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Attitudes Toward Animal Research Among Medical Students in the United States

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Prior to use in patients in the clinical setting, the safety, mechanism of action, and efficacy of new treatments must be established. This often requires testing new treatments in animals. Public attitudes toward animal research have been investigated, but less is known about the attitudes of physicians. To begin to address this, we examined attitudes of medical students regarding animal research, and whether these attitudes were rigidly held. We surveyed US-based student members of the American Academy of Neurology (AAN). Students were questioned regarding agreement or disagreement with a set of 14 positively- or negatively-biased statements regarding animal research. To determine if these attitudes were rigidly held, students viewed an educational video regarding animals used in research and repeated the survey immediately after the video. One hundred sixty-eight students completed the initial survey. A group attitude score was calculated based on agreement with 14 statements. Males and those with previous research experience had a significantly more positive attitude toward animal research, but other variables had no effect. After viewing the video, 108 students repeated the survey. The overall attitude of respondents changed to be significantly more positive toward animal research. Of the 14 statements, attitudes toward 7 individual statements became significantly more positive after viewing the video. To our knowledge, this is the first study to examine attitudes toward animal research among medical students. Overall, the group's attitude toward animal research was more positive than negative. However, these negative attitudes do not appear to be rigidly held. These findings should be considered in the future of medical education curriculum development.

Abbreviations: AAN, American Academy of Neurology; AAN-SIGN, American Academy of Neurology Student Interest Group in Neurology; ANOVA, Analysis of Variance

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Typically, one of the steps for developing new clinical treatments involves testing in animals. Therefore, the appropriate use of animals in research impacts future developments for treatment for patients.[3,10] Because the use of animals in research is a highly regulated and monitored process,[3,15,16] a minimum number of animals are used. The public's attitudes regarding the use of animals in research has been studied previously. In 1990, 60% of college students had no serious reservations about the value of animals in research.[13] Over the last several decades, well-funded efforts from advocacy groups have been undertaken to influence public opinion regarding the use of animals in research.[2-6,8,12,14] More recent national polls commissioned by the Foundation for Biomedical Research found a decrease in public support of animal research in surveys of at least 1,000 adults in the general public (64% support in 2004 compared with 54% in 2008), falling to 48% in 2016.[7] Decreasing acceptability of animal research among the public is likely to increase restrictions and limitations on animal research. Furthermore, legal actions restricting animal research have been implemented in the United States and Europe.[3,5]

As the providers of new treatments to the general public, physicians are in a unique position to discuss the origins of these new treatments and educate the public regarding the nature of the research pipeline. However, the attitudes of medical professionals regarding animals in research are not known. Furthermore, the medical education setting is where most physicians will have the greatest access to new treatments and the research involved in the development of the new treatments. Therefore, the assessment of physician attitudes to research animal use in the medical education setting would be particularly important. To establish the attitudes of those preparing for a career in the medical profession, we surveyed U.S. medical student members of the American Academy of Neurology Student Interest Group in Neurology (AAN-SIGN), chosen since this research was conducted through the American Academy of Neurology, regarding their attitudes toward animal research. We also examined factors that might influence their attitudes toward animal research. Furthermore, we wanted to determine whether the attitudes represented are rigidly held beliefs. To investigate this, we also assessed the changes to these responses after viewing a 14-min educational video about animals in research.

Materials and Methods

Instrument. The survey was created by AAN Animal Studies Task Force Chair David Beversdorf, MD and AAN staff to establish attitudes on animal research. (Supplemental Table). Five survey questions were based on the Animal Research Scale originally published by Wuensch and colleagues,[17] with additional questions derived by consensus of the research team. The final survey consisted of 7 positively-biased and 7 negatively-biased statements regarding animal research. For negatively-biased statements such as "Animal research cannot

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be justified and should be stopped", respondents received a score of 1 for answering "Strongly agree", a 2 for "Agree", a 3 for "No opinion", a 4 for "Disagree", and a 5 for "Strongly disagree". The reverse coding was used for positively-biased statements such as "Most medical research done on animals is valid"; respondents received a 5 for "Strongly agree" and a 1 for "Strongly disagree". The demographic information that might impact attitudes was collected, including gender, years in medical training, diet (vegetarian compared with nonvegetarian), pet ownership, experience with farming, rural compared with an urban upbringing, size of the city of origin, and prior experience with animal research.

Sample. The *Animal Research Survey* sample was comprised of 1,200 AAN members who, according to the AAN's database records, were current medical students in the United States. Of 1,831 eligible members, 1,200 were randomly selected for the sample. Thirty-three members were removed from the sample due to invalid email addresses, for a final sample size of 1,167.

Data Collection. The administration of the survey was approved as exempt by the University of Missouri Institutional Review Board, as all responses were anonymous. The survey was sent to the entire sample group by email on September 26, 2013. Two reminder emails were sent, and data collection closed on October 21, 2013. As an incentive, all members who received the survey request were invited to participate in a drawing for one of two $500 prepaid gift cards.

Educational Video. To determine whether viewing an educational video would change their attitudes toward animal research, the 14-question attitude scale was administered to respondents, followed by a 14-min educational video that was embedded in the online survey window. The video, which was titled *Veterinarians Speaking for Research*, was generated by Americans for Medical Progress for educational purposes.[1] It was selected for its length of less than 15 min and can be seen at http://www.youtube.com/watch?v=5RC2HhRCQ3s. It described the purpose of animal research and the regulations which ensure the standard of living conditions and care of animals in research. It also discussed the positive medical implications that such research has had. Respondents who indicated that they were able to watch the entire video were directed to complete the scale a second time.

Analysis. Descriptive statistics were calculated for the response rates and sample demographics, and demographics were compared between responders and non-responders. After calculation of responses to individual questions and calculation of a composite attitude score, (described in detail below) the influence of demographics on composite attitude scores were calculated with Spearman's rho for years in training, ANOVA for childhood setting, and for all of the other contrasts, which were between 2 groups, independent sample *t* tests were performed. Responses after the video were then compared with responses prior to the video using paired *t* tests for each individual question and for composite attitude scores. Significance for all comparisons was established at $P < 0.05$.

Results

Response Rate. A response rate of 14.4% (168/1,167) was achieved. The margin of error for all respondents at a 95% confidence level is ±7.0.

Demographic Characteristics of Sample. Demographic information on survey respondents was analyzed from the AAN internal membership database. The mean age of survey participants was 27 y and the majority of respondents were male. A detailed comparison of all demographic variables can be found in Figure 1. Differences in age and gender between respondents and non-respondents were not significant.

Responses to Individual Questions. Aggregate responses to individual questions can be viewed in Figure 2. In the medical education setting, to determine the understanding of the role of animal research in the development of new therapeutics, the key questions of whether surgical procedures or new drugs should be tested in animals, and whether animal research, in general, is justified were a specific focus. Among respondents to the first survey, 4.8% agreed with the statement 'Animal research cannot be justified and should be stopped', 13.2% disagreed with the statement 'New surgical procedures should be tested on animals before they are used on people,' and 7.2% disagreed with 'New drugs should be tested on animals before they are used on people'. In addition, 11.9% disagreed with 'Most medical research done on animals are valid.' After viewing the educational video, the group's overall attitude changed to be more positive toward animal research, with the responses above decreasing to 0.9%, 2.8%, 0.9%, and 4.7%, respectively for the aforementioned statements (Figure 3), which significantly differed from baseline scores for many of these items (Figure 4).

Composite Attitude Score. A composite animal research attitude score was calculated for each respondent based on responses to the survey's attitude scale. The average score for all 14 statements was calculated for each respondent to determine his or her composite attitude score. Therefore, a score near 5 indicates that the respondent has a positive attitude toward animal research, while a score near 1 indicates a negative attitude. The composite was calculated separately for the responses to the first survey, and the responses to the second survey after the educational video discussing animal research.

Base Composite Attitude Score. Using the scale detailed above, the mean base attitude score of all 168 survey respondents before viewing the video was 3.9 (± 0.6 SD, range 2.2 to 5.0), indicating that survey respondents as a whole showed a positive attitude toward animal research coming into the survey.

Change in Base Composite Attitude Score. Of the 168 survey respondents who completed the base attitude scale, all but 60 indicated that they had viewed the video in full. A paired samples *t* test comparing attitude scores of the 108 respondents before and after they watched the video indicated that the mean attitude of survey respondents changed at a statistically significant level to become more positive ($t(107) = 5.50$, $P < 0.00001$) after viewing the video. The mean attitude score of all 108 survey respondents completing both surveys was 4.0 (± 0.5 SD, range 2.8 to 5.0) before viewing the video; after viewing the video, the score was 4.1 (± 0.5 SD, range 2.9 to 5.0).

Base Composite Attitude Score and Demographic Variables. The survey included several demographic questions to test for relationship with base attitude score. These variables included gender, years in medical training, vegetarianism, pet ownership, experience with animal farming, the population of the city in which respondents were raised, and prior animal research experience. Of these items, only gender ($t(105)=2.65$, $P = 0.009$) and prior animal research experience had a statistically significant relationship with attitude score ($t(166)=2.95$, $P = 0.004$); male respondents had a base mean attitude score of 4.0, compared with 3.8 for females, and respondents who had previous animal research experience had a base mean attitude score of 4.0, compared with a score of 3.7 for those who had not done animal research in the past. See Figure 5 for survey frequencies on demographic questions. See Figure 6 for signifi-

Demographic characteristics		Survey respondents (n = 168)	Survey nonrespondents (n = 999)	Significance test score
Age[a] **(mean)**		27.2 y (SD = 4.0)	27.0 y (SD = 3.3)	$P = 0.36$[c]
Gender[b] **(%)**	Male	56.9	52.0	
	Female	43.1	48.0	$P = 0.24$[d]

[a]Data missing for 5% of respondents and 3% of nonrespondents
[b]Data missing for <1% of respondents and 0% of nonrespondents
[c]One-sample *t* test
[d]Pearson χ^2
Attitude scores

Figure 1. Demographic characteristics of survey respondents and nonrespondents.

	n	*Strongly disagree*	*Disagree*	*No opinion*	*Agree*	*Strongly agree*	*Mean attitude score*[a]
To understand human genetic diseases, it is necessary to conduct research using live animal models.	168	1.8%	3.0%	6.5%	44.0%	44.6%	4.3
Animal research cannot be justified and should be stopped.[b]	168	46.4%	44.0%	4.8%	3.6%	1.2%	4.3
There are plenty of viable alternatives to the use of animals in biomedical research.[b]	165	11.5%	49.1%	17.0%	21.2%	1.2%	3.4
New drugs should be tested on animals before they are used on people.[b]	168	2.4%	4.8%	10.7%	47.6%	34.5%	4.1
New surgical procedures should be tested on animals before they are used on people.[b]	167	4.2%	9.0%	15.0%	43.7%	28.1%	3.8
Research on animals has little bearing on problems confronting humans.[b]	167	40.1%	49.1%	8.4%	2.4%	0.0%	4.2
Most medical research done on animals is valid.[b]	168	1.8%	10.1%	26.8%	50.0%	11.3%	3.6
Research on invertebrates such as fruit flies has no relevance to understanding human disease.	168	46.4%	42.3%	7.7%	2.4%	1.2%	4.3
It is not okay for researchers to induce head trauma in rodents for the purpose of developing neuroprotective agents for humans.	168	23.8%	44.0%	16.1%	13.1%	3.0%	3.7
Rodents should be used in experiments that would help explore human cognition, even if they die as a result of the experiment.	168	1.8%	10.2%	15.0%	55.1%	18.0%	3.8
A new catheter for use in opening up blood vessels should be tested on pigs before use in humans.	168	1.2%	3.6%	8.9%	58.3%	28.0%	4.1
If there is a genetic disease in dogs that closely mimics a similar disease in humans, it is okay to test new treatments on dogs.	167	1.8%	6.0%	8.4%	54.5%	29.3%	4.0
Researchers should not perform invasive procedures on primates, even for the purpose of exploring higher cognition in humans.	168	19.6%	48.2%	17.3%	11.3%	3.6%	3.7
It is not okay for researchers to induce head trauma in primates for the purpose of developing neuroprotective agents for humans.	168	14.3%	37.5%	19.6%	23.2%	5.4%	3.3

[a]For negatively-biased statements such as "Animal research cannot be justified and should be stopped", respondents received a score of 1 for answering "Strongly agree"; 2) for "Agree"; 3) for "No opinion"; 4) for "Disagree"; and 5 for "Strongly disagree". The reverse coding was used for positively-biased statements such as "Most medical research done on animals is valid"; respondents received a 5) for "Strongly agree" and a 1 for "Strongly disagree". Therefore, a mean score near 5 for each statement indicates a positive attitude toward animal research while a score near 1 indicates a negative attitude.
[b]Questions derived from Wuench and colleagues (14)

Figure 2. Base animal research attitude scale frequencies before viewing educational video.

	n	*Strongly disagree*	*Disagree*	*No opinion*	*Agree*	*Strongly agree*	*Mean attitude score*[b]
To understand human genetic diseases, it is necessary to conduct research using live animal models.	108	0.0%	0.9%	3.7%	49.1%	46.3%	4.4
Animal research cannot be justified and should be stopped.[c]	108	57.4%	38.9%	3.7%	0.0%	0.0%	4.5
There are plenty of viable alternatives to the use of animals in biomedical research.[c]	108	13.0%	53.7%	16.7%	15.7%	0.9%	3.6
New drugs should be tested on animals before they are used on people.[c]	108	0.0%	0.9%	8.3%	56.5%	34.3%	4.2
New surgical procedures should be tested on animals before they are used on people.[c]	106	0.9%	1.9%	9.4%	53.8%	34.0%	4.2
Research on animals has little bearing on problems confronting humans.[c]	108	51.9%	45.4%	1.9%	0.9%	0.0%	4.5
Most medical research done on animals is valid.[c]	107	0.0%	4.7%	15.9%	63.6%	15.9%	3.9
Research on invertebrates such as fruit flies has no relevance to understanding human disease.	108	50.9%	42.6%	5.6%	0.9%	0.0%	4.4
It is not okay for researchers to induce head trauma in rodents for the purpose of developing neuroprotective agents for humans.	107	23.4%	47.7%	15.0%	11.2%	2.8%	3.7
Rodents should be used in experiments that would help explore human cognition, even if they die as a result of the experiment.	108	0.9%	2.8%	13.0%	62.0%	21.3%	4.0
A new catheter for use in opening up blood vessels should be tested on pigs before use in humans.	108	0.0%	0.0%	4.6%	59.3%	36.1%	4.3
If there is a genetic disease in dogs that closely mimics a similar disease in humans, it is okay to test new treatments on dogs.	108	0.9%	1.9%	7.4%	54.6%	35.2%	4.2
Researchers should not perform invasive procedures on primates, even for the purpose of exploring higher cognition in humans.	106	24.5%	48.1%	14.2%	9.4%	3.8%	3.7
It is not okay for researchers to induce head trauma in primates for the purpose of developing neuroprotective agents for humans.	108	23.4%	47.7%	15.0%	11.2%	2.8%	3.5

[a]When asked "Were you able to view the video?", 108 respondents answered "Yes"; the responses from those who viewed only some or none of the video were not included in this table.
[b]For negatively-biased statements such as "Animal research cannot be justified and should be stopped", respondents received a score of 1 for answering "Strongly agree"; 2 for "Agree"; 3 for "No opinion"; 4 for "Disagree"; and 5 for "Strongly disagree". The reverse coding was used for positively-biased statements such as "Most medical research done on animals is valid"; respondents received a 5 for "Strongly agree" and a 1 for "Strongly disagree". Therefore, a mean score near 5 for each statement indicates a positive attitude toward animal research while a score near 1 indicates a negative attitude.
[c]Questions derived from Wuench and colleagues (14)

Figure 3. Animal research attitude scale frequencies after viewing an educational video on the value of animal-based medical research.[a]

cance tests on the relationship of composite attitude score with each demographic variable.

Discussion

This is the first study that we know of to examine attitudes toward animal research among medical students. Our findings suggest that medical students who are interested in neurology exhibit a more positive than negative view of animal research and that the negative attitudes among them are not rigidly held.

Findings suggest that at baseline, a substantial number of medical students express disagreement with statements that describe essential components of the drug and procedure development pipeline. As described above, 13.2% disagreed with the statement 'New surgical procedures should be tested on animals before they are used on people,' and 7.2% disagreed with 'New drugs should be tested on animals before they are used on people.' Animal testing is a critical step in the process of testing new drugs and procedures,[10] and therefore these questions were a focus of attention in this study exploring the attitudes of medical students. Furthermore,

	n	*Mean attitude score before Video*[b]	*Mean attitude score after Video*[b]	*Change in mean score*	*Significance*
To understand human genetic diseases, it is necessary to conduct research using live animal models.	108	4.4	4.4	0.0	t(133) = 1.32, *P* = 0.43
Animal research cannot be justified and should be stopped.[c]	108	4.4	4.5	+0.1	t(134) = 2.79, *P* = 0.001[d]
There are plenty of viable alternatives to the use of animals in biomedical research.[c]	106	3.5	3.6	+0.1	t(132) = 0.76, *P* = 0.18
New drugs should be tested on animals before they are used on people.[c]	108	4.1	4.2	+0.1	t(134) = 2.36, *P* = 0.12
New surgical procedures should be tested on animals before they are used on people.[c]	106	3.9	4.2	+0.3	t(130) = 4.01, *P* = 0.0001[d]
Research on animals has little bearing on problems confronting humans.[c]	107	4.3	4.5	+0.2	t(133) = 3.09, *P* = 0.001[d]
Most medical research done on animals is valid.[c]	107	3.6	3.9	+0.3	t(133) = 4.58, *P* = 0.00001[d]
Research on invertebrates such as fruit flies has no relevance to understanding human disease.	108	4.3	4.4	+0.1	t(134) = 1.17, *P* = 0.18
It is not okay for researchers to induce head trauma in rodents for the purpose of developing neuroprotective agents for humans.	107	3.7	3.8	+0.1	t(133) = 0.82, *P* = 0.23
Rodents should be used in experiments that would help explore human cognition, even if they die as a result of the experiment.	107	3.8	4.0	+0.2	t(133) = 2.51, *P* = 0.001[d]
A new catheter for use in opening up blood vessels should be tested on pigs before use in humans.	107	4.2	4.3	+0.1	t(133) = 3.37, *P* = 0.002[d]
If there is a genetic disease in dogs that closely mimics a similar disease in humans, it is okay to test new treatments on dogs.	108	4.1	4.2	+0.1	t(133) = 2.33, *P* = 0.01[d]
Researchers should not perform invasive procedures on primates, even for the purpose of exploring higher cognition in humans.	106	3.8	3.8	+0.0	t(132) = 0.45, *P* = 0.53
It is not okay for researchers to induce head trauma in primates for the purpose of developing neuroprotective agents for humans.	108	3.4	3.5	+0.1	t(134) = 1.34, *P* = 0.35

[a]When asked "Were you able to view the video?", 108 respondents answered "Yes"; the responses from those who viewed only some or none of the video were not included in this table.
[b]For negatively-biased statements such as "Animal research cannot be justified and should be stopped", respondents received a score of 1 for answering "Strongly agree"; 2 for "Agree"; 3 for "No opinion"; 4 for "Disagree"; and 5 for "Strongly disagree". The reverse coding was used for positively-biased statements such as "Most medical research done on animals is valid"; respondents received a 5 for "Strongly agree" and a 1 for "Strongly disagree". Therefore, a mean score near 5 for each statement indicates a positive attitude toward animal research while a score near 1 indicates a negative attitude.
[c]Questions derived from Wuench and colleagues (14)
[d]Statistically significant results in bold type
Demographic Frequencies and Analysis

Figure 4. Question-by-question change in attitude scores, and statistical significance of change, among respondents who viewed full video.[a]

4.8% agreed with the more sweeping statement 'Animal research cannot be justified and should be stopped.' Physicians represent the critical link between newly developed treatments and the general public, as they are responsible for dissemination of these treatments. If dissemination of the process of new treatment development does not occur, patients may unknowingly take up advocacy positions against their own long-term healthcare needs. Furthermore, in some cases, physicians might also take up advocacy positions against patients' future healthcare needs, placing the future of treatment development at risk.[3,10] Because students have the greatest exposure to new therapies and the preclinical research environment in the medical education setting, this is a critical time window for appropriate learning about the research pipeline. The changes in attitudes after observing the video suggests that negative attitudes can be changed, and that medical education may have a role in this setting. The video described specific research vignettes, and teaching medical ethics has been found to be most effective when based on vignettes and discussion.[9,11] Therefore, such an approach may be beneficial in this setting.

According to our surveys, the only predictors of attitudes toward animals in animal research were gender (men had a more positive baseline attitude) and a history of experience with research. Support for animal research is greater in men than women among the general public, 60% to 40%, especially in the 24 to 39-y-old age group.[7] This may become more relevant in the future, as the proportion of women entering medical schools continues to increase.[7] Interestingly, years of training was not a predictor of attitude score. This may raise concerns that the medical education process is having an insufficient impact on awareness of these issues. However, it is also possible that the students who had greater research motivation at an earlier stage of training were also more comfortable with animal research, since this student interest group also sponsors research scholarships between years 1 and 2 of medical school, thus potentially selecting a more research-friendly group of students early in training, offsetting our ability to detect the impact of time in

For how many years have you been in medical training? (*n* = 167)			
Mean (SD)	*Median*	*Minimum*	*Maximum*
3.3 (1.4)	3.0	1.0	10.0
Do you consider yourself to be a vegetarian? (*n* = 168)			
1.8%	Yes - I eat no meat or animal products		
4.2%	Yes - I eat no meat		
3.6%	Yes - I eat no red meat		
80.4%	No		
10.1%	Not currently, but I have been in the past		
Have you ever owned a pet? *Mark all that apply. (*n* = 167)**			
76.6%	Yes, in my household growing up		
38.9%	Yes, currently		
13.8%	No		
*Due to some respondents selecting more than one response, totals add up to over 100%.			
Do you have any prior animal research experience? (*n* = 168)			
64.9%	Yes (please specify your experience):		
35.1%	No		
What was the duration, in years, of your animal farming experience? (*n* = 29)			
Mean (SD)	*Median*	*Minimum*	*Maximum*
8.6 (8.1)	5.0	0.0	26.0
Using the definitions below and your own judgment, in which of the following settings did you spend most of your childhood? (*n* = 168)			
33.3%	Urban – in a city or town of over 25,000 (please estimate the population of the city or town):		
50.0%	Suburban – residential area within commuting distance of a city or town		
16.1%	Rural – in a town of under 25,000 or in an area outside of any city limits		
0.6%	Other (please specify):		
Urban – in a city or town of over 25,000 (please estimate the population of the city or town):			
Mean (SD)	*Median*	*Minimum*	*Maximum*
2,163,377 (4,174,523)	330,000	25,000	18,900,000

Figure 5. Frequencies of demographic survey questions.

Variable	*Significance test score for relationship with composite attitude score (base)*
Gender	t(105) = 2.65, *P* = 0.009
Years in medical training	r = 0.011, *P* = 0.89[a]
Vegetarian	t(166) = 0.91, *P* = 0.36
Pet ownership	t(166) = 0.54, *P* = 0.60
Farming experience	t(166) = 0.47, *P* = 0.64
Childhood setting	F(3,164) = 0.682, *P* = 0.56
Prior research experience	t(166) = 2.95, *P* = 0.004[b]

[a]Spearman rho
[b]Statistically significant results in bold type ($P < 0.05$)

Figure 6. Significance tests on relationship of demographic variables with base composite attitude score.

the medical education setting in this survey. The lack of effect of farming experience and vegetarian diet may be impacted by the relatively small numbers of students representing these categories.

The findings in this study may be an underestimate of negative attitudes of medical students in general. This incidence of disagreement with animal research may be higher among other medical students, as the students sampled in this study had identified a specific interest in a relatively research-oriented specialty, neurology. However, despite the attitudes represented in the initial survey, these attitudes do not generally appear to be rigidly held. After viewing an educational video on the role of animals in research in the research pipeline, the expression of disagreement significantly decreased, despite the absolute value of composite scores not changing markedly. This was likely due to most participants indicating favorable attitudes toward animal research at baseline, which potentially contributed to a ceiling effect. The composite score included several questions on which there was considerable agreement at baseline as well as follow-up, thus minimizing the magnitude of change of the composite score upon watching the video. Even so, the overall change in composite score was statistically significant.

One limitation of this study was the scope of the population. As this is a study specifically of AAN-member medical students interested in neurology, the relevance for a broader range of students needs to be assessed. However, a nationwide sample was obtained in this survey. Despite the modest response rate to the survey, we found no apparent differences in demographics of respondents and non-respondents. Due to the potential impact, these findings may need to be considered in the future of medical education curriculum development. Potential avenues of investigation include assessment of the impact of specific educational programming targeting this issue within the medical school setting. The purpose of the video component of the current study was for the more general purpose of assessing malleability of these attitudes. These results suggest that the incorporation of a simple educational intervention like this video may influence the attitudes of this crucial population. Future studies could also evaluate the potential long-term effects of such educational interventions. Furthermore, as previous exposure to animal research was the only factor that influenced attitudes in this study, some understanding of the principles of translational animal studies would appear to be a critical element of such educational intervention.

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