People Like Me Become Veterinarians: The Role of Pre-Veterinary Residency Programs in Preparation for Veterinary School

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In the United States, there are few pre-veterinary programs that are independent from college and university affiliation, and for those that do exist, there is little data that shows the impact of these programs on participants' long-term graduate school and career prospects in veterinary medicine. These programs have the potential to provide undergraduate students with early access to veterinary skills that may help in their applications to veterinary colleges of medicine and their identification of future veterinary career paths. In 2007, the Association of American Veterinary Medical Colleges (AAVMC) released a report looking forward in veterinary medicine to anticipate the upcoming needs of veterinarians in a changing world (Willis et al., 2007).

In this report, based on what they call the Foresight Project, they discuss the transition that their profession is in and the factors that will impact that transition, including an increasing human population, climate change, and global political destabilization (Willis et al., 2007). One area this project focuses on, and germane to the research in this paper, is veterinary education (Willis et al., 2007). They write that their responsibility as veterinarians is:

> …to respond to both foreseeable and, as yet, undetermined future needs, a broad range of skills, knowledge, and attributes will be required, e.g., communication skills, leadership abilities, cultural competence, business skills, interpersonal skills, values, and ethics. (Willis et al., 2007, p. 8)

They acknowledge in the report that colleges of veterinary medicine cannot provide all these skills, and so they must be developed over time and in multiple ways (Willis et al., 2007). One of these ways could be through experiential learning in pre-veterinary programs that are housed outside of colleges and universities. This study is the first of its kind in examining the program satisfaction of, student self-assessed learning in,

and overall impact on long-term career aspirations of students participating a non-college affiliated pre-veterinary summer residency program.

Here, we define pre-veterinary programs as a structured, interactive program involving students who are in college or university at the undergraduate level that focuses on veterinary topics or work. Pre-veterinary programs can be considered learning communities; Purdie et al. (2007) looked at undergraduate freshmen who participated in a freshman interest group for animal science, which included being part of a cohort taking classes and seminars together, and found that this participation increased their odds of success in graduation from undergrad and entry into veterinary medical school. Similarly, Fish and Griffith (2014) examined student outcomes after a one-credit seminary course during veterinary students' first year that focused on different career areas students could enter into. They found that students who participated in this seminar reconsidered their career "path" due to the seminar, which included specific specialties within veterinary medicine (Fish & Griffith, 2014). Pre-veterinary programs may serve as a professional learning community that provides students with an early opportunity to explore careers to determine what might be right for them in the early stages of their veterinary journey.

Research on pre-veterinary programs is virtually non-existent, as these programs, independent from colleges and universities, are few in number. Loop Abroad, the program under study here, was founded in 2009 as an international veterinary residency program for high school students who were interested in exploring veterinary careers after their undergraduate degrees. The program has expanded to undergraduate college students as well, building on its original vision of veterinary education and expanding to focus on animal science, cross-cultural learning, and veterinary-based research. Today, Loop programs operate in nine countries with more than 1,000 students served in their most recent summer study-abroad programs.

Evidence of Pre-Veterinary Program Impact on Long-Term Veterinary Outcomes

Pre-veterinary programs that provide experiential learning have the opportunity to provide future veterinary students with two major experiences that impact their degree path: development of soft skills (sometimes called "non-cognitive skills") needed for the profession, and hands-on experience.

So-called "soft skills" are subjective but are still often required of students to succeed both in veterinary school as well as in careers such as "teamwork, communication skills, empathy, and adaptability," and cultural responsiveness skills (Trivedi et al., 2022, p. 280). Several studies have found little to no connection between so-called "non-cognitive" skills and academic outcomes in veterinary school (Fish & Griffith, 2014; Kortum et al., 2022; Rousch et al., 2014); however, it is important to point out that academic outcomes are not the only predictor of a long-term veterinary career. According to Trivedi et al. (2022), almost 20% of the colleges of veterinary medicine in the United States in the 2021 admissions cycle had a requirement of experience hours of at least 200 hours for admission to their veterinary school. These hours provide prospective veterinary students with access to not only work directly with animals, but practice working in places and with people that are different from their own life experiences. It should be noted that cultural competency in particular is a pilar of the Loop abroad programs. While many of these experience hours can come at the undergraduate level, there is value in independent programs that take students out of the classroom and put them in the field with instructors and practicing veterinarians to gain hands-on experience.

The hands-on experience helps take the reality of veterinary medicine out of the theoretical and into the real world. In the AAVMC's Foresight Project report, they specifically state that "hands-on experience is essential and fundamental to achieving a DVM [Doctor of Veterinary Medicine] degree" (Willis et al., 2007, p. 9). This experience may help students' often myopic focus on getting into graduate school at the expense of everything else (Kogan et al., 2009) and into a better understanding of what constitutes a real-world veterinary experience, expanding what "veterinary education" can be. Because veterinary medicine is a graduate degree and cannot be obtained with a bachelor's degree, pre-veterinary educational programs can fill a gap that university- and college-based science coursework cannot; namely, these programs can create hands-on, experiential learning in locations around the world. While research and laboratory work are an important part of the veterinary education process, working hands-on with animals and practicing veterinarians can provide a crucial education that sustains students across coursework, allowing them to connect their personal experience with the work done in textbooks and laboratories. Kogan et al. (2009) found no significant

relationship between undergraduate coursework and success in veterinary coursework, echoing previous findings. A hands-on, experiential pre-veterinary experience may fill in the gap of this relationship.

Veterinarian-supervised experience hours (Kortum et al., 2022) are an important part of the veterinary school application process; most schools have recommendations of the number of hours students should accumulate before application (Kortum et al., 2022). Kortum et al. (2022) wanted to see if species-specific pre-veterinary experience hours were correlated with veterinary students' academic outcomes in classes specifically relating to the species in those hours; they found that while students believe that there was a connection when asked, the evidence did not bear out this connection (Kortum et al., 2022). However, there is value in the student perception of the impact – because while there is a connection between veterinary students' academic outcomes, their class rank, and their veterinary licensure exam scores (Rousch et al., 2014), there is no evidence to date that teases out the impact of independent pre-veterinary experiences, including those supervised by veterinarians.

Both of these impacts are those that can be facilitated by and developed within an independent pre-veterinary program such as Loop Abroad.

Justification for Research and Research Questions

The evidence to support the use of independent pre-veterinary programs to prepare students to apply to veterinary colleges of medicine after their undergraduate programs is scant and needed to support both short-term and long-term outcomes of these programs on future veterinary students and veterinarians. Previous research has found that learning communities are an important part of supporting student success overall (e.g., Purdie et al., 2007), and pre-veterinary learning communities can impact student positive outcomes specifically (e.g., Kortum et al., 2022). This leads into the research for this study.

The purpose of this correlational research is to examine program satisfaction of, student self-assessed learning in, and overall impact on long-term career aspirations of students participating in a non-college affiliated pre-veterinary summer residency program. Few of these programs exist in the United States, so examining the pre- and post-survey responses that discuss these three major goals of the research will fill a

gap in the research and provide evidence for the usefulness of these types of programs. The research questions for this study were:

(1) How satisfied are students with their experience at a pre-veterinary summer residency program?

(2) Did students learn more about veterinary work as a career during their residency than when they began the residency?

(3) Did students who participated in the program feel more prepared to apply to veterinary school?

(4) Are students who participated in this program more likely to want to pursue veterinary school after their summer residency than they were prior to the program?

Method

This study was a correlational research design that used a convenience sample. Participants were involved in a pre-veterinary program (Loop Abroad) who are over the age of 18. The data collection took place in summer 2024, between June and August 2024. This study was granted exempt status through the City University of New York's Institutional Review Board (Protocol 2024-0275-CCNY) in April 2024. This exempt letter can be found in Appendix A.

Participants were first asked if they were 18 or older, and if they affirmed, they were handed a survey and told to only write their first name and last initial to match pre- and post-surveys. They were told to read the consent form attached to the first page of the survey and to continue with the survey if they consented. If they did not consent, they were instructed to fill out that portion of the consent form and return the blank survey. The pre-survey took approximately ten (10) minutes to complete. At the end of their program, the same process was done with the post-survey; the post-survey also took approximately fifteen (15) minutes to complete.

The pre-survey contained 29 questions that asked participants about their knowledge of veterinary careers, their academic and professional self-concept, and their awareness of culture in veterinary medicine.

The post-survey contained these same 29 questions and an additional 23 questions about their experience, learning, and support in the program (i.e., program satisfaction survey). Each of these questions was on a five-point Likert scale, with one being "not at all" and 5 being "totally." These questions can be seen in Tables 1 through 6 in the Results section.

The data analysis was done using descriptive statistics and paired-sample *t*-tests.

Results

The data analysis process began by compiling the pre- and post-survey results and removing any surveys for whom 477students did not give consent to be part of the study via the consent form or for students who were under age 18. The pre-survey had 324 participants complete the survey, and the post-survey had 304 participants complete the survey. The final data set was 304 participants (N=304) across 27 residency locations in this study.

To answer the first research question, which asked how satisfied students were with their experience at a pre-veterinary summer residency program, Table 1 presents the mean, standard deviation, and median of the program satisfaction questions. Every question response saw satisfaction at no less than three out of five points on a Likert scale; the means ranged from 3.00 to 3.84 (medians ranged from 3 to 4). Satisfaction questions with the highest scores included learning valuable hands-on skills (M=3.80, SD=0.03), learning more on the trip than they would have in two weeks in a classroom (M=3.77, SD=0.03), gaining insight into another culture on the trip (M=3.84, SD=0.03), gaining an understanding of the relationship between culture and veterinary medicine (M=3.79, SD=0.03), feeling more ready to take on challenges (M=3.80, SD=0.04), and having their perspective broadened (M=3.80, SD=0.02).

Table 1

Program Satisfaction Ratings

Question	*n*	*M*	*SD*	Median
I understand more about vet school than I did before this trip.	288	3.00	0.06	3
I understand more about being a vet than I did before this trip.	288	3.42	0.05	4

I learned valuable hands-on skills during this trip.	288	3.80	0.03	4
I learned more than I would have learned in 2 weeks in a classroom on this trip.	288	3.77	0.03	4
I made at least one valuable professional connection during this trip.	287	3.64	0.04	4
I feel more prepared for vet school than I did before this trip.	287	3.36	0.05	4
I feel more empowered about my academic and professional future than I did before this trip.	287	3.45	0.05	4
I would recommend a Loop Abroad trip to a friend.	288	3.72	0.03	4
I would come on another Loop Abroad trip.	288	3.53	0.05	4
I feel more ready for vet school than I did before this trip.	287	3.21	0.06	3
I am more excited to be a veterinarian than I was before this trip.	286	3.39	0.05	4
I feel like I better understand what I want my career to look like than I did before this trip.	287	3.41	0.05	4
I have more academic support than I did before this trip.	288	3.13	0.06	3
I made friends who I plan to stay in touch with.	287	3.56	0.05	4
I feel more inspired than I did before this trip.	288	3.60	0.04	4
I feel more included than I did before this trip.	288	3.34	0.05	4
I feel more confident in my goals than I did before this trip.	288	3.45	0.05	4
I have gained insight into another culture during this trip.	288	3.84	0.03	4
I have gained insight into myself during this trip.	288	3.62	0.04	4
I have gained an understanding of the relationship between culture and veterinary medicine during this trip.	288	3.79	0.03	4
I feel more ready to take on new challenges than I did before this trip.	288	3.80	0.04	4
My perspective has broadened during this trip.	288	3.80	0.02	4
This trip has helped me feel like I can accomplish more than I thought.	287	3.63	0.04	4

To answer the second research question, which asked if students learned more about veterinary work as a career during their residency than when they began the residency, paired-sample *t*-tests were run for the pre- and post-survey questions regarding this topic. Table 2 presents the paired-sample *t*-tests for the matched questions. All four questions asking about veterinary work as a career showed an increase from pre- to post-survey at statistically significant levels.

Table 2

Paired-sample t-*tests for knowledge of veterinary work*

Question	Pre-survey		Post-survey		*n*	*t*(*n*)	*p*
	M	*SD*	*M*	*SD*			
I understand a lot about different veterinary careers.	2.40	0.78	3.15	0.74	302	-14.50	<0.001
I understand a lot about different career paths of veterinarians.	2.51	0.78	3.26	0.73	303	-15.60	<0.001
I understand a lot about how vets contribute to conservation.	2.61	0.90	3.64	0.57	303	-19.49	<0.001
I think that understanding culture is important in veterinary medicine	3.65	0.57	3.85	0.40	304	-5.93	<0.001

To answer the third research question, which asked if students who participated in the program feel more prepared to apply to veterinary school, paired-sample *t*-tests were run for the pre- and post-survey questions regarding this topic. Table 3 presents the paired-sample *t*-tests for the matched questions. All four questions that asked if participants felt more prepared to apply to veterinary school showed an increase from pre- to post-survey at statistically significant levels.

Table 3

Paired-sample t-*tests for feeling more prepared to apply to veterinary school*

Question	Pre-survey		Post-survey		*n*	*t*(*n*)	*p*
	M	*SD*	*M*	*SD*			
I understand what I need to do to be prepared for vet school.	2.69	0.93	3.29	0.79	300	-12.26	<0.001
When it is time to apply to vet school, I will be a strong candidate.	2.70	0.89	3.16	0.87	301	-9.84	<0.001
I feel prepared for the journey to vet school.	2.51	0.96	3.04	0.94	301	-10.91	<0.001
People like me become veterinarians.	2.85	1.08	3.38	0.84	301	-9.85	<0.001

To answer the fourth research question, which asked if students who participated in this program were more likely to want to pursue veterinary school after their summer residency than they were prior to the program, paired-sample *t*-tests were run for the pre- and post-survey questions regarding this topic. Table 4 presents the paired-sample *t*-tests for the matched questions. Neither questions that asked if participants felt more prepared to pursue veterinary school showed statistically significant increases from pre- to post-survey.

Table 4

Paired-sample t-*tests for increased likelihood of pursing veterinary school*

Question	Pre-survey		Post-survey		*n*	*t*(*n*)	*p*
	M	*SD*	*M*	*SD*			
I plan to go to vet school.	3.52	0.97	3.56	0.92	303	-1.14	0.255
I plan to be a veterinarian.	3.53	0.97	3.55	0.92	303	-0.77	0.443

Exploratory Questions

The first exploratory question asked if students who participated in this program saw an increase in confidence around their professional goals. To determine if this was the case, paired-sample *t*-tests were run for the pre- and post-survey questions regarding this topic. Table 5 presents the paired-sample *t*-tests for the matched questions. All fourteen questions asked if participants felt more confident in their professional goals showed an increase from pre- to post-survey at statistically significant levels.

Table 5

Paired-sample t-*tests for knowledge of feelings and beliefs around professional goals*

Question	Pre-survey		Post-survey		*n*	*t*(*n*)	*p*
	M	*SD*	*M*	*SD*			
I feel excited about my academic goals.	3.42	0.77	3.60	0.63	303	-4.95	<0.001
I have the potential to make a difference.	3.50	0.65	3.69	0.58	303	-5.34	<0.001
I feel like I am not alone in my professional goals.	3.25	0.87	3.61	0.61	302	-6.97	<0.001
I have a good idea which professional path might be right for me.	2.83	0.94	3.36	0.78	303	-9.72	<0.001
I agree that if my first career goal doesn't happen, there are other ways to be successful.	2.99	0.95	3.35	0.79	303	-7.06	<0.001
I have professional role models to look up to.	2.92	1.05	3.57	0.69	304	-11.26	<0.001
I can see myself in my future proposed career.	3.47	0.73	3.70	0.59	300	-5.97	<0.001
I know where to look if I have a question about my career goals.	2.79	0.90	3.51	0.67	303	-12.89	<0.001

I am smart enough to meet my future career goals.	3.11	0.82	3.39	0.75	303	-6.81	<0.001
I feel included and represented in my future profession.	2.86	0.96	3.04	0.94	301	-9.67	<0.001
I feel that I can serve as a role model for others in my profession.	2.98	0.89	3.41	0.74	302	-8.81	<0.001
I am hopeful for my future.	3.37	0.81	3.66	0.61	303	-7.09	<0.001
I expect that the academic path to my career goals will be hard.	3.77	0.47	3.85	0.39	303	-2.71	0.007
I can meet my academic goals if I work hard.	3.60	0.59	3.76	0.49	304	-4.85	<0.001

The second exploratory question asked if students who participated in this program saw an increase in excitement and belief of importance in learning about other cultures. To determine if this was the case, paired-sample *t*-tests were run for the pre- and post-survey questions regarding this topic. Table 6 presents the paired-sample *t*-tests for the matched questions. The question that asked if participants felt more excitement in learning about other cultures showed an increase from pre- to post-survey at a statistically significant level. However, the questions about belief in value and enjoyment of learning from others did not reach statistical significance from pre-survey to post-survey.

Table 6

Paired-sample t-*tests for knowledge of learning about others*

Question	Pre-survey		Post-survey		*n*	*t*(*n*)	*p*
	M	*SD*	*M*	*SD*			
I am excited to learn about other cultures.	3.79	0.46	3.87	0.38	304	-3.04	0.003

I think it's valuable to have people in the group who have different perspectives and experiences.	3.88	0.35	3.90	0.32	304	-0.73	0.467
I like learning from people who have a different cultural background than I do.	3.86	0.39	3.86	0.38	304	-0.30	0.764

Discussion

This study sought to examine program satisfaction of, student self-assessed learning, and overall impact on long-term career aspirations of students participating in a non-college affiliated pre-veterinary summer residency program. Overall, program satisfaction was high, and students showed an increase from pre- to post-program in their knowledge of veterinary work and careers.

The first research question asked how satisfied students were with their experience at a pre-veterinary summer residency program, and the answer to this was, overall, "satisfied." Satisfaction questions with the highest scores included learning valuable hands-on skills, learning more on the trip than they would have in two weeks in a classroom, gaining insight into another culture on the trip, gaining an understanding of the relationship between culture and veterinary medicine, feeling more ready to take on challenges, and having their perspective broadened.

The second research question asked if students learned more about veterinary work as a career during their residency than when they began the residency. Paired-sample *t*-tests indicated that participants increased their knowledge in this area from pre- to post-survey at statistically significant levels, including understanding about different veterinary careers, understanding about different career paths of veterinarians, knowing about how veterinarians contribute to conservation, and knowledge of how understanding culture is important to veterinary medicine. This research question was answered in the affirmative.

The third research question asked if students who participated in the program feel more prepared to apply to veterinary school. Paired-sample *t*-tests showed an increase from pre- to post-survey at statistically

significant levels for questions about how participants felt prepared for veterinary school and the journey there, how to be a strong candidate for veterinary school applications, and how they see themselves as veterinarians. This research question was answered in the affirmative.

The fourth research question asked if students who participated in this program were more likely to want to pursue veterinary school after their summer residency than they were prior to the program. Paired-sample *t*-tests did not indicate statistically significant increases from pre- to post-survey, specifically on whether or not students planned to go to veterinary school and become veterinarians. While there was an increase from pre- to post-survey, it was not significant, indicating that the last research question was not answered in the affirmative.

Exploratory questions asked if students who participated in this program saw an increase in confidence around their professional goals and if students who participated in this program saw an increase in excitement and belief of importance in learning about other cultures. Paired-sample *t*-tests indicated that participants felt more confident in their professional goals showed an increase from pre- to post-survey at statistically significant levels and that participants felt more excitement in learning about other cultures at a statistically significant levels.

The findings in this study support the two areas of impact that the Foresight Project referenced: the development and support of soft skills and the use of hands-on skills to teach pre-veterinary students what a veterinarian does in their work. The development of soft skills can be seen specifically in students' positive responses to questions around gaining an understanding of the relationship between culture and veterinary medicine, making valuable professional connections, and learning about themselves while on their Loop Abroad trips. These self-report questions on the satisfaction survey were mirrored by the statistically significant increases from pre- to post-survey on questions about excitement of learning about other cultures, being hopeful for the future, and seeing a path forward for their academic and professional goals. The hands-on experience that students participated in was connected to their increases from pre- to post-survey on questions about learning what veterinarians do, feeling prepared for that in veterinary school, and seeing how

people like themselves become veterinarians. Pre-veterinary residency programs such as Loop Abroad have the capacity to build these two processes – developing soft skills and providing hands-on experiences – to support students long before they reach the point of the veterinary school application process.

Limitations and Future Directions

While this study provides a good basis for understanding how pre-veterinary programs can support student knowledge of veterinary work and confidence in their future path to veterinary school, there are limitations to this study that may be addressed in future research. The first limitation is that these results were based on survey data with no available comparison group. While correlational research is important to establish a baseline of program success, it would be useful to have a comparison group to determine how these results compare to another pre-veterinary residency program or, most commonly, no program at all.

The second limitation of this study is that there is no long-term data available at this time; only one summer program cycle is available to examine. There are two future directions that could take this data and expand it into a body of research that supports the need for more pre-veterinary residency models to prepare students for veterinary school. The first is a cross-sectional study of program alumni of this particular program at two, five, 10, and 15 years post-program. This would provide data on student outcomes at different points in their post-program experience to give the program and the research an idea of how their program experiences play into their long-term goal achievement around veterinary medicine. This would provide a cross-sectional picture of long-term outcomes that could guide a long-term cohort study.

The second direction this could take is a long-term cohort study, the goal of which would be to collect the same information as the cross-sectional study, but on the same cohort over time. The goal of a ten-year follow up would be done at the one-, three-, five-, eight-, and ten-year points in time after the completion of their Loop Abroad summer. Following the same group of students over this time frame, even with attrition that is normal for a cohort study, would provide clear and compelling evidence of student career decisions over time and how that is connected to their time spent in the program. While a quasi-experimental design

would be ideal for this research, with the dearth of pre-veterinary residency programs, the next best option is a long-term cohort study.

Conclusion

There is little information about how pre-veterinary programs such as this one may impact future outcomes such as performance in veterinary school and veterinary careers; the research available has only looked at undergraduate grade point average and Graduate Record Exam scores (Rousch et al., 2014). There is value in looking beyond these usual measures to see what other factors might impact long-term veterinary program and career success, particularly in relation to pre-veterinary programs and training. The AAMVC calls for two years of prerequisite, pre-veterinary training (Willis et al., 2007), of which programs such as this one can serve a function. They recognize that, "without significantly increasing the length of the education program, it is not possible for individual colleges to provide the requirements to meet all of the anticipated needs" of the report (Willis et al., 2007, p. 20). Pre-veterinary programs such as Loop Abroad may help close the gap on those needs in pre-veterinary education supporting long-term goals in the field.

References

Fish RE, Griffith EH. Career attitudes of first-year veterinary students before and after a required course on veterinary careers. J Vet Med Educ 41(3):243-252, 2014.

Kogan LR, Stewart SM, Schoenfeld-Tacher R, Janke JM. Correlations between pre-veterinary course requirements and academic performance in the veterinary curriculum: implications for admissions. J Vet Med Educ 36(2):158-165, 2009.

Kortum A, Huckel J, Robertson J, Sheats MK. Lack of correlation between pre-veterinary school experience hours and DVM course performance: Pros and cons of veterinary work experience as a Prerequisite for admission to veterinary school. Educ Health Prof 5(1):4-12, 2022.

Loop Abroad. Accessed 11/15/24. <https://www.loopabroad.com >

Martin F, Ruby K, Farnum J. Importance of the human-animal bond for pre-veterinary, first-year, and fourth-year veterinary students in relation to their career choice. J Vet Med Educ 30(1):67-72, 2003.

Purdie II JR, Williams JE, Ellersieck MR. The effect participating in a pre-veterinary learning community or freshmen interest group (FIG) has on the odds new animal science majors graduate. J Agric Educ 48(2):46-55, 2007.

Roush JK, Rush BR, White BJ, Wilkerson MJ. Correlation of pre-veterinary admissions criteria, intra-professional curriculum measures, AVMA-COE professional competency scores, and the NAVLE. J Vet Med Educ 41(1):19-26, 2014.

Trivedi S, Clark JC, Royal KD. The impact of COVID-19 on pre-veterinary opportunities and recommendations for DVM admissions. J Vet Med Educ 49(3):280-288, 2022.

Willis NG, Monroe FA, Potworowski JA, Halbert G, Evans BR, Smith JE, Andrews KJ, Spring L, Bradbrook A. Envisioning the future of veterinary medical education: the Association of American Veterinary Medical Colleges Foresight Project, final report. J Vet Med Educ 34(1):1-41, 2007.