A measure of and predictors for veterinarian trust developed with veterinary students in a simulated companion animal practice

James A. Grand, PhD ; James W. Lloyd, DVM, PhD ; Daniel R. Ilgen, PhD ;

Sarah Abood, DVM, PhD ; Ioana M. Sonea, DMV, PhD

From the Department of Psychology (Grand, Ilgen) and the College of Veterinary Medicine

(Lloyd, Abood, Sonea), Michigan State University, East Lansing, MI 48824.

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Abstract

Objective—To gain a better understanding of the role of interpersonal trust in veterinarian-client interactions during routine health-care visits, develop a measure of trust uniquely suited to the context of veterinary medicine, and interpret the actions, beliefs, and perceptions that capture client trust toward veterinarians.

Design—Correlational study.

Sample Population—103 veterinary students and 19 standardized clients with pets from a college of veterinary medicine at a large public Midwestern university.

Procedures—A measure of trust specific to veterinarian-client interactions was constructed on the basis of preexisting conceptualizations of the construct and administered to veterinary students and standardized clients following interactions in 2 medical scenarios in a high-fidelity simulated animal health clinic. Exploratory and confirmatory factor analytic techniques were used to validate the measure of trust and hierarchic linear modeling was used to explore indicators of standardized client trust perceptions in one of the scenarios.

Results—Factor analysis revealed that the measure captured 2 perceptions indicative of trust in veterinary contexts: professionalism and technical candor. Students who had behaviors reflecting these factors as well as those who were more perceived as more technically competent were seen as more trustworthy by standardized clients.

Conclusions and Clinical Relevance—The development of trustworthy relationships between clients and veterinarians is important to the continued growth and success of the profession. By identifying characteristics of veterinary trustworthiness and developing related measurement tools, proactive approaches to monitoring veterinarian-client relations can be implemented and incorporated into veterinary training and practice programs to identify areas for improvement.

Abbreviations

HLM Hierarchical linear modeling

ICC Intraclass correlation coefficient

Both intuitive and systematic observers of social interaction and exchange have typically placed trust among the most fundamental qualities of human relationships.[1] Whether in the context of spousal partnerships, dealings with coworkers and employers, simple transactions among strangers, or even interfacing with inanimate machinery, developing, producing, and interpreting perceptions of trust is an important and daily part of the human social condition.[2–4] However, honing and maintaining a trusting relationship is no easy feat in the face of current societal trends. Sociological research reveals that Americans' overall level of trust in other individuals and larger institutions has been steadily decreasing since the 1980s.[5] Speculation as to why this decrease has been observed vary widely; for example, greater accessibility to negative media coverage and electronic entertainment, increased pressures placed on time and money, exposure to implausible marketing and advertisement campaigns, and changes in corporate attitudes toward employment and downsizing have all been posited as potential explanations for diminishing levels of trust.[6,7]

Regardless of its drivers, such developments have potentially troubling implications for the veterinary profession. For example, the declining trend in trust parallels a similar decrease in the frequency of client visits to veterinary care providers over the past 25 years that has become a cause of widespread concern in the field.[8] Although evidence of a causal relation between these 2 patterns has not been established, there is little doubt that trust between veterinary practitioners and their clients can play a major role in clients' attitudes toward and perceptions of veterinarians and the veterinary profession, which can significantly influence the likelihood of future visitations. As noted in the human health-care and service industry, the importance of trust between patient and practitioner is a central component in creating and sustaining effective medical relationships.[9–11] Greater trust in physicians has been shown to be meaningfully related

to reductions in patient turnover, higher willingness to recommend a physician to others, fewer disagreements over treatment suggestions, and greater perceptions regarding effectiveness of care delivery.[9] An additional benefit of the positive trust relationship for both veterinarians and physicians is higher compliance rates among clients and patients to recommended treatment programs and regimens.[10–13] For example, Jansen et al[14] describe how trust plays a vital role in dairy farmers' motivations toward seeking out and complying with veterinarian treatment recommendations. On the basis of qualitative interviews and thematic analyses, Jansen et al[14] report that clients and their behaviors and attitudes toward a veterinarian's treatment plans can be classified according to whether those clients were generally open to external information sources (ie, recommendations from veterinarians) and whether they trusted the information provided by those sources to be accurate and intent on improving animal health.

Perhaps most indicative of the importance of trust to the veterinary profession are recent research and state of the industry reports released by the American Animal Hospital Association, which emphasize the importance of developing positive practitioner-client communication channels and increasing compliance as critical areas through which veterinarians can improve their level of care provided and grow revenue,[15,16] both of which are intimately related to the trust-building efforts engaged in by veterinary professionals.[11–14] Despite its noted importance, little is known about the perceptions of clients or the behavioral actions of veterinarians that contribute to the development of trust in the context of veterinary medicine. One cannot examine this issue without first considering precisely what is meant by trust and how it is perceived by and demonstrated to others.

Objectively defining trust and the manner by which it is observed, produced, and exerts influence on meaningful outcomes is a complicated endeavor. For example, trust perceptions are

often idiosyncratic and situationally bound such that one's level of trust toward a person under one set of circumstances (eg, an inexperienced veterinarian conducting a routine physical exam on a household pet) may differ dramatically from perceptions of trust toward that individual under different conditions (eg, an inexperienced veterinarian performing a complex surgical procedure).[17] Given these complexities, considerable effort has gone toward identifying fundamental components of trust perceptions that are applicable across persons and situations.

Trust can most generally be defined as a "psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviors of another."[18] There is general agreement that all perceptions of trust are accompanied by 2 basic psychological experiences of the trustor (ie, the individual attempting to trust another person)—confident expectations of positive outcomes and a willingness to be vulnerable to the actions and behaviors of the trustee (ie, the individual being trusted).[17] These essential elements are relayed through both observable behaviors by the trustee and broader, subjective evaluations of a person's trustworthiness by the trustor. In the case of the former, trustworthy behaviors are any actions that generally attenuate the risk and uncertainty that the trustor may hold about the likelihood of their obtaining a desired outcome.[19,20] These specific actions will vary depending upon the situational circumstances of the interaction and purpose of the relationship; for example, trust in a veterinarian may improve following observations of a well performed medical diagnosis, procedure, or treatment of an animal.

With respect to the more subjective evaluations of trustworthiness, previous research has identified 3 psychological perceptions related to a person's interpretation of trustworthiness.[17] The first, perceptions of ability, is related to the observation of competent performance and reflects the trustor's evaluation of a trustee's domain-specific knowledge and skills. Such

information conveys that the trustee is capable of helping the trustor obtain his or her desired goals and outcomes and can be related even if one has never seen the trustee perform (eg, education and awards are indirect indicators of performance capability). The remaining 2 facets do not concern the trustee's actual or perceived competence. The extent to which a trustee is believed to want to do good to or for the trustor aside from any profit motives is also an important consideration. Broadly characterized as benevolence, this perception is synonymous with concepts such as caring, supportiveness, openness, loyalty, and selflessness. Lastly, integrity involves whether the trustee is perceived as adhering to moral and ethical principles that the trustor finds acceptable and includes notions such as fairness, promise fulfillment, justice, and consistency. Meta-analytic evidence combining the results of > 100 studies has revealed that each of these 3 facets (ability, benevolence, and integrity) uniquely contribute to an individual's perceptions of trust toward another.[21]

Despite empirical support and the availability of generalized measures for this 3-factor model of trust indicators, there are several pragmatic and conceptual reasons for why investigating trust specific to veterinarian-client interactions is warranted. For example, the meta-analytic validation of the 3-factor model was based almost entirely on trust relationships in the workplace between an employee and his or her coworkers or supervisor in the context of everyday job tasks aggregated across multiple interactions.[22] However, the development of veterinarian-client trust likely differs considerably relative to these peer-to-peer and subordinate-supervisor relations that are not reflected in the meta-analytic data. In veterinary contexts, there are appreciable and normatively accepted differences in the expertise, power (ie, the relative influence of one's position), and perceived control over outcomes between the interacting parties that influence the characteristics of the interaction. Furthermore, the nature of the service

relationship between veterinarians and clients, wherein the former's primary role is to first and foremost provide adequate animal health care, implies that the relative importance and meaning of the facets of perceived trustworthiness may differ as well. These characteristics likely also interact with situational factors (eg, consequences associated with not complying with a recommended procedure for one's animal and balancing financial considerations of a suggested course of action with immediate vs long-term health consequences for one's animal) that may further impact how trust is perceived, transmitted, and interpreted within a veterinarian-client interaction.[9,10] In short, the unique domain and situational circumstances under which physicians and veterinarians professionally and personally engage with clients implies that the dynamics of the trust relationship likely differ in important ways.

In sum, traditional conceptualizations of trust may not be appropriate or accurate for veterinary contexts. A better understanding of how to capture, document, and interpret the veterinarian-client trust relationship may thus be beneficial to enriching the services and quality of care veterinarians are able to provide. Therefore, the aims of the study reported here were to A) develop a measure of the psychological trusts facets specific to and which can be easily administered in veterinary contexts; B) examine the validity of this measure; and C) present preliminary evidence of the influence these psychological facets and other demonstrative behaviors exert on the manifestation of trust between veterinary students and standardized clients interacting in a high-fidelity clinical simulation.

MATERIALS AND METHODS

Participants and setting—Data were collected from 103 veterinary students (n = 91 females and 12 males) enrolled in the American Veterinary Medical Association accredited veterinary college of medicine at Michigan State University. The sample was primarily

composed of first-year students in the second semester of their Doctor of Veterinary Medicine education program. As part of the first-year educational curriculum, courses related to normal structure and function, animal nutrition, and physiology required students to participate in high-fidelity clinical simulations with human standardized clients and their pets. High fidelity simulation, commonly employed to train physicians and nurses in human medicine, is an instructional technology that provides participants with opportunities to practice, learn, and receive hands-on experience applying important domain knowledge and skills under realistic conditions in a controlled and safe environment. Most simulations follow a standardized, structured script which presents participants with a realistic problem (or series of problems) which must be addressed using only their expertise and equipment/resources typically available in an actual clinical setting. In the present study, the simulated scenarios were developed by educators from the college of veterinary medicine and required the veterinary students to interact with a standardized client to apply their knowledge and skills to complete the required tasks. The present simulations took place in a dedicated center on campus and were conducted in simulated exam rooms. In addition to the equipment one might expect to find in a standard veterinary exam room, these rooms were also equipped with video and audio recording equipment as well as computer workstations for collecting data from students and standardized clients.

Each of the students in the sample population were enrolled in 2 classes that required visits to the simulation center on separate occasions to complete 2 different scenarios. The task complexity of both scenarios was low. The first scenario asked students to collect a diet history and complete a routine, minimally invasive physical exam of a healthy pet (58% of students interacted with a dog and 42% with a cat) with the standardized client present. The second scenario asked students to interpret and explain the results of diagnostic medical tests to the

owner of a fictitious dog that had been brought in to the clinic with health problems (clinical signs consistent with either mitral insufficiency or Addison disease). The standardized clients were 19 experienced actors (9 females and 10 males) employed by the simulation center who had received extensive training as evaluators for simulation-based educational settings; the training familiarized standardized clients with the measures administered during the simulations, how to identify relevant behaviors that the veterinary students would be performing as well as how to respond to them, and provided direction on the generic script and dialogue to accompany the simulated scenarios. Standardized clients were also made aware that they would be asked to fill out an additional measure for research purposes, but they were not specifically instructed that this measure examined trust perceptions. Two actors participated as standardized clients in both scenarios, although no student visited with the same standardized client twice. Consequently, 11 standardized clients were used in the diet history and physical exam scenario and 10 in the medical problem scenario.

Because the students were participating in the simulated interactions as part of normal classroom activities, institutional review board approval was granted to treat all data collected in the simulations as preexisting, deidentified data (ie, the student and standardized client data belonged to the instructors of the class and were collected for and incorporated into the normal conduct of the class). Prior to participation, all students were informed that their interactions would be recorded and 100% of the student sample consented to the use of their questionnaire responses for research and instructional purposes in the aggregate. Standardized clients were not required to provide consent given that the questionnaire content was consistent with the purpose of the courses and their role as evaluators. Nevertheless, all standardized clients were also informed of and did not object to the use of their responses to the administered measures for

research. Once the data from students and simulated clients were matched, all personal identifiers were stripped from the data set to maintain the confidentiality of students and standardized clients.

Questionnaires—Given that a primary goal of the present study was to develop a valid measure of trust that could be generalized to veterinarian-client interactions, a number of steps were undertaken to create a measure of trust suitable to the context. First, items from a questionnaire created and used by the authors of the original 3 facet trust model were examined for use in veterinary settings.[17,22] This questionnaire was originally designed to measure employees' perceptions of trust in upper management teams along the dimensions of ability, benevolence, integrity, and overall trust in the workplace; consequently, the referents, level of analysis, and actions indicative of trust were not particularly well aligned with the context of the present study. Thus, 2 sources of guidance were used to adapt the measure to the veterinarian-client relationship. First, the course instructors of the students participating in the study were asked to review, provide feedback on, and contribute additional items to the original 3-factor trust measure on the basis of their extensive experience observing interactions between veterinary students and standardized clients in similar scenarios. Second, exemplar data on difficulties veterinarians had when attempting to develop trust with clients, the types of communication and relationship-building strategies used, and efforts undertaken to improve client compliance were gathered from a small, informal focus group composed of private practice veterinarians and technicians. The purpose of this activity was to seek out general exemplar behaviors which typified veterinarian-client interactions to roughly gauge the applicability of the 3-factor model of trust in veterinary contexts (ie, whether behavioral and communicative episodes involving themes of ability, benevolence, and integrity could be

identified) and thus provide at least indirect support for the face validity of the measurement approach.

These efforts resulted in the creation of a 30-item questionnaire pertaining to aspects of veterinarian-client interactions believed to contribute to the development of trust. To reduce the length of the questionnaire and the load placed on standardized client raters, a short form of this measure was created. Decisions regarding which items to remove were guided by the following priorities:

1. The items and measure should be as generalizable as possible; thus, questions were removed when they reflected specific conditions that may not be present in all situations (eg, “The veterinary student physically interacted with my animal in a manner that clearly demonstrated he or she knew what he or she was doing,” “The veterinary student kept my animal calm and relaxed during the interview”).
2. Items should be consistent with the stated definition of trust or related facets as opposed to general communication skills or verbal ability. The latter items were expected to demonstrate criterion validity with a measure of trust, but not construct validity (eg, “The veterinary student greeted me pleasantly using my name,” “The veterinary student did not appear rushed or hurried and spoke at a comfortable pace,” “The veterinary student asked me whether I had any questions at the end of the visit”).
3. Items should not require a respondent to make evaluations of the accuracy and validity of any diagnoses, claims, or terms (eg, “The veterinary student answered my questions correctly without hesitation,” “The veterinary student explained the purpose of the visit clearly and accurately”).

The final product was an 11-item measure organized across the 3 facets of trust (ability, benevolence, and integrity) as well as general perceptions of trust **(Appendix)** that specifically referenced the student–standardized client interaction. In addition, a self-report version of the measure was also created for the veterinary students asking them to indicate the extent to which they believed they had demonstrated these same trustworthy behaviors or the extent to which they believed the standardized client had observed these behaviors during their interactions. Due to a computer error at the simulation center, the self-reported trust measure was only administered to students following the diet history and physical exam scenario. Responses to both the standardized client and self-report measure were provided on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree); scale scores were computed by calculating the mean of responses to arrive at a single score for each subscale.

Perceived behavioral performance measures were also completed by the standardized clients for both scenarios, although for the purposes of this study, only those administered during the diet history and physical exam scenario were analyzed. For this scenario, the standardized clients completed a dichotomous 10-item physical exam performance checklist by indicating (yes or no) whether the veterinary student completed certain medically relevant behaviors. Similar to most clients in a real veterinary visitation, the standardized clients were not medical experts and did not possess the technical skills that would qualify them to judge whether a student was correctly performing or neglecting important aspects of the physical exam; however, standardized clients were instructed on what actions and behaviors to look for during the scenario that were broadly indicative of the student's technical capability (eg, "The veterinary student looked at both of my animal's eyes," "The veterinary student felt my animal's front or hind limbs"). The mean for items on this measure was computed to form a single indicator of

perceived technical competence which described standardized clients' observations of the student's performance capabilities. Additionally, standardized clients also responded to a 10-item general communication skills checklist by indicating (disagree, agree with reservation, or agree) whether the veterinary student performed various, positively valenced communication behaviors during the clinical visit; example items from this measure included "The veterinary student allowed me to tell my story uninterrupted" and "The veterinary student greeted me pleasantly (asked or said my name; shook my hand)." The score for communication skills was computed by calculating the mean rating for each item to form a single scale score.

Procedures—The diet history and physical exam scenario was completed over the course of 2 days with approximately half of the sample participating in the simulation on the first day and the remaining half participating in the simulation the second day. A similar schedule was followed with the medical problem scenario, which took place approximately 1 week later. The students were informed of the general technical nature of the scenarios they would be completing, although no specific details were provided until arrival at the simulation center; furthermore, the students were aware that they would be completing an additional measure for research purposes but were not informed that it measured perceptions of trust developed with the standardized client. As students arrived for their scheduled scenario run, they were led to a waiting room where they were briefed on what they would be doing during the simulation and received their exam room assignments. The standardized clients were individually located in separate exam rooms awaiting the beginning of each scenario.

Once the scenario was ready to begin, a single wave of 10 to 11 students would enter their individually assigned exam rooms and participate in the scenario. Each student was given 15 minutes to interact with the standardized client and complete the scenario in full, although

they were allowed to conclude the visit and exit the room if they finished before the time limit expired. The mean number of students that each standardized client interacted with was 9.4 (range, 6 to 11) and 10.3 (range, 9 to 11) during the diet history and physical exam and medical problem scenarios, respectively, with no standardized client interacting with > 6 students on any given day. After the student had left the room, the standardized clients logged into the computer workstation located inside the exam room and completed the trust, perceived technical competence, and general communication skills questionnaires; similarly, the veterinary students responded to the self-reported measure of trust by logging into a computer workstation outside of the exam room. Students were then free to leave the simulation center after finishing the scenario, while the standardized clients remained in the exam room to prepare for the next veterinary student.

Statistical analysis—Analyses were performed in 2 stages. First, properties of the trust measure were evaluated by comparing the latent factor structures of the standardized client ratings gathered during the diet history and physical exam scenario with that gathered during the medical problem scenario. Second, the data gathered during the diet history and physical exam scenario was used to provide a preliminary exploration of the predictors of standardized clients' trust in the veterinary students. Unless otherwise stated, standard statistical software[a] was used to conduct the analyses.

The first step of the measure validation process involved conducting an exploratory factor analysis (principal axis factoring) with standardized clients' responses to items from the 3 facets of the trust measure (ability, benevolence, and integrity) collected in the diet history and physical exam scenario. Exploratory factor analysis is a multivariate statistical technique used to extract patterns and clusters among item responses indicative of ≥ 1 latent constructs tapped in a

measure; typically, these item clusters are then given a label by the researcher which reflects the semantic meaning of the underlying construct. Because there are no rigidly adhered to rules for interpreting the results of exploratory factor analyses,[23] commonly used procedures based on Kaiser's criteria (eg, factors with eigenvalues > 1) and examination of scree plots (graph of the eigenvalues associated with each factor) were used to determine the appropriate number of factors to extract from the data. Once the factor structure was estimated, a varimax rotation was applied to the results; the rotation is an orthogonal transformation of the extracted factors, which produces a more easily interpretable factor solution, making it easier to describe and identify response patterns in the data.

The final step of the measure validation procedure used confirmatory factor analysis to cross-validate the factor structure with standardized clients' trust data from the medical problem scenario. Confirmatory factor analysis is a specialized case of structural equation modeling that produces parameter estimates of a factor model by specifying a priori relationships between some number of latent factors and observed indicators of those factors.[23] In this case, the trust data provided by standardized clients from the medical problem scenario were fit to the factor model suggested by the exploratory factor analysis results; to the extent that these data adequately fit the model, one can conclude that the measure is capturing similar facets of trust in both scenarios. Again, there are no agreed upon methods for assessing the fit of a confirmatory factor model, although most researchers take into consideration the χ^2 difference statistic ($P >$ 0.05 indicates acceptable fit) and additional goodness of fit indices. On the basis of recommendations from the extant literature,[24] the following indices and benchmarks were used to assess model fit in the present study: the standardized root mean square residual ($\leq$ 0.08 indicates good fit), the root mean squared error of approximation ($\leq$ 0.05 indicates close fit,

between 0.05 and 0.08 represents moderate fit, and > 0.10 reflects poor fit), and the comparative fit index (> 0.90 indicates acceptable fit). Structural equation modeling software[b] was used to conduct the confirmatory factor analyses.

For the preliminary analyses exploring which factors were most predictive of standardized clients' general ratings of trust, a HLM approach was used. Hierarchical linear modeling (also known as multilevel modeling, mixed model regression, or random coefficient regression) is an extension of traditional ordinary least squares regression that is useful for analyses in which data are clustered and nested or otherwise nonindependent (eg, longitudinal data or data in which lower level units are nested within higher level units).[25] If a different standardized client had been used to rate every student in the study, then HLM would not be necessary because the data for each student would be independent from each other. In the present study, however, individual standardized clients provided ratings for multiple veterinary students; thus, the relationship between trust and relevant predictors could be different for each rater as a result of systematic differences between standardized clients (eg, some standardized clients may be consistently less trusting than others or more lenient raters of perceived technical competence).

Hierarchical linear modeling first involves identifying the appropriate number of nested levels within the data. In the present study, veterinary students are nested within each standardized client; thus, students are considered the level 1 units and standardized clients are considered the level 2 units. The basic HLM approach then proceeds by specifying a common regression equation for the level 1 units. As the perception of overall trust toward a veterinary student was the dependent variable of interest, this outcome is regressed onto the trust facet subscales, perceived technical competence, and general communication skills. This process results in an estimate of level 1 regression intercepts and slope terms that specifies the relation

between each of these predictors and trust for each level 1 unit (ie, the students). These parameters are subsequently used as the dependent variables predicted in the level 2 analysis. Here, the values of the estimated level 1 intercept and slope terms for each predictor variable are separately regressed onto the means provided by each standardized client for those variables; thus, unique regression equations predicting each parameter of the level 1 model are analyzed. The result of this regression of regression procedure with clustered data produces mean estimates of the relationship between each predictor variable and overall trust perceptions that accounts for between-rater differences in the model variables.

The results from the HLM procedure provide 2 unique pieces of information.[26,27] First, they produce regression parameter estimates which describe the relationship between each independent variable and the dependent variable controlling for clustering in the data. Second, they produce estimates of the amount of variance in a variable attributable to observed differences between students and the amount of variance in a variable attributable to differences in each standardized client's perceptions of the students. These latter estimates are useful for determining the amount of clustering in the data through the computation of the ICC, which, in the context of this study, provides a measure of the degree to which students rated by a single standardized client were more similar to each other than they were to other students. The ICC is calculated by dividing the between-rater variance in a variable divided by the sum of the between-rater and within-group variance. Intraclass correlation coefficients range from 0 to 1, with larger numbers indicating higher degrees of clustering (ie, systematic differences between standardized clients exist).An ICC even as low as 0.05 can have a significant effect on the results of statistical analyses that do not control for clustering if level 1 sample sizes are small[25] (as they were in the present study).

Two HLM models were fit to the data. The first, labeled the unconditional cell means or null model, estimates the level 1 regression equation with no predictor variables and is based solely on the standardized clients' means for overall trust. This model is used to evaluate the level of clustering in the data for the overall trust measure and provides an indication as to whether subsequent HLM analyses including predictor variables are warranted. The second model, labeled the predictor model, introduces the level 1 predictors into the equation; in this model, the intercept terms of the level 2 regression equations provide an estimate of the relationship between each predictor variable and overall trust, taking into account any potential clustering in the data. All predictor variables were grand-mean centered prior to being analyzed[26,27]; as such, all regression coefficients should be interpreted as the amount of change expected in the dependent variable for every 1 unit increase above the mean in the independent variable. The HLM regression coefficients are interpreted exactly like standard regression coefficients, with P values < 0.05 indicating that the estimated relationship is significantly different from zero. Specialized statistical software[c] was used to perform the HLM analyses.

Lastly, Cronbach's coefficient α was computed to examine the internal consistency reliability of the measures used in the study. Coefficient α ranges from 0 to 1 and indicates the extent to which the items in a measure reflect variation in an underlying factor versus random error. Values of $\alpha > 0.70$ are generally considered acceptable for research. Basic descriptive statistics (means and SDs), partial correlations (Pearson correlation with dummy codes to partial out rater effects), and paired-samples t tests were also computed to examine differences between students and standardized clients perceptions of trust; for all inferential statistics, values of $P < 0.05$ were considered significant.

RESULTS

Measure validation—Trust ratings were not provided by standardized clients for 7 veterinary students during the diet history and physical exam scenario, leaving a total sample size of 96 for the exploratory factor analysis and subsequent descriptive and inferential analyses. Results from the first step of the measure validation process in which standardized clients' responses to the ability, benevolence, and integrity items were submitted to exploratory factor analysis were summarized **(Table 1)**. The results show that this measure appeared to be tapping 2 underlying response patterns from standardized client respondents. The first factor was composed of the 3 items from the benevolence subscale and 1 item from the ability subscale. These items generally seemed to depict standardized clients' perceptions of the degree to which the veterinary students had a respectful, approachable disposition and communicative tone; as such, this factor was labeled professionalism. The second factor, composed of the 2-item integrity subscale and the remaining ability item, appeared to collectively describe standardized clients' perceptions about a veterinary student's competence and willingness and capability to communicate honestly his or her knowledge about the medical and diagnostic aspects of the visit. This factor was therefore labeled technical candor.

This 2-factor model was then tested via confirmatory factor analysis to determine the extent to which this same response pattern captured standardized clients' trust perceptions toward the veterinary students during the medical problem scenario as well. Both the χ^2 fit index ($\chi^2[12] = 16.9$; $P = 0.15$) and the goodness-of-fit indices (standardized root mean square residual =0.05; root mean squared error of approximation =0.06; and comparative fit index = 0.98) indicated that the data fit the model exceptionally well. The reported indices are based on a factor model in which the error terms for 2 items ("The veterinary student did not talk down to

me or above my head" and "I believe the veterinary student would readily seek the advice of others if he or she had doubts about his or her diagnosis or recommendations for treatment" [Appendix]) were correlated to improve model fit. Given the high interrcorrelation among items in the trust scale and the fact that this scale had not been published elsewhere, this path was added to the confirmatory factor analysis. An analysis in which the original 3-factor model was fit to this data failed to produce an admissible solution. Together, this evidence suggests that the trust facet measure was largely capturing the same 2 factors in the medical problem scenario that were identified in the diet history and physical exam scenario. In sum, the results of the cross-validation procedure demonstrated that although the 3 predicted factors (ability, benevolence, and integrity) believed to underlie generalized perceptions of trust were not reproduced, the measure reliably captured 2 interpretable factors (professionalism and technical candor) specific to the trust relationship during the veterinary student-standardized client interactions across 2 different situations and points in time .

Based on the results above, scale scores for the professionalism and technical candor facets were formed by computing the mean of the responses from each subscale. The means, SDs, reliability coefficients, and partial correlation coefficients for the standardized clients' trust-related perceptions, the veterinary students' trust-related perceptions, and the perceived technical competence and communication skill variables measured during the diet history and physical exam scenario were summarized **(Table 2)**. An examination of the reliability coefficients reveals that all measures were fairly internally consistent, although the technical candor and the general communication skills measures were somewhat low. With respect to the technical candor scale, this result is not altogether surprising given the small number of items in that subscale (3) and the results from the factor analyses, which show that 2 of the 3 items had only moderately strong

factor loadings (Table 1). The reliability of the technical candor subscale used by the standardized clients is adequate for research purposes, although efforts to improve its reliability through the inclusion of additional items would be desirable. The lower reliability of the general communication skills measure is primarily a function of the fact that nearly every student received the highest possible score on the measure (mean score, 0.98/1); thus, those few instances in which an individual did not have a particular communication skill are greatly magnified in this index. Nevertheless, analyses including this measure should be interpreted tentatively.

HLM analyses—The full set of equations, parameter definitions, and results from the null and predictor HLM models were summarized **(Table 3)**. Again, the purpose of these analyses was to pursue a preliminary examination of the factors predictive of standardized clients' overall trust perceptions in the veterinary students. In interpreting these findings, it is appropriate to start with the null model to evaluate the amount of clustering present in the data and whether there is enough variance in trust ratings across students to warrant further examination. On the basis of the estimates of between-rater (τ_{00}) and within-rater (σ^2) variance, the ICC for trust ratings was (0.06/[0.06 + 0.20]) = 0.23. This large value indicates that on average, the students rated by any single standardized client were generally more similar to each other than to other students in the sample and is indicative of substantial clustering in the data. Furthermore, the value obtained for the within-rater variance estimate indicates that 20% of the observed variance in trust perceptions remains to be explained by possible predictor variables above and beyond standardized clients' average level of trust. In sum, these results suggest that further examination of variables which may have accounted for perceptions of standardized client trust is warranted.

The parameter estimates shown for the predictor model (Table 3) relates whether standardized clients' perceptions of professionalism, technical candor, general communication skills, and perceived technical competence were indicative of trust in veterinary students. In the full model including all predictors, only perceptions of professionalism (γ_{10} = 0.48) and perceived technical competence (γ_{40} = 0.77) were significantly ($P < 0.05$) different from zero, indicating that students who were viewed as generally more professional and were demonstrably more competent performers were perceived as more trustworthy across all standardized clients. Of additional note, this model yielded a substantially reduced σ^2 (0.07) relative to the null model, indicating that the included predictor variables accounted for a large proportion of the observed variance in trust ratings; in all, approximately ([0.20 – 0.07]/0.20) X 100 = 65% of the observed variance in standardized client trust across all students was accounted for by the level 1 predictor variables. Similarly, the reduction in τ_{00} indicates that ([0.06 – 0.02]/0.06) X 100 = 67% of the between-rater differences in trust was accounted for by variation in students' observed professionalism, technical candor, general communication skills, and perceived technical competence.

On the basis of the pattern of intercorrelations (Table 2), it seemed likely that technical candor was also a significant predictor of overall trust, although multicollinearity issues with the professionalism subscale (ie, 2 strongly correlated independent variables) may have been suppressing the effect.[25] As expected, when the professionalism measure was removed from the predictor model (Table 3) technical candor emerged as a significant ($P < 0.05$) predictor of overall trust (γ_{20} = 0.40), with higher levels of technical candor related to higher levels of reported trust. These results suggest that professionalism and technical candor are likely both significant predictors of overall trust; however, they appear to compete for mostly the same

underlying variance, with perceptions of professionalism accounting for a slightly larger total percentage than technical candor. In short, veterinary students who had higher degrees of either professionalism or technical candor were generally seen as more trustworthy by standardized clients.

Additional exploratory analyses—The present data set permitted examination of 2 additional exploratory questions of interest. First, although the beliefs of the client as the trustor are the most important to outcomes such as compliance and perceptions of the quality of care delivered, examining the degree to which the veterinary students' self-perceived professionalism, technical candor, and overall trust differed from that of the standardized clients may offer insight into meaningful differences in the manner by which trustees versus trustors interpret a given interaction. The results of paired-sample *t* tests were used to examine whether standardized clients and students' perceptions of trust, professionalism, and technical candor were significantly different following the simulated interaction. In this case, only perceptions of overall trust were significantly different between both groups. The standardized clients reported significantly ($P < 0.01$) higher trust in the students (mean, 4.55) than the students perceived that the standardized clients felt toward them (mean, 4.29; t[95] = 4.074). In other words, the students were less likely to believe that the standardized clients trusted them than the standardized clients actually reported. Furthermore, the nonsignificant correlation between perceived trust of the students and standardized clients implies that this perception was true regardless of the level of trust felt by either party.

DISCUSSION

The development of trust has often been noted as a primary leverage point for the creation of healthy and productive doctor-patient relationships in the human health-care

industry.[9–13] The present study attempted to expand this notion to the veterinarian-client relationship by developing a measure of trust specific to the context of veterinary medicine. This effort resulted in an 11-item questionnaire, which was tested in a simulated clinical visit with veterinary students and standardized clients. Unlike previous examinations of aggregate trust perceptions in generic work settings, results across 2 medical scenarios revealed that the measure tapped 2 facets of perceived trustworthiness, which were labeled professionalism and technical candor. Furthermore, in the context of the simulated diet history and physical exam visit, preliminary evidence indicated that standardized clients were more trusting of students who appeared technically competent and had greater professionalism or technical candor. Lastly, exploratory analyses indicated that the veterinary students tended to underestimate the degree of overall trust placed in them by standardized clients following their brief interaction.

Given the central role that the identified professionalism and technical candor perceptions held in relation to perceptions of trust in this study, it is useful to more precisely examine and elaborate on the meaning of these 2 facets in the general context of the veterinarian-client relationship. Perceptions of professionalism appear to most closely correspond with the quality and nature of the interpersonal boundaries between a veterinarian and his or her client. Characteristics indicative of a veterinarian's professionalism describe actions that establish his or her role as a respected and respectful practitioner as well as a figure of authority whose procedures and professional recommendations are clear, fair, and beneficent to the client. Thus, behaviors and communication approaches that demonstrate to clients a neutral stance with regard to prognoses and recommended treatments (eg, having no ulterior agenda for treatment recommendations), allows clients to voice their questions and concerns, eases clients through the

diagnoses and results of tests, and establishes the veterinarian as a knowledgeable, empathetic decision-maker are likely to improve clients' perceptions of a veterinarian's professionalism.

Alternatively, perceptions of technical candor depict the situational and task-based dynamic of the veterinarian-client relationship. The relevant characteristics indicative of technical candor describe the extent to which a veterinarian is perceived as honestly demonstrating their domain-relevant capabilities, knowledge, and expertise in their attempts to problem solve and provide their services to a client. Notably, this facet does not reflect an individual's actual level of technical proficiency, but rather the manner by which the veterinarian conveys what and how they know about the condition of the client's animal. Providing full disclosure about one's interpretations of diagnostic tests, results, and personal recommendations as well as permitting admissions of uncertainty backed with reassurances of follow-up and further investigation promotes a sense of truthfulness and integrity in one's medical explanations and conversational dialogue that encourages trust development. Interestingly, technical candor seems to capture a mutual and nonrecursive aspect of trust somewhat unique to the veterinarian-client relationship in that the veterinarian's willingness to display his or her own vulnerability (eg, by revealing the limits of their domain and task knowledge) plays an important role in the client's perceptions of trust. However, as the significant positive relationship between trust and perceived technical competence shows, one is not likely to be trusted if completely incompetent or incapable of performing a task one has been entrusted with completing.[17,18,21] However, recognizing and acknowledging the boundaries of the veterinarian-client exchange relationship did not appear to be perceived negatively in this study. This finding adds to previous research that shows patients and clients are generally most satisfied and experience better health-care outcomes when the communication and power dynamic between health-care provider and

receiver is balanced and factors in the needs and capacity of both parties.[28,29] Thus, even in a professional domain where veterinarians are expected to be highly knowledgeable and generate immediate solutions to the problems of their clients, a healthy trust relationship may still emerge if the interaction is open and honest and the veterinarian expresses a commitment to solving the issue through other means.

The relationships identified between trust and its facets as well as its relations with perceived technical competence and communication in the study implicate a number of directions for future research and the education, training, and continued improvement of both veterinary students and established practitioners. First, the nonsignificant correlations between the veterinary students' trust-related perceptions and those same perceptions from the perspective of the standardized clients suggest an intriguing area of focus. Such null results may be attributable to statistical artifacts (ie, floor effect in the questionnaire responses in which neither students nor standardized clients tended to provide ratings below the scale mid-point); nevertheless, these findings suggest that examinations of trust perceptions from the perspective of the veterinarian may also prove useful in determining whether he or she is effectively building a trusting relationship with clients. Previous research[14,28–31] has primarily focused on the messages and specific content of communication delivered by veterinarians rather than veterinarian's effectiveness as socially attuned, reflexive, and participative actors in exchanges with clients. Adapting the tone, content, and goals of one's communications in response to social and situational cues is critical to influencing the perceptions and related outcomes held by other individuals,[32–34] especially when there are imbalances in the authoritative power of the interacting parties.[35–37] Although improvement in this area is likely to be a gradual process, even simple interventions that encourage veterinarians to seek feedback from clients on the nature and

quality of their professional and interpersonal relationship building, engage in fully transparent conversations that balance client wants and goals for their animal's health with available treatment options, or reframe clinical visits as a single step rather than one-off encounters in the trust-building process have the potential to substantially improve the communicative quality and trust-building efforts between veterinarian-client interactions.

Second, the present results demonstrated the effect of trust on short-term, immediate outcomes (ie, perceptions of the quality of care provided and general communication skills), but it remains to be seen what implications the trust of clients toward their veterinarians hold for outcomes beyond a single interaction. The decrease in the frequency of client visits to pet health-care providers is a growing concern for many veterinary professionals.[8] Although evidence from the human health-care industry strongly suggests that the trust that develops between doctors and patients has a significant impact on visitation and compliance behaviors over the course of extended medical treatments,[11–13] a number of possible intervening factors may cause this relationship to operate differently within the veterinary profession. For example, the simple fact that the health service is being delivered to one's pet or animal as opposed to one's self suggests that clients' perceptions of the necessity of treatment may be an important difference in the decision to seek out and comply with veterinary services. This implies that the strength of the pet-owner bond may be an important moderating influence of the relationship between trust and compliance and visitation likelihood.[38,39] As another example, researchers have found that non-Caucasian pet owners are approximately 7% to 13% less likely to take their pets to a veterinarian during any given 12-month period than are Caucasian pet owners, even after controlling for income, education, location, and other factors known to impact the likelihood of purchasing veterinary care.[40] Given that veterinary medicine is among the least diverse of any of the health-

care professions,[41] discrepancies in trust between clients of different versus the same race or ethnicity as their practitioner may also hold unique implications on the impact that trust exerts on outcomes desirable to veterinary care providers.

Lastly, previous research indicates that individuals may have very different perceptions of trust when considering relationships with specific individuals (eg, a specific veterinarian or a front office receptionist), groups of individuals (eg, a specific veterinarian practice), or larger institutional and social systems (eg, veterinarian practice in general).[9,18] In areas where successfully establishing a cooperative and effective working relationship is paramount to achieving a particular goal, perceptions of mistrust at higher group and system levels can be problematic.[11,42,43] However, the behaviors and attitudes adopted by a specific veterinarian toward his or her clients over the course of multiple interpersonal interactions may be able to counteract these perceptions and exert a strong influence over the development of a productive and mutually beneficial veterinarian-client relationship. Such a calculus-based model of trust development[18] implies that examining differences between clients' perceptions of interpersonal trust toward a single veterinarian and veterinary practice in general may be an important distinction for improving visitation rates and compliance behaviors.

The results from the present study hold practical implications as well. First, the items from the trust measure (Appendix) can be easily implemented in veterinary practices as part of a brief exit questionnaire or customer feedback package to assess clients' overall perceptions toward the clinic or veterinarians within the practice. The calculation of the subscales is easily performed, and the conceptual definitions provided make their interpretation straightforward. In addition to its descriptive and evaluative uses, information on perceptions of trust and its predictive facets may also be useful for coaching or training purposes. To the extent that efforts

to promote compliance rates and high-quality relationships within one's client base remains an important directive, the ability to provide guidance to veterinary students and doctors on the specific types of relational qualities important to such efforts is critical. Simply advocating that the development of effective nontechnical or communication skills are essential to healthy veterinarian-client relationships does not provide the prescriptive framework needed to elicit effective behavioral change. However, by identifying specific dispositional and communicative practices conducive to trust building, explicating what is meant by those constructs, rewarding conscious efforts to improve those areas of practice, and monitoring progress toward achieving goals of improved client trust and compliance through continued measurement, considerable progress can be achieved.

This point is also highlighted by the nonsignificant relationship between general communication skills and trust observed in the present study. The communication skills measured in the present study largely captured generic behaviors that a person would expect from any interaction in a service context (eg, pleasant greeting, did not interrupt, and allowed and invited questions). However, the willingness for one to make themselves vulnerable to the decisions of another which accompanies perceptions of trust is a complex cognitive and emotional process that research suggests is influenced by specific verbal and nonverbal factors.[17,18] Although the purpose of a given clinical appointment may strongly influence the communicative nature of the veterinarian-client interaction,[29] a trustee that is knowledgeable of those factors that underlie a trustor's perceptions of trust (eg, professionalism and technical candor) has the potential to adapt their interactions in a manner that is more favorable to trust development and, ultimately, improved client and patient outcomes.

As with any empirical investigation, several limitations relevant to the interpretation of this study's results should be considered. The first is the small sample size obtained and the fact that it consisted of students interacting with trained actors in a high-fidelity simulation. With respect to sample size, the statistical results of the measurement validation and HLM analyses were fairly conclusive and it is unlikely that a larger sample size would have produced substantially different findings. Nevertheless, a larger sample would have been desirable to produce more stable parameter estimates in both analyses; thus, we believe it is justifiable to draw conclusions on the basis of the observed direction of the identified relationships (ie, higher professionalism, technical candor, and perceived technical competence lead to greater perceptions of trust), though interpretations of the relative magnitude of the effects (eg, whether performance is more important to perceptions of trust than professionalism or technical candor) should be withheld until further data has been accumulated.

Note that on the basis of the present study, we do not advise use of either the professionalism or technical candor scales for purposes beyond descriptive feedback in practical applications. The small sample size with which the measurement validation results are based and the moderate internal consistency reliability coefficients do not offer sufficient support for the use of this measure in evaluative decision contexts (ie, as part of performance assessments or other major organizational decisions). Through the accumulation of additional investigations with this measurement tool, greater confidence can be placed in the validity and reliability of the instrument; until that time, the results of this study offer a preliminary treatment of the conceptualization and measurement of trust in veterinary contexts.

As concerns the use of veterinary students and standardized clients across only 2 simulated scenarios, one could argue that these interactions may not have been sufficiently

realistic to obtain measurements of trust. Consequently, issues regarding the generalizability of the present study's results can be called into as to question. We acknowledge this limitation, but this weakness is partially offset by the experimental control afforded by the present study's design. Given that our stated goal was to develop and examine the functioning of a trust measure specifically targeted toward veterinary contexts, the present design offered a number of desirable advantages, such as the ability to explicitly standardize situational factors of the student–standardized client interactions (eg, severity of patient condition and purpose of visit), which may have confounded validation efforts in a real sample.[9,10,17] Additionally, the ability to gather data on perceived technical competence and general communication skills from trained standardized clients, which may have been difficult or impossible to gather from real clients, permitted a richer exploration of the factors that relate to perceptions of trust. Lastly, the unique opportunity to pursue cross-validation efforts with the trust measure across 2 controlled scenarios administered at different time points and with different student–standardized client combinations lent further strength to the conclusions drawn from results of the factor analysis. Nevertheless, we note that there is always a tradeoff between issues of internal (ie, does the study adequately examine what it intends to) and external (ie, do the results of the study extend to samples beyond the one used in the research) validity in any experimental research that must be justified by the intended purpose and goals of the research.[44] The present effort represented an initial exposition and preliminary examination of veterinary trust that was appropriate for examination in a controlled environment; however, future investigations would benefit from attempting to extend these findings with to clients in a practicing veterinary office. Although the use of simulated settings to study technical and nontechnical skills is a new advancement in veterinary medicine,

we contend, as have other researchers, that the methodology holds many benefits and offers considerable potential for informing best practices.[45–47]

Additional limitations concern aspects of the correlational research design and the use of same source perceptual data. Previous theory and empirical evidence[17,20,23] provide adequate justification for treating perceptions of professionalism, technical candor, and perceived technical competence as causal influences of trust. However, the fact that all data were collected at a single time-point in a nonexperimental design does not permit a true test of this presumed causal ordering. This goal was not a central pursuit of the present study, but future research could greatly contribute to this area of research by incorporating behavioral data or pretest-posttest experimental designs and manipulations to examine the causal ordering of factors that contribute to trust.

The practice of understanding, interpreting, and improving veterinary communication competencies is a young but burgeoning area in the veterinary profession.[28–31] In the present study, the case was made for the centrality of trust as a critical component of veterinarian-client interactions and relations that holds implications for improving client compliance, visitation frequency, and the quality of care that can be provided by veterinarians.[8,15,16] The results of this research offer a preliminary step in deciphering the unique role of trust in the veterinary profession. It is our hope that through the development and application of measures, tools, and interventions designed to specifically examine the manner by which trust is manifested in the context of veterinary care, valuable and meaningful improvements can continue to be made to the training of future industry professionals and discussions of best practices in the field of veterinary medicine.

Footnotes

[a] SPSS, version 19.0.0, SPSS Inc.

[b] AMOS, version 19.0.0, SPSS Inc.

[c] HLM, version 7.0 (Student Edition)

[d] The reported indices are based on a factor model in which the error terms for two items (#3 and #6 in Appendix) were correlated to improve model fit. Given the high interrcorrelation among items in the trust scale and the fact that this scale had not been published elsewhere, this path was added to the confirmatory factor analysis.

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Table 1
Exploratory Factor Analysis Results of SC Trust Perceptions from the Diet History/Physical Exam Scenario (n = 96)

Items from Trust Measure	Rotated Factor Loadings	
	1	2
Factor 1: Professionalism		
The student-doctor put me at ease during our interview. (Benevolence)	.95	
The student-doctor behaved in a professional manner. (Ability)	.91	
The student-doctor did not talk down to me or above my head. (Benevolence)	.87	
The student-doctor was kind and accommodating towards me, but firm when required. (Benevolence)	.46	
Factor 2: Technical Candor		
The student-doctor was honest with me if he/she did not know the answer to a question or was uncertain about his/her knowledge. (Integrity)		.95
I believe the student-doctor would readily seek the advice of others if he/she had doubts about his/her diagnosis or recommendations for treatment. (Integrity)		.57
The student-doctor demonstrated his/her knowledge about my animal's condition by describing his/her diagnosis completely and precisely. (Ability)		.44
% variance explained:	40.8%	23.2%

Note. Words in parentheses indicate the original subscale of the trust measure from which the item was taken. % variance explained describes the percentage of total variance in the data captured by the rotated factor (varimax rotation).

Table 2

Means, Standard Deviations, and Partial Correlations Among SC Perceptions of Trust, Veterinary Students Self-Perceptions of Trust, Perceived Technical Competence, and Communication Skills in the Diet History/Physical Exam Scenario (n = 96)

	Mean	SD	1	2	3	4	5	6	7	8
1. Professionalism (SC)	4.49	.50	(.85)							
2. Technical Candor (SC)	4.25	.49	**.69**	(.69)						
3. Overall Trust (SC)	4.55	.51	**.66**	**.43**	(.89)					
4. Professionalism (Self-report)	4.40	.46	-.03	.10	.04	(.85)				
5. Technical Candor (Self-report)	4.33	.53	.07	.19	.02	**.63**	(.55)			
6. Overall Trust (Self-report)	4.20	.63	-.11	.05	-.04	**.77**	**.54**	(.96)		
7. Perceived Technical Competence[a]	.94	.13	.14	.03	**.30**	.11	.00	.16	(.77)	
8. Communication Skills[b]	.98	.08	**.26**	.21	**.32**	.01	.02	-.02	.05	(.63)

Note. The numbers in the half-matrix represent Pearson correlation coefficients, with bold coefficients significant at $p < .05$. Cronbach's alpha are reported in parentheses on the diagonal.

[a]Dichotomous response scale (0 = Did not perform, 1 = Did perform)

[b]Dichotomous response scale (0 = Disagree, 1 = Agree)

Table 3

HLM Analyses and Parameter Estimates Predicting the Relationship between Professionalism, Technical Candor, Perceived Technical Competence, and Communication Skills on Standardized Clients Ratings of Trust Towards Veterinary Students in the Diet History/Physical Exam Scenario (n = 96)

Model	Parameter Estimates						
	γ_{00}	γ_{10}	γ_{20}	γ_{30}	γ_{40}	τ_{00}	σ^2
Null Model Level-1: $Trust_{ij} = B_{0j} + r_{ij}$ Level-2: $B_{0j} = \gamma_{00} + u_{0j}$	4.56*	—	—	—	—	.06*	.20
Predictor Model Level-1: $Trust_{ij} = B_{0j} + B_{1j}(Professionalism_{ij}) + B_{2j}(Technical\ Candor_{ij}) + B_{3j}(Communication\ Skills_{ij}) + B_{4j}(Perceived\ Technical\ Competence) + r_{ij}$ Level-2: $B_{0j} = \gamma_{00} + u_{0j}$ $B_{1j} = \gamma_{10} + u_{1j}$ $B_{2j} = \gamma_{20} + u_{2j}$ $B_{3j} = \gamma_{30} + u_{3j}$ $B_{4j} = \gamma_{40} + u_{4j}$	4.56*	.48*	.03	1.11	.77*	.02*	.07

* parameter estimate is significant, $p < .05$

Notes. Level-1 equations model the relationship between trust and relevant predictors for each student in the sample, whereas the Level-2 equations estimate the Level-1 coefficients across SCs. The definition of each parameter in the modeled HLM equations is provided below. All predictor variables were grand mean centered prior to analyses and thus should be interpreted as the amount by which perceptions of trust change for every 1 unit increase above the mean of the predictor. Of greatest interest to the prediction of trust, the γ parameters represent the relationship between a predictor and trust accounting for nonindependence of SC ratings.

B_{0j} = mean of trust for students rated by SC *j*

B_{1j} = relationship between Professionalism and Trust for student *i* rated by SC *j*

B_{2j} = relationship between Technical Candor and Trust for student *i* rated by SC *j*

B_{3j} = relationship between Communication Skills and Trust for student *i* rated by SC *j*

B_{4j} = relationship between Perceived Technical Competence and Trust for student *i* rated by SC *j*

γ_{00} = mean rating of trust for all students across all SCs

γ_{10} = average relationship between Professionalism and Trust for all students across all SCs

γ_{20} = average relationship between Technical Candor and Trust for all students across all SCs

γ_{30} = average relationship between Communication Skills and Trust for all students across all SCs

γ_{40} = average relationship between Perceived Technical Competence and Trust for all students across all SCs

r_{ij} = residual variance in Trust for student *i* rated by SC *j*

u_{0j} = residual variance in Trust for all students rated by SC *j*

u_{1j} = residual variance in Professionalism for all students rated by SC *j*

u_{2j} = residual variance in Technical Candor for all students rated by SC *j*

u_{3j} = residual variance in Communication Skills for all students rated by SC *j*

u_{4j} = residual variance in Perceived Technical Competence for all students rated by SC *j*

σ^2 = variance in r_{ij} (variance due to random error in Trust for student *i* rated by SC *j*)

τ_{00} = variance in u_{0j} (variance in average Trust for all students rated by SC *j*)

Appendix

Veterinarian Trust Scale

Instructions: Using the 5-point scale presented below, please respond to the following items regarding your perceptions of the student-doctor you have just interviewed with to the best of your ability.

1 Strongly disagree	2 Disagree	3 Neither agree or disagree	4 Agree	5 Strongly agree

Professionalism

1. The student-doctor put me at ease during our interview.B
2. The student-doctor behaved in a professional manner.A
3. The student-doctor did not talk down to me or above my head.B
4. The student-doctor was kind and accommodating towards me, but firm when required.B

Technical Candor

5. The student-doctor was honest with me if he/she did not know the answer to a question or was uncertain about his/her knowledge.I
6. I believe the student-doctor would readily seek the advice of others if he/she had doubts about his/her diagnosis or recommendations for treatment.I
7. The student-doctor demonstrated his/her knowledge about my animal's condition by describing his/her diagnosis completely and precisely.A

Overall Trust

8. I trust this student-doctor as a veterinarian-in-training.
9. Based on this interview, I would see this student-doctor again for my animal's care.
10. I trusted that the student-doctor had carefully considered my and his/her concerns regarding my animal.
11. I would recommend this student-doctor to others for their veterinary needs.

Note. The superscripts A, B, and I refer to the ability, benevolence, and integrity subscales from the original three-factor measure.