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Assessment of canine health and preventative care outcomes of a community medicine program

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Abstract

The objective of this study was to assess if use of a community based veterinary medical program (the Tufts at Tech Community Veterinary Clinic) was related to indicators of canine health and well-being in a low-income community through the provision of low-cost preventative care. Participants were 177 low-income dog owners; 63 were repeat wellness/preventative care clients of the Tufts at Tech clinic, 46 were new or urgent care clients of the Tufts at Tech clinic, and 68 were a comparison sample of owners who had not used the clinic but did attend an outreach clinic in a community setting. Participants were asked to complete a survey that assessed owner demographic information, indicators of canine health and quality of life, pet attachment, and barriers that limit access to veterinary care. Results indicated that clients of the Tufts at Tech clinic were more likely to be White/Caucasian and female. In addition, there were significant positive differences on several indicators of canine health and preventative care for the Tufts at Tech wellness clients including monthly heartworm use ($p < .001$), use of veterinary services for both wellness ($p < .001$) and illness/injury ($p = .001$), and vaccination status ($p = .003$). There were no significant differences in spay/neuter status ($p = .48$), use of flea/tick preventative ($p = .17$), use of obedience training ($p = .75$), problem behaviors ($p = .05$), canine quality of health ($p = .74$) or attachment ($p = .63$). The Tufts at Tech clients reported lower rates of several barriers to accessing care, including cost. These findings provide important information regarding who is using low-cost clinics such as the Tufts at Tech model, the potential benefits of repeated preventative care on dog health, and suggestions for reducing barriers to accessing veterinary services.

Keywords

Accessible veterinary care; Preventative care; Dog; Dog health

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1. Introduction

In the context of the rising costs of healthcare, increasing attention is being paid to the racial, ethnic, and socioeconomic disparities that exist with regard to access to high quality human health services, especially related to preventative care (Adler & Rehkopf, 2008; Kelley et al., 2005). Many low-income and minority communities are particularly underserved due to a lack of primary care services (Dotinga, 2012). Increasingly, the medical community is recognizing the need to address care disparities (Fischella et al., 2000) and is providing targeted training programs for medical students (Lunn & Sanchez, 2011). Community health centers that provide low-cost preventative and primary care are playing a role in addressing these care gaps (Politzer et al., 2001).

Many of the same issues of access to and affordability of quality healthcare likely exist for animal populations in low-income communities. Existing research exploring the impact of affordability in veterinary care has found that pet owners with lower incomes (less than $35,000 a year) or who are unemployed were less likely to have taken their pet to a veterinarian within the previous year (Volk et al., 2011). Lower income pet owners have been found to be more likely to make veterinary care decisions based on price, and both low and high income owners often report the perception that veterinary care is very expensive (Lue et al., 2008). Many owners feel challenged by addressing cost barriers with their veterinarians (Coe et al., 2007), particularly when owners have difficulty affording the necessary or recommended care. These findings suggest that there may be a portion of the petowning population who is unable to access care for their animals due to cost.

Given these disparities, a key task in improving the status and welfare of pets, specifically dogs, in society is addressing the issue of promoting canine health and welfare in underserved communities. Such communities often do not have access to affordable veterinary care options, or education about fostering optimal welfare for their dogs. Although there are similarities between human and animal healthcare disparities within underserved communities, very little research has focused on documenting or addressing such disparities (Patronek, 2010). The implementation of low cost spay/neuter programs has been successful in reducing canine overpopulation (Frank & Carlisle-Frank, 2007; White et al., 2010). However, many of these programs do not include other aspects of routine preventative veterinary care and husbandry, and illness is often cited as a factor for canine relinquishment to shelters (Kass et al., 2001). Capitalizing on low-cost, community health models that have been successful in human healthcare settings may be an effective method of addressing access to veterinary care (particularly preventative care) in underserved canine populations, but there is little empirical research on assessing such models, particularly in the United States (LaVallee et al., 2017).

Through a partnership with the Worcester Technical High School in Massachusetts, Cummings School of Veterinary Medicine at Tufts University has spearheaded the Tufts at Tech Community Veterinary Clinic, which provides subsidized veterinary care to low-income pet owners with documented need in the Worcester, Massachusetts area (McCobb et al. 2017). The clinic also provides both vocational training for high school students as veterinary assistants and training for veterinary students in primary care. Through this

integrated educational model of community veterinary care delivery, Tufts at Tech is a means to effectively improve the health of pets in the community through direct provision of veterinary care. While about two thirds of the clients come to Tufts at Tech seeking assistance with an urgent medical problem for their pet, a portion of these and the remaining clients receive preventative care services (McCobb et al., 2017). About 40% of the clients at Tufts at Tech bring their pets to Tufts at Tech for annual wellness care, which includes vaccinations and parasite prevention (McCobb et al. 2017).

This study aimed to assess the effectiveness of Tufts at Tech's educational model of community-based veterinary medicine by quantifying if use of the clinic was related to indicators of canine health and well-being in an underserved community. Through survey data, owners were asked to report on their dogs' health-related quality of life, health indicators, and perceived barriers to accessing veterinary care. We hypothesized that there would be significant differences in indicators of canine health and quality of life for Tufts at Tech clients who repeatedly utilize clinic wellness services compared to new or urgent care only Tufts at Tech clients, and a group of similar low-income owners in the same community who have not accessed care in this setting.

2. Materials and methods

2.1. Participants and procedure

The Tufts University Institutional Review Board approved the data collection procedures for dog owners as exempt research. Survey data were collected from a convenience sample of 177 low income adult (18 years of age or older) dog owners from Worcester, Massachusetts. Dogowning clients from the Tufts at Tech clinic qualified for care at the clinic through income-screening eligibility criteria, which include documentation of at least one of the following: Women, Infant, and Children (WIC) food and nutrition service benefits, Supplemental Nutrition Assistance Program (SNAP), Worcester Housing Authority (or other local housing authority) resident, Worcester Technical High School student. Worcester is a city in central Massachusetts with a population of 181,045 (as of the 2010 Census), a median household income of $46,105, and 22% of the population lives below the poverty line (2010–2014 American Community Survey).

Of the overall sample, 63 participants were dog owners who were repeat clients to Tufts at Tech, and who had used the clinic services for preventative care (wellness care users). An additional 46 participants were Tufts at Tech clients who were either new clients or used the clinic for urgent care. The purpose of separating these two groups was to assess potential differences in dog health indicators for those who use the clinic for repeated preventative care as compared to those who only come for a single urgent care appointment. Tufts at Tech clients were asked to complete a paper survey in the clinic waiting room prior to their appointment.

The comparison sample included 68 dog owners who had not ever used the Tufts at Tech clinic. The non-Tufts at Tech clients were recruited through a number of local community groups and organizations, such as food pantries (for both human and dog food), local vaccine clinics, and through word of mouth within the community. The questionnaires were

available in both English and Spanish. These participants were also asked to complete a paper copy of the survey and were given a small bag of dog food ($10 value) or a $10 clinic voucher as compensation for their time.

2.2. Measures

Participant Characteristics.—Participants were asked to report their own age, gender, race/ethnicity, yearly household income, and who lives in their household (e.g., children, parents). In addition, dog owners were asked which income screening requirements they were eligible for (see above).

Pet Ownership.—Dog owners were asked to report the age of their dog(s). If they had multiple dogs living in their home, Tufts at Tech clients were asked to complete the questionnaire related to the dog visiting the clinic that day. For the comparison group participants, they were asked to complete the questionnaire for the dog they had owned the longest. They were also asked to report the number and species of pets in their home.

Dog Health Indicators.—Owners were asked to report on a number of health indicators for their dogs associated with access to preventative/wellness care. These indicators included spay/neuter status, use of heartworm preventative, use of flea/tick preventative, wellness exam within the last year, visit to a veterinarian for an illness/injury within the past year, vaccination status, presence of problem behaviors (e.g., aggression/fear towards people or other dogs, destructive behavior, resource guarding, difficulty with housetraining, separation anxiety), and use of obedience training.

Canine Health-Related Quality of Life.—Canine quality of life (QOL) was measured using a modified version of the Canine Health Quality of Life Survey (CHQLS-15; Lavan, 2013). This measure has three QOL subscales, including happiness (4 items), mental status (3 items), and physical functioning (3 items). Response options range from 1 (Strongly Disagree) to 5 (Strongly Agree). The original CHQLS-15 survey contained an additional hygiene scale (3 items), but pilot testing with our population of interest indicated that owners were confused by the wording of these items. An additional two items from the physical functioning scale were removed as a result of pilot testing with an initial sample of 30 Tufts at Tech clients due to confusion in the population of owners.

Attachment.—Owner-reported attachment to their dogs was measured using the Companion Animal Bonding Scale (Poresky et al., 1987), a validated and frequently used companion animal attachment measure. The scale includes eight Likert-type items asking about attachment behaviors, with response options ranging from 1 (Never) to 5 (Always). Sample items include “How often are you responsible for your pet’s care?” and “How often do you feel that your pet is responsive to you?” Participants rated each of the items regarding their dog.

Barriers to Accessing Veterinary Care.—Owners were also asked to report the degree to which they agreed with a set of seven statements reflecting barriers to accessing veterinary care, with response options ranging from 1 (Strongly Disagree) to 5 (Strongly

Agree). Statements included: “veterinary care is too expensive,” “I can’t find a vet near me,” “My pet does not need to see the vet because he or she is healthy,” “I don’t have time to bring my pet to the vet,” “It is hard for me to find a way to bring my pet to the vet,” “It is hard for me to understand my vet,” and “The vet isn’t open during hours when I can bring my pet.”

2.3. Statistical analysis

Statistical analyses were performed with SPSS 22.0 computer software[1] Reliability of scales was assessed using Cronbach’s alpha. Summary descriptive statistics (mean and standard deviation or median and range for continuous variables, and frequency count/percentage for categorical variables) were reported for participant demographics, dog characteristics, pet ownership, health indicators, attachment, and quality of life. Pearson’s chi-square tests were used for comparisons between the three groups for categorical variables. For health indicators, quality of life, and attachment variables, and barriers to care, logistic regression models or analysis of covariance (ANCOVA) models were used to control for possible confounder variables. In particular, given the statistically significant demographic differences between Tufts at Tech clients and the comparison group on owner ethnicity (White/Caucasian) and gender, both of these variables were included in the regression models as control variables. Prevalence ratios for health indicators were calculated using Open Epi: Open Source Epidemiologic Statistics for Public Health[2]. For all comparisons, values of $P<.05$ were considered significant. Given the exploratory nature of this study, there was no need to adjust the p-value for multiple testing.

3. Results

3.1. Participant characteristics

The overall owner sample ranged in age from 19 to 76, with a mean age of 45 years ($SD = 12$). See Table 1 for descriptive statistics on all demographic characteristics, by group. Both the Tufts at Tech wellness clients and the new/urgent care clients were significantly more likely to be women as compared to the non-Tufts at Tech clients, $P<.001$ (see Table 1). There were no significant differences with regard to owner age between all three groups, $P=.27$.

The racial/ethnic distribution of the participants was relatively similar to the overall racial/ethnic demographics of Worcester (76.0% White; 20.5% Hispanic/Latino/a U.S. Census Bureau website, 2014). As indicated in Table 1, both Tufts at Tech wellness clients and urgent/new clients were significantly more likely to be White/Caucasian as compared to the non-Tufts at Tech clients group, $P=.002$. There were no other significant between group differences on race/ethnicity. Both groups of Tufts at Tech clients were significantly more likely to live with children as compared to the non-Tufts at Tech users, $P < .001$. The new/urgent Tufts at Tech clients were also significantly less likely to live alone as compared to

[1]IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
[2]Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version 3.01. www.OpenEpi.com, updated 2013/04/06, accessed 2018/01/09.

the non-Tufts at Tech clients, P=.003. There were no other significant between-group differences with regard to housing.

As seen in Table 1, the majority of the overall sample reported an annual household income of less than $25,000 per year. There were no significant differences in annual household income between the two groups of Tufts at Tech clients and the comparison group; P=.59. In general, the household income in our sample was lower than average for Worcester (30.9% under $25,000/year [U.S. Census Bureau website, 2014).

3.2. Dog characteristics and pet ownership

Dogs ranged from less than one year to 15 years old. The majority of participants had one dog only (107; 60.5%), 45 participants (25.4%) had two dogs, and 20 had three or more (11.3%), and 5 participants (2.8%) did not report how many dogs they had. An additional 51 participants (28.8% of the sample) reported having at least one cat, and 14 (7.9%) had at least one other type of pet including chickens, guinea hens, parakeets and other birds, reptiles, ferrets, fish, rabbits, and horses.

3.3. Dog health indicators

Descriptive statistics for indicators of health/preventative care in the two groups are reported in Table 2. Given the statistically significant demographic differences between the two groups of Tufts at Tech clients and the non-Tufts at Tech clients on owner ethnicity (White/Caucasian) and gender, both of these variables were included in the logistic regression models as control variables. Table 2 presents descriptive statistics for indicators of health/preventative care by group, unadjusted prevalence ratios, and logistic regression results for comparisons between groups on health indicators, adjusted for owner race/ethnicity and gender. Results indicated significant differences between groups on use of heartworm preventative, use of preventative care within the past year, use of veterinary care for an illness or injury within the past year, and being up-to-date on vaccinations (see Table 2 for full results).

There were no significant between-group differences on spay/neuter status, use of flea/tick preventative, use of obedience training, or presence of problem behaviors.

3.4. Canine health-related quality of life

Controlling for race/ethnicity and gender of the owner, ANCOVA results indicated there were no significant differences between the three groups of clients on happiness-related QOL, physical QOL, mental health QOL, or overall QOL. See Table 3 for descriptive statistics on each of the subscales and ANCOVA results. The QOL scale demonstrated acceptable reliability (Cronbach's α=.70).

3.5. Attachment

Overall, participants reported high attachment to their pets, (M=4.41; SD=.58). Controlling for owner race/ethnicity and gender, ANCOVA results indicated that there were no significant differences on attachment scores for Tufts at Tech wellness clients (M=4.50; SD=.52), new/urgent Tufts at Tech clients (M=4.47; SD=.46), and the comparison group

owners, (M=4.31; SD=.65); $F(2)$=0.47, P=.63. The Companion Animal Bonding Scale attachment scale demonstrated acceptable reliability (Cronbach's α=.70).

3.6. Barriers to accessing veterinary care

Overall, Tufts at Tech clients reported significantly lower scores on cost and ability transport their dogs to the veterinarian as barriers to care. See Table 4 for descriptive statistics for each barrier and ANCOVA results for each comparison.

4. Discussion

The goal of this study was to provide initial evidence assessing the effects of a community-based veterinary medicine program at the Tufts at Tech clinic on several outcomes related to preventative care. Participant demographics indicated that the Tufts at Tech clinic is meeting the objective of serving primarily low-income clientele. However, it is important to note that Tufts at Tech clients were more likely to be White/Caucasian and female compared to the non-Tufts at Tech clients. These findings have important implications for understanding the most effective ways of providing services to diverse populations of pet owners. Removing cost barriers is an important step, but not sufficient on its own in providing veterinary care that is accessible to all pet owners. The veterinary profession is largely female (62.5%) and White/Caucasian (91.2%; U.S. Department of Labor, 2017). Increased diversity within the profession, as well as non-traditional formats of outreach may allow for broader access and use of veterinary care.

As predicted, the results indicated significant differences in several indicators of canine health and preventative care (monthly heartworm use, use of veterinary services for both wellness and illness/injury, vaccination status) for Tufts at Tech wellness clients compared to similar low-income owners who had not accessed the clinic. Furthermore, the magnitude of the odds ratios and prevalence ratios suggest that the repeat wellness care users have higher prevalence of health indicators compared to those who are new or urgent care only Tufts at Tech clients. These findings suggest the importance of providing programs where dog owners can access regular preventative care, above and beyond one time vaccine clinics.

Interestingly, we did not find differences on spay/neuter status between the groups. These findings could be attributed to differences in how owners source their dogs, the age at which they obtain them, and the prevalence of free or low-cost spay/neuter options in the Massachusetts area. Currently, Tufts at Tech clients are not required to spay/neuter their pets in order to receive services. However, other community programs (e.g., dog food assistance) as well as some local housing authorities require dogs to be spayed/neutered. Future research should explore the effects of clinic use longitudinally to assess if affordable wellness care use is linked to continued health outcomes (and eventual spay/neuter status for clients who had young animals at the time of the study) over time. In addition, this study focused exclusively on outcomes related to preventative care. The Tufts at Tech clinic also provides services beyond preventative care for acute injury/illness (including some basic surgeries). Although we included urgent care users in the analysis, further exploration of the patterns of use (including in conjunction with preventative care) and impact of these services

is needed. For example, it would be useful to know if urgent care users who are exposed to the clinic are likely to come back and use the clinic for preventative care services.

There were no significant differences between the groups on health-related quality of life or attachment between the groups. We did not assess if pets had any current acute health issues, which may have influenced the QOL findings. The majority of dog owners reported being very highly attached to their pets, and there may have been a ceiling effect, despite the extensive use of the Companion Animal Bonding Scale attachment measure in many different populations. Nevertheless, the high attachment scores demonstrate the strength of the human-animal bond in diverse pet owners. Combined with the existing research demonstrating the relationship between attachment to pets and positive outcomes for pet owners (Kurdek, 2009; Mueller, 2014) as well as the rates of pet ownership among clients living at or below the poverty level (American Pet Products Manufacturers Association (APPA), 2018), the findings from this study underscore the importance of providing access to veterinary care to ensure optimum health and welfare and mutually beneficial human-animal interaction for all pet owners, regardless of the owner's financial circumstances.

Finally, there were significant differences between the Tufts at Tech clients and the non-Tufts at Tech clients with regard to how they reported barriers to obtaining care for their dogs. Cost was a significantly higher barrier for non Tufts at Tech clients, as was obtaining transportation. These results indicate that the Tufts at Tech clinic may be ameliorating these barriers for their clients, or that the clients who use Tufts at Tech are able to overcome these barriers on their own (in particular, transportation). Cost was the highest rated barrier overall, which indicates that price is still an issue of concern for many dog owners. Although the Tufts at Tech clinic provides significantly reduced cost for care (prices are set at approximately 25% of the national average), this cost may still be challenging for clients with particularly severe financial constraints. Further exploration of the factors promoting barrier reduction (e.g., relationships with clinic staff) is needed.

Overall, the results from this study provide initial support for the effectiveness of the Tufts at Tech model in supporting health outcomes related to preventative care and in addressing several key barriers to accessing veterinary services. This model combines low-priced care with an educational setting for teaching primary care to veterinary students. In addition to providing affordable services to community pet owners, the use of primary care services demonstrated in this study indicates that the clinic also appears to be meeting its objective of providing veterinary students with experience delivering primary/wellness care.

Although the results of this study are promising, there were several methodological limitations that warrant further exploration in future research. First, there was no random assignment of participants to the Tufts at Tech clinic or the comparison group; our sampling approach was based on dog owners' voluntary use (or not) of the clinic. Therefore, there may have been underlying differences between the two groups not identified through the measured demographic variables. In particular, for the comparison group participants, we did not assess reasons why they had not used the Tufts at Tech clinic. It may be that there are practical challenges such as lack of transportation, transient housing conditions, or lack of the ability to procure one of the qualifying criteria (such as Supplemental Nutrition

Assistance Program documentation) despite qualifying for assistance, that prevent some pet owners from utilizing the clinic. Future research should explore in detail who the clinic is serving as well as who is not accessing care, and what the barriers may be for pet owners to access low-price veterinary care. For example, many participants in the comparison group reported having disability benefits, which could be used as an additional income screening criterion. In addition, the demographic analyses indicated that the Tufts at Tech clinic was serving a lower percentage of minority clients as compared to the comparison group. We also did not measure alternative methods dog owners may have been using to obtain veterinary care, such as free or low cost vaccine clinics. Finally, we only focused on dog owners for this study, and future research on this model should assess outcomes for other species, such as cats.

This study also did not address the specific economic model and fee structures of the Tufts at Tech clinic with regard to clinic sustainability. Future work involving more detailed exploration of client financial barriers and sustainable models for low price clinics is necessary for scaling up such initiatives. Similarly, one of the benefits of the Tufts at Tech clinic is the integrated educational model, and future research exploring the effectiveness of this model in training future primary care veterinarians and veterinary assistants/technicians is an important component of assessing long term impact and viability.

5. Conclusions

Evaluating the effectiveness of community veterinary healthcare models is a key aspect of creating infrastructure for reducing veterinary healthcare inequalities, and scaling up such initiatives to impact a wider range of communities, particularly with regard to racial/ethnic diversity. These initiatives have the potential to affect canine health on a community-level, as well as provide sustainability through utilizing a teaching model that educates the next generation of veterinary professionals in the specific needs of underserved canine populations. Additional research evaluating the potential benefits of community medicine programs such as Tufts at Tech is needed to validate and guide the scaling up of these initiatives to impact a broader population. Such studies should include multi-institution, multi-site designs with large sample sizes and robust control groups in order to fully explore the impacts of community medicine programs.

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Abbreviations

QOL	quality of life

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Table 1

Participant demographics, by group.

	Full Sample (n = 177) n (%)	**Tufts at Tech Wellness (n = 63) n (%)**	**Tufts at Tech New/Urgent (n = 46) n (%)**	**Non-Tufts at Tech (n = 68) n (%)**	***P***
Female	135 (76.3%)	58 (84.1 %)[a]	39 (84.8%)[b]	38 (55.9%)[a, b]	**<.001**
Race/Ethnicity *					
American Indian or Alaska Native	16 (9.0%)	8 (12.7%)	2 (4.3%)	6 (8.8%)	.32
Asian	1 (0.6%)	1 (1.6%)	0 (0%)	0 (0%)	.40
Black or African American	11 (6.2%)	3 (4.8%)	1 (2.2%)	7 (10.3%)	.18
White/Caucasian	117 (66.1%)	49 (77.8%)[a]	34 (73.9%)[b]	34 (50.0%)[a, b]	**.002**
Hispanic or Latino/a	47 (26.6%)	13 (20.6%)	11 (23.9%)	23 (33.8%)	.21
Household demographic *					
Alone	53 (29.9%)	18 (28.6%)	6 (13.0%)[a]	29 (42.6%)[a]	**.003**
Children	70 (39.5%)	33 (52.4%)[a]	23 (50.0%)[b]	14 (20.6%)[a, b]	**<.001**
Significant other/spouse	60 (33.9%)	18 (28.6%)	17 (37.0%)	25 (36.8%)	.54
Relatives	18 (10.2%)	6 (9.5%)	7 (15.2%)	5 (7.4%)	.39
Parents	15 (8.5%)	4 (6.3%)	8 (17.4%)	3 (4.4%)	.04
Non-relatives/roommates	8 (4.5%)	2 (3.2%)	3 (6.5%)	3 (4.4%)	.71
Household income(annual)					.59
Less than $25,000	141 (79.7%)	49 (77.8%)	35 (76.1%)	57 (83.8%)	
$25,000 to $50,000	25 (14.1%)	10 (15.9%)	9 (19.6%)	6 (8.8%)	
Over $50,000	6 (3.4%)	2 (3.2%)	2 (4.3%)	2 (2.9%)	
Benefit qualification *					
Supplemental Nutrition Assistance Program (SNAP)	120 (67.8%)	54 (85.7%)[a]	37 (80.4%)[b]	29 (42.9%)[a, b]	**< .001**
Housing authority resident	23 (13.0%)	6 (9.5%)	5 (10.9%)	12 (17.6%)	.34
Women, Infant, and Children (WIC)	10 (5.6%)	4 (6.3%)	2 (4.3%)	4 (5.9%)	.90

Note: Subscript letters denote groups whose proportions differ significantly from each other at the .05 level.

*Participants were allowed to select more than one category; therefore, percentages do not sum to 100%.

Table 2

Dog health indicators by group (Non Tufts at Tech clients n=68; Tufts at Tech wellness clients n=63; Tufts at Tech new/urgent care clients n=46), adjusted model controlling for race/ethnicity and gender of owner.

Dog Health Indicators (Yes/No)	N (%)	Unadjusted Prevalence Ratio	Adjusted Model		
			Odds Ratio	95% CI	p-value
Spayed or neutered					.48
Non Tufts at Tech clients (reference group)	34 (50%)	–	–	–	
Tufts at Tech wellness clients	43 (68%)	1.37	1.30	1.67, 6.77	
Tufts at Tech new/urgent care clients	24 (56%)	1.12	0.77	0.33, 1.83	
Heartworm preventative					**<.001**
Non Tufts at Tech clients (reference group)	18 (27%)	–	–	–	
Tufts at Tech wellness clients	48 (76%)	2.88	6.98	2.47, 19.72	
Tufts at Tech new/urgent care clients	20 (44%)	1.76	1.30	0.49, 3.40	
Flea/tick preventative					.17
Non Tufts at Tech clients (reference group)	46 (68%)	–	–	–	
Tufts at Tech wellness clients	55 (87%)	1.29	2.71	0.89, 8.19	
Tufts at Tech new/urgent care clients	32 (70%)	1.10	1.03	0.37, 2.85	
Preventative care within the past year					**<.001**
Non Tufts at Tech clients (reference group)	36 (53%)	–	–	–	
Tufts at Tech wellness clients	61 (97%)	1.82	18.34	3.94, 85.30	
Tufts at Tech new/urgent care clients	27 (59%)	1.19	1.20	0.50, 2.87	
Injury/illness care within past year					**.001**
Non Tufts at Tech clients (reference group)	11 (16%)	–	–	–	
Tufts at Tech wellness clients	36 (57%)	3.53	5.48	2.19, 13.67	
Tufts at Tech new/urgent care clients	17 (37%)	2.44	2.82	1.06, 7.47	
Vaccinations up-to-date					**.003**
Non Tufts at Tech clients (reference group)	36 (53%)	–	–	–	
Tufts at Tech wellness clients	56 (89%)	1.68	8.02	2.45, 26.29	
Tufts at Tech new/urgent care clients	31 (67%)	1.36	1.79	0.71, 4.52	
Obedience training					.75
Non Tufts at Tech clients (reference group)	7 (10%)	–	–	–	

Dog Health Indicators (Yes/No)	N (%)	Unadjusted Prevalence Ratio	Adjusted Model		
			Odds Ratio	95% CI	p-value
Tufts at Tech wellness clients	15 (24%)	2.31	1.51	0.51, 4.47	
Tufts at Tech new/urgent care clients	10 (22%)	2.26	1.42	0.44, 4.51	
Problem behaviors					.05
Non Tufts at Tech clients (reference group)	46 (68%)		–	–	
Tufts at Tech wellness clients	32 (51%)	0.75	0.37	0.16, 0.83	
Tufts at Tech new/urgent care clients	27 (59%)	0.93	0.52	0.22, 1.22	

Missing data: Spay/neuter 9 (5.1%); Heartworm 33 (18.6%); Flea/tick preventative 11 (6.2%); Routine exam 12 (6.8%); Illness exam 19 (6.2%); Vaccinations 16 (9.0%); Obedience training 11 (6.2%); Problem behaviors 0 (0%).

Table 3

Canine Health-Related Quality of Life (QOL) comparisons by group, controlling for race/ethnicity and gender of owner.

	Full Sample (n= 177) ***Mdn*** **[min, max]**	**Tufts at Tech Wellness (n=63)** ***Mdn*** **[min, max]**	**Tufts at Tech New/Urgent (n=46)** ***Mdn*** **[min, max]**	**Non-Tufts at Tech (n=68)** ***Mdn*** **[min, max]**	***P***
QOL: Happiness	4.75 [2.5, 5.0]	4.75 [3.0, 5.0]	4.75 [3.5, 5.0]	4.75 [2.8, 5.0]	.39
QOL: Mental Status	1.67 [1.0, 4.0]	1.67 [1.0, 4.0]	2.00 [1.0, 4.0]	1.33 [1.0, 4.0]	.96
QOL: Physical Functioning	1.67 [1.0, 4.0]	1.67 [1.0, 4.0]	2.00 [1.0, 4.0]	1.67 [1.0, 4.0]	.43
QOL: OVERALL	3.00 [1.6, 4.4]	3.00 [2.3, 4.3]	3.31 [2.3, 4.0]	2.90 [2.2, 4.1]	.74

Missing data: 4 participants (2.3%).

Table 4

Comparisons across group in barriers to accessing veterinary care (range 1 [low barrier] to 5 [high barrier]), controlling for owner race/ethnicity and gender.

	Full Sample (n= 177) ***Mdn*** **[min, max]**	**Tufts at Tech Wellness (n=63)** ***Mdn*** **[min, max]**	**Tufts at Tech New/Urgent (n=46)** ***Mdn*** **[min, max]**	**Non-Tufts at Tech (n=68)** ***Mdn*** **[min, max]**	***P***
Veterinary care is too expensive.	4.0 [1.0, 5.0]	4.0 [1.0, 5.0]	4.5 [1.0, 5.0]	5.0 [1.0, 5.0]	**.02**
I can't find a vet near me.	2.0 [1.0, 5.0]	2.0 [1.0, 5.0]	2.0 [1.0, 5.0]	2.0 [1.0, 5.0]	.051
My dog does not need to see the vet because he or she is healthy.	2.0 [1.0, 5.0]	1.0 [1.0, 5.0]	2.0 [1.0, 5.0]	2.0 [1.0, 5.0]	.32
I don't have time to bring my dog to the vet.	1.0 [1.0, 5.0]	1.0 [1.0, 4.0]	2.0 [1.0, 4.0]	2.0 [1.0, 4.0]	.18
It is hard for me to find a way to bring my dog to the vet.	2.0 [1.0, 5.0]	1.0 [1.0, 5.0]	2.0 [1.0, 5.0]	2.0 [1.0, 5.0]	**.048**
It is hard for me to understand my vet.	1.0 [1.0, 5.0]	1.0 [1.0, 4.0]	2.0 [1.0, 5.0]	2.0 [1.0, 5.0]	.36
The vet isn't open during hours when I can bring my dog.	2.0 [1.0, 5.0]	1.0 [1.0, 5.0]	1.0 [1.0, 5.0]	2.0 [1.0, 5.0]	.54