target high school- and college-age students. Unfortunately, history and national trends suggest that these efforts alone will not result in rapid or substantial changes in the racial or ethnic diversity or gender imbalance of the veterinary profession. Racial and ethnic disparities are already evident in high school students and are further accentuated in the undergraduate population.^{1,2}

Career development research suggests that elementary school students are a critical population to expose to the breadth of careers in veterinary medicine. Moreover, the Association of American Veterinary Medical Colleges' National Recruitment Promotion Plan³ cited US elementary school students as the largest key audience to target for workforce development. Awareness of career possibilities begins at a very young age, with children forming career

impressions from adults in their lives and the books they read.^{4–6} Seligman et al⁷ found that most children could clearly articulate their career aspirations by 10 years of age. Trice⁸ reported that for 41% of adults, their current occupations matched the first realistic career aspiration they had made before 12 years of age, providing evidence that many childhood career aspirations last into adulthood.⁹

One method to expose children to career opportunities in veterinary medicine is through children's books.⁶ Bobo et al¹⁰ recommended that career information resources depict individuals who are culturally diverse so that all children can envision themselves in the careers. Unfortunately, most commercially available nonfiction children's books do not provide a broad perspective of the veterinary profession. Instead, these books tend to portray veterinarians as White adults working in veterinary practices with dogs, cats, and exotic animals, with the book covers depicting veterinarians as White women.¹¹

The *How I Became a Veterinarian* chapter book¹² was developed to expose children to cultur-

ABBREVIATIONS

URM Underrepresented minority

ally diverse veterinarians in a broad range of careers within the veterinary profession. A set of collectible cards, each highlighting a veterinarian portrayed in the book, was created as a supplemental resource for the book. The purpose of the study reported here was to determine the impact of exposure to the book and collectible cards on the career aspirations and expectations of third-grade students when delivered by elementary school teachers as part of the curriculum. We hypothesized that delivering age-appropriate informational material highlighting racially and ethnically diverse veterinarians of both genders would increase the percentages of third-grade students, particularly boys and students from minority groups underrepresented in veterinary medicine, desiring or expecting to pursue a career in veterinary medicine.

Materials and Methods

This study protocol was reviewed and approved by the Purdue University Human Research Protection Plan. The study was performed in compliance with institutional guidelines for human subject research.

The *How I Became a Veterinarian* chapter book¹² featured 7 veterinarians. Each chapter began with a short story about a day in the life of one of the veterinarians. The story was followed by personal information such as where the individual grew up, what pets the individual had owned, what schools he or she had attended, and the path the individual had taken to attain a career in veterinary medicine. Each chapter ended with an inspirational message from the veterinarian. The information was supplemented with pictures of each veterinarian as a child and as an adult. Veterinarians represented both genders and various races and ethnicities. Career paths included pathology, anesthesiology, equine medicine, laboratory animal medicine, poultry medicine, cardiology, and academia. A set of collectible cards highlighting the 7 veterinarians in the book as well as 3 additional veterinarians and a veterinary student was produced to supplement the chapter book. The front of each card depicted the veterinarian or veterinary student as a child. The back of the card depicted the individual as an adult and included information about the individual's current career, favorite school subjects, favorite after-school activities, and favorite animal, along with an inspirational message.

Third-grade teachers in Indiana were recruited to participate in the study. Many teachers contact the Purdue University College of Veterinary Medicine's Office of Engagement for classroom resources. Teachers who requested educational resources or copies of the book were asked if they would like to participate in the study. Eight of the 18 third-grade teachers who agreed to participate were excluded from the study for not completing the study (5), not following study instructions (2), or turning the data in after the deadline (1).

Teachers who agreed to participate in the study were provided copies of the book and collectible cards, a key to record student demographics, and

copies of a questionnaire for students to take before and after exposure to the book and collectible cards. Teachers were asked to assign each student a unique identification number and document the student's gender (male, female, or other), race and ethnicity (White or URM), and geographic location (urban, suburban, or rural). Teachers were then asked to have students complete a questionnaire consisting of 2 open questions: "When you are an adult, what job would you like to have?" and "When you are an adult, what job do you expect to have?"

Next, teachers were asked to provide each student with a copy of the book and set of collectible cards. Teachers were not directed on how to incorporate the books and cards into their curriculum but were asked to document how the materials were incorporated and the duration of use. Teachers were asked to have students again complete the questionnaire within 1 week after students completed working with the book and cards. Teachers labeled questionnaires completed before and after exposure to the book and collectible cards with each student's identification number, and not the student's name, before providing results to the investigators.

Statistical analysis

Only students who provided responses to both questions on both questionnaires were included in the study. A response indicating that the student did not know what career he or she would like to have or expected to have was considered a valid answer. Desired and expected careers were categorized. Frequencies were tabulated for all students as a whole and for race-ethnicity, gender, and geographic location subgroups. The McNemar test was used to compare results for questionnaires completed before and after exposure to the book and collectible cards. All analyses were performed with standard software.^a Values of $P < 0.05$ were considered statistically significant.

Results

Ten teachers from 6 schools in Indiana participated in the project. Two schools were located in rural locations, 3 were in suburban locations, and 1 was in an urban location. One school was a charter school; the remaining 5 were public schools.

A total of 176 third-grade students participated in the study and completed both questionnaires. Of these 176 students, 100 (56.8%) were male, and 76 (43.2%) were female. Twenty-nine (16.5%) students were URM, and 147 (83.5%) were White. There were 94 (53.4%) students from rural areas, 60 (34.1%) students from suburban areas, and 22 (12.5%) students from urban areas.

Teachers reported they used the materials in the classroom for 5 to 14 days (mean, 7 days) and that the total time students spent with the materials ranged from 1.5 to 5.5 hours (mean, 3 hours). In 8 classrooms, students worked with the materials both alone and in groups. In the other 2 classrooms,

students worked with the materials only in groups. Teacher-reported activities included students reading the books independently, in groups, and as a class; reading and playing games with the cards; and having group and whole-class discussions. Teachers reported that students completed the follow-up questionnaire either immediately or up to 8 days after they finished using the materials, with a mean time of completion of 4.4 days after students finished using the materials.

Career aspirations

Before exposure to the book and cards, 58 careers were named by the students when asked what job they would like to have as an adult. Careers named by ≥ 10 students were athlete (29), teacher (21), police officer (13), and veterinarian (10). The remaining careers were named by ≤ 7 students. The 100 male and 76 female students named 39 and 30 careers, respectively. The most frequent answers by males were athlete (25), police officer (12), and armed forces (8), whereas the most frequent answers by females were teacher (18) and veterinarian (8). Two male students answered veterinarian.

The 29 URM students named 17 careers, whereas the 147 White students named 55 careers. The most frequent answers for URM students were athlete (5), teacher (5), and doctor (4); the most frequent answers for White students were athlete (24), teacher (13), and police officer (11). Nine White students and 1 URM student answered veterinarian.

In terms of geographic location, the 94 rural, 60 suburban, and 22 urban students named 37, 27, and 14 careers, respectively. The most frequent answers from rural students were athlete (12), teacher (12), and veterinarian (9). Suburban students most frequently answered athlete (11), police officer (7), and teacher (7). No suburban students answered veterinarian. Urban students most frequently answered athlete (6), police officer (2), singer (2), teacher (2), and television star (2). One urban student answered veterinarian.

After exposure to the book and cards, students named 52 careers in response to the question about what job they would like to have as an adult. Careers named by ≥ 10 students were athlete (25), veterinarian (20), police officer (12), and teacher (12). The remaining careers were named by ≤ 9 students. Male and female students named 36 and 30 careers, respectively. The most frequent answers by males were athlete (21), police officer (11), and veterinarian (9); the most frequent answers by females were veterinarian (11), teacher (10), and artist (7). Underrepresented minority students named 18 careers, and White students named 44 careers. The most frequent answers for URM students were athlete (3), teacher (3), doctor (3), and police officer (3), with 2 URM students answering veterinarian. The most frequent answers for White students were athlete (22), veterinarian (18), police officer (9), and teacher (9). Rural, sub-

urban, and urban students named 29, 27, and 12 careers, respectively. The most frequent answers from rural students were veterinarian (15), athlete (12), and teacher (8). Suburban students most frequently answered athlete (8), artist (7), and police officer (6). Three suburban students answered veterinarian. Urban students most frequently answered athlete (5) and police officer (3), with 2 urban students answering veterinarian.

Significantly ($P = 0.034$) more students answered that they would like to be a veterinarian as an adult after exposure to the book and cards (20/176 [11.4%]) than before exposure to the book and cards (10/176 [5.7%]). However, the only demographic group that had a significant shift in career aspirations was male students. Significantly ($P = 0.046$) more male students answered that they would like to be a veterinarian as an adult after exposure to the book and cards (9/100 [9%]) than before exposure (2/100 [2%]).

Career expectations

Before exposure to the book and cards, 64 careers were named by the students when asked what job they expected to have as an adult (1 student indicated he or she did not know). Careers named by ≥ 10 students were teacher (24), athlete (12), farmer (11), veterinarian (10), and police officer (10). The remaining careers were named by ≤ 5 students. The 100 male and 76 female students named 49 and 33 careers, respectively. The most frequent answers by males were athlete (12), farmer (9), police officer (9), and teacher (7). One male student answered veterinarian. The most frequent answers by females were teacher (17) and veterinarian (9).

The 29 URM students named 20 careers, whereas the 147 White students named 59 careers. The most frequent answers for URM students were teacher (3) and work at Walmart or Target (3). Two URM students answered veterinarian. The most frequent answers for White students were teacher (21), athlete (11), farmer (11), and police officer (10), with 8 White students answering veterinarian. The 94 rural, 60 suburban, and 22 urban students named 40, 34, and 16 careers, respectively. The most frequent answers from rural students were teacher (14), farmer (10), and athlete (9), with 7 students answering veterinarian. Suburban students most frequently answered teacher (7), police officer (6), artist (4), and computer job (4). Only 1 suburban student answered veterinarian. The most frequent answer from urban students was teacher (3), with 2 urban students answering veterinarian.

After exposure to the book and cards, students named 66 careers in response to the question about what job they expected to have as an adult. Careers named by ≥ 10 students were veterinarian (19), athlete (18), teacher (16), and police officer (12). The remaining careers were named by ≤ 8 students. Male and female students named 46 and 34 careers, respectively. The most frequent answers by males were

athlete (16), police officer (11), veterinarian (7), and farmer (7); female students most frequently answered teacher (16) and veterinarian (12). Underrepresented minority students named 21 careers, and White students named 57 careers. The most frequent answer for URM students was teacher (4), with 2 URM students answering veterinarian. The most frequent answers for White students were veterinarian (17), athlete (17), and teacher (12). Rural, suburban, and urban students named 41, 34, and 17 careers, respectively. The most frequent answers from rural students were veterinarian (16), athlete (11), and teacher (9). Suburban students most frequently answered athlete (7), police officer (7), artist (4), and inventor (4). Two suburban students answered veterinarian. Urban students most frequently answered teacher (4). One urban student answered veterinarian.

Significantly ($P = 0.039$) more students answered that they expected to be a veterinarian as an adult after exposure to the book and cards (19/176 [10.8%]) than before exposure (10/176 [5.7%]). Significantly ($P = 0.041$) more male students answered that they expected to be a veterinarian as an adult after exposure to the book and cards (7/100 [7%]) than before exposure (1/100 [1%]). Additionally, significantly ($P = 0.027$) more White students answered that they expected to be a veterinarian as an adult after exposure to the book and cards (17/147 [11.6%]) than before exposure (8/147 [5.4%]). Lastly, twice as many rural students ($P = 0.027$) answered that they expected to be a veterinarian as an adult after exposure to the book and cards (16/94 [17%]) as did so before exposure (7/94 [7.4%]).

On questionnaires completed before and after exposure to the book and cards, a minority of students (66/176 [37.5%] and 77/176 [43.7%], respectively) gave the same answer to the questions on what career they would like to have and what career they expected to have as an adult.

Discussion

Results of the present study indicated that classroom educational materials, namely books and collectible cards, could influence, at least in the short term, the career aspirations and expectations of third-grade students. For the present study, because of conditions that were included when the study protocol was approved by the Purdue University Human Research Protection Plan, the investigators could not dictate how the book and cards would be used in the classrooms. Despite this fact, exposure to the materials significantly increased the percentages of students wanting or expecting to be a veterinarian. Specifically, the materials significantly increased the percentage of third-grade boys who wanted to or expected to become a veterinarian. Surprisingly and despite featuring veterinarians of diverse races and ethnicities, the materials did not significantly increase the percentage of URM students who wanted or expected to become a veterinarian.

Findings of the present study agreed with previous career development research showing that children are considering careers at an early age.^{4,5} Children in the study identified nearly 70 different careers, with some careers clearly being more popular than others. The most popular careers before exposure to the educational materials, namely athlete, teacher, and police officer, were consistent with those reported by others¹⁰ to be popular among third-grade students. The present study also reinforced findings from earlier studies^{5,10} that a career in veterinary medicine is not only being considered by young children but is particularly popular among girls. Phipps⁵ found veterinarian to be among the top 4 career choices for 74 third- through fifth-grade students. Bobo et al¹⁰ surveyed career choices of 1,611 African American-Black, Hispanic-Latino, and Anglo US elementary school students and found that only Anglo girls listed veterinarian as a top 3 career choice.

Results of the present study also provided evidence that third-grade students can discriminate between imagined (I would like to be a ...) and realistic (I expect to be a ...) career expectations. On questionnaires completed before and after exposure to the book and cards, a minority of students (37.5% and 43.7%, respectively) gave the same answer to the questions on what career they would like to have and what career they expected to have as an adult. This was consistent with results of other studies¹³⁻¹⁵ in which 37% to 50% of children reported matching career aspirations and expectations.

One aim of our study was to determine whether the materials highlighting racially and ethnically diverse veterinarians would increase the percentage of URM students who wanted or expected to pursue a career in veterinary medicine. The materials used in the present study included a higher percentage of URM veterinarians than is currently found in the profession. In 2013, the US veterinary profession was 96.5% White¹⁶; yet, only 2 of the 7 veterinarians featured in the book and 3 of the 11 individuals featured on the cards used in this study were White. Surprisingly, a significant increase in the percentage of students wanting or expecting to be a veterinarian was not detected among URM students, but a significant increase in the percentage of students expecting to be a veterinarian was identified among White students. Although Bobo et al¹⁰ recommended that resources depict individuals who are culturally diverse, Purves et al¹⁷ reported conflicting results with children in some studies preferring books illustrated with characters of their race and children in other studies ambivalent about the race and ethnicity of individuals in books. One limitation of the present study was the low number of URM students participating, which could have limited the power to detect significant differences in responses to questionnaires. The small sample size also hindered us from examining whether the magnitude and direction of the changes in responses between the first and second questionnaires were similar or different for White versus URM students.

A second aim of the present study was to determine whether the materials would increase the percentage of boys wanting or expecting to pursue a career in veterinary medicine. Sex stereotyping can influence young children's attitudes toward occupations.^{18,19} Sellers et al²⁰ explored how gender identity of children impacted career choice and found that even third- and fourth-grade children who were classified as androgynous tended to select sex-typed occupations. Interestingly, around 1980, when the veterinary profession was 90.5% male,²¹ an investigation by Nelson²² of the career aspirations of 48 third-grade boys and girls found that 2/24 (8.3%) girls and 5/24 (20.8%) boys selected veterinary medicine. When the same children were asked what they would be if they were the opposite sex, 3 of 24 (12.5%) girls and none of the boys stated veterinarian (1 boy stated that if he were a girl, he would be an assistant veterinarian). In contrast, the veterinary profession was 44.4% male in 2013,²³ when data were collected from third-grade students for the present study. We found that 2 of 100 (2%) and 1 of 100 (1%) boys and 8 of 76 (10.5%) and 9 of 76 (11.8%) girls aspired or expected to be a veterinarian before exposure to the book and cards, indicating that gender stereotyping of the veterinary profession may have played a role in initial career choices.

After exposure to materials in the present study, in which 5 of 7 veterinarians featured in the book and 5 of 11 individuals featured on the cards were men, significantly more boys aspired or expected to be veterinarians. Trepanier-Street and Romatowski¹⁹ reported that books could influence children's perceptions of whether careers were gender stereotyped. Additionally, in a study of 56 Canadian children aged 6 to 14, Morton et al²⁴ found that although no boys spontaneously listed veterinarian in their top 3 career choices, when specifically asked about the field, 50% of the boys indicated the career of veterinarian was appealing. Our results could suggest that boys find careers in veterinary medicine attractive but consider being a veterinarian a female occupation. Exposure to the book and cards in this study perhaps diminished gender stereotyping because most of the veterinarians featured in the book were men.

Although not a primary aim of the present study, more than twice as many rural students answered that they expected to be a veterinarian as an adult after exposure to the book and cards than before exposure. When Trice²⁵ asked, on 2 occasions, 8 months apart, 203 eight-year-olds and 219 eleven-year-olds from urban and rural backgrounds what they wanted to be when they grew up and what they thought they really would be, rural children were more likely to respond with a parent's occupation, while urban children answered with either careers of their parents or common occupations within their community. The author concluded that urban children were exposed to a wider range of careers than rural children and this exposure impacted their career aspirations.

However, in the present study, rural children consistently listed more careers than either suburban or urban children, suggesting broader awareness of career choices exists among rural youth today, perhaps because of Internet accessibility. This also implied that an opportunity exists to continue to engage rural youth in veterinary medicine despite the urbanization of society.

The present study was limited in terms of number of students and geographic location. Investigators could not control how or how long the materials were used by teachers in their classrooms. Additionally, investigators could not assess student attention to or retention of the material. Finally, the study only explored impact on short-term career aspirations and expectations of the students. Despite these limitations, results of the present study supported previous findings that children in elementary school are indeed exploring careers. The study also provided evidence that young children can be influenced, at least in the short term, to consider careers in veterinary medicine when they are provided with educational materials containing examples of racially and ethnically diverse male and female veterinarians who are engaged in various facets of the veterinary profession. Further studies are needed to determine whether such interventions could have a long-term impact on occupational selection.

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Footnotes

- a. GraphPad QuickCalcs, Graphpad Software Inc, San Diego, Calif. Available at: www.graphpad.com/quickcalcs/. Accessed Jan 29, 2014.

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Correction: Sedation and mechanical hypoalgesia after sublingual administration of detomidine hydrochloride gel to donkeys

In the report "Sedation and mechanical hypoalgesia after sublingual administration of detomidine hydrochloride gel to donkeys" (*J Am Vet Med Assoc* 2016;249:83-89), Figure 1 incorrectly displayed mean and range values rather than median and range values. The correct figure is provided below:

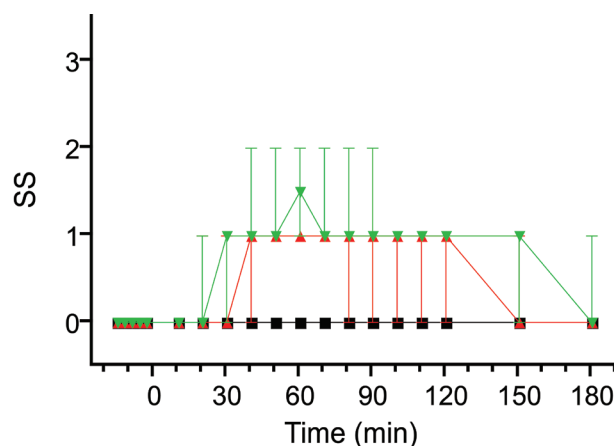


Figure 1—Median and range SSs for 6 healthy donkeys before (prior to 0 minutes) and at various points after sublingual administration of a placebo (squares) or detomidine hydrochloride gel at 20 µg/kg (9 µg/lb; upright triangles) or 40 µg/kg (18 µg/lb; inverted triangles). Donkeys received each of the 3 treatments (at 0 minutes) 1 week apart in a crossover, Latin-square design. An SS of 0 indicates no sedation, and an SS of 3 indicates marked sedation.