

Exam Induced Stress Levels of First and Second Year Veterinary Medicine Students

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Abstract

Veterinary students feel overwhelmed because they spend long days in the classroom and spend long hours in the evening memorizing excessive amounts of material for multiple choice tests. They face extreme pressure to perform well in homogeneous groups where most students are perceived as academically gifted. With little time for personal care or recreation, many veterinary students are believed to experience clinical levels of depression and anxiety. Anecdotal reports suggest that students at Tufts Cummings School of Veterinary Medicine (TCSVM) show signs of depression and anxiety, but lack convenient access to professional counseling services on campus. The purpose of this study was to pilot a peer support group intervention and measure its effectiveness in lowering depression and anxiety levels among participating subjects. In this pilot study, significant effects of support group intervention were not observed (though the sample size was small). However, feedback from the participants may be helpful in planning future interventions. Indeed, an anonymous and voluntary survey was sent out to the entire first and second year classes (190) and generated a 74% response rate. Statistics collected from this survey will support the need for on campus counseling services, and perhaps lead to changes in the curriculum and the introduction of more interventions.

Keywords: veterinary medicine students, peer support group, intervention, exam induced stress, student anxiety, student depression, student stress

Introduction

Veterinary students at the Cummings School of Veterinary Medicine (TCSVM) are believed to experience high levels of stress when studying for exams, since they are required to absorb a significant amount of information in relatively short periods of time. During the first year, Gross Anatomy examinations, which are five hours long, are scheduled to take place every five weeks. The students also face multiple examinations in other challenging courses such as Physiological Chemistry, Histology and Immunology. Second year students study for high stakes examinations in Cardiovascular, Reproductive, Endocrinology, and Gastrointestinal Pathophysiology, to name a few.

The TCSVM administration conducted an Academic Climate & Prerequisite Survey in 2007. “Extremely stressful” was how 52.4% of students surveyed classified their TCSVM academic experience.¹ The following year, TCSVM built a small workout room in the student center, and more recently, a small yoga class has been offered to students and staff to promote relaxation and good health. In addition, a part-time counselor visits the campus one day a week to provide referrals for the nearly 400 students who may be seeking professional counseling or therapy off campus. Nevertheless, during the 2012 to 2013 academic year, five first year students dropped out of school (medical leaves), reportedly due to the effects of stress (though this has not been confirmed with medical records). There is, therefore, an apparent need for a more comprehensive effort to support student mental health and overall quality of life.

A new elective course at TCSVM was created in the Fall, 2012 semester entitled, “Human Psychopathology,” instructed by John Byrnes, M.A., Ph.D. The first class was

comprised of four, second year veterinary medicine students and one graduate student from the Center for Animals and Public Policy, located on the same campus.

Conversations before, during, and after the initial classes centered around the need for veterinary students to have an outlet for psychological stress, especially during their first year at the school. The second year students reflected on their struggles, and shared some private and painful emotional obstacles that they had faced. These conversations were the impetus behind this study.

The Statistics Agree

A body of literature on veterinary student stress is developing. In a recent article, Reisbig et al. investigated the relationship between common stressors experienced by veterinary medical students and their impact on mental health, general health, and academic performance.² Three cohorts of students were tracked over the course of their first three semesters. The study found that 49%, 65%, and 69%, respectively, of the participants reported depression levels using the Center for Epidemiologic Studies Depression Scale (CES-D) at or above the clinical cut-off. Research out of Kansas State University asserts that veterinary medicine students are more likely to struggle with depression than human medicine students, undergraduate students and the general population.³ The same research also suggests that gender differences may play a role in the high depression rates among veterinary students. National studies have shown that women are two to three times more likely than men to suffer from mood disorders, and women make up 75% of veterinary students.

A stress study was also conducted at Aga Khan University, a medical school, in Karachi, Pakistan.⁴ Shaikh et al. reported that 264 out of 300 students from all five

years filled in a questionnaire. The respondents were 52.3% male and 47.7% female. The authors concluded that females felt more fatigue, headaches and short temper than males. In addition, students who were getting financial assistance reported more frequent headaches as compared to non-assisted students. When in a stressed situation, females were more likely to want to talk to somebody.

Hofmeister et al. published an article in 2010 that reported that 48% - 54% of students in all four years at Colorado State and University of Georgia Veterinary schools used over the counter (OTC) medications and energy boosting products.⁵ The most common reasons students gave for using stimulants were to help study, to remain awake, or wake up in the morning. Not surprisingly, the OTC medication and energy drink users had higher stress and anxiety levels and were more exhausted. When asked to provide a number of days in the past week that they had enough sleep to feel rested, 25.7% reported 0 to 1 days, 31.8% reported 2-3 days, 24.7% reported 4-5 days, and 17.8% reported 6-7 days.⁶

The data collected in these studies illustrate that medical students, whether they are studying human medicine or veterinary medicine, are faced with stressors that are negatively impacting their mental health. Addressing the mental health needs of students, therefore, should be a goal for all institutions where medicine is studied. Since the veterinary profession is becoming increasingly dominated by women, veterinary schools need to adjust to the mental health needs of females, in particular. In a survey conducted in 2012, Kogan et al. compiled data on the psychological services offered in 26 U.S. veterinary medicine schools. When asked about the recent trends in the need for counseling and the amount of counseling offered to students, 17

schools reported an increase, 8 schools reported that it was stable, and no schools reported a decrease.⁷

Veterinary Students Have Unique Stressors

Kogan et al. revealed in their study that veterinary students confided that they “feel their admission to the program was a mistake, and that faculty and other students will soon discover that they are not really capable of performing up to the expected standards.”⁶ A study by Sutton used online surveys to collect data from first year veterinary students at North Carolina State University. She articulated that veterinary students feel especially overwhelmed because while other graduate programs have shorter class schedules and require students to synthesize ideas and write papers, veterinary students spend long days in the classroom and spend long hours in the evening memorizing material for multiple choice tests.⁸ veterinary medicine students experience stress related to the information overload associated with the veterinary medicine curriculum, which covers several species in contrast to human medical doctors, for instance, who study human anatomy alone. Sutton found that one specific source of stress for veterinary students, is the lack of time to take care of personal needs outside of school.

In addition to time management issues and information overload, Gelberg and Gelberg suggest that learning to detect animal suffering is stressful until students have refined their medical skills.⁹ Pressure from animal rights and animal welfare advocates can also cause stress for students who are in laboratories or working with teaching animals. Having to respond to animal cruelty and counseling people through pet loss

and euthanasia are also unique stressors. Veterinarians have to advise people faced with the agonizing decision over when to end their cherished pet's life.

Collins and Foote conducted a study with Australian veterinary medicine students and learned that troubled students often remain “invisible” to the faculty because they are students who have been selected for their high academic ability and because of competitiveness, these students are not willing to admit that they need help.¹⁰ It is speculated by Zenner and his colleagues (as cited in Reisbig et al) that veterinary medical students, like other students in highly selective academic programs, may be more susceptible to mental health problems because they find themselves in a large group of other intellectually gifted and high- performing students.¹¹ In the same article, Halliwell and Hoskin assert that the academic homogeneity of the students in veterinary school compared to those in undergraduate school may cause normally high performing students a great deal of unexpected anxiety.¹¹

Salivary Cortisol as a Measure of Stress

Cortisol is a glucocorticoid hormone, a corticosteroid, that is normally released in our bodies in response to waking up in the morning, exercising, and stress.¹² It can be measured in serum via a blood test, or more easily, it can be measured using a saliva sample. When stressed, cortisol provides the body with energy for the fight or flight response. Elevated cortisol levels over time, however, can lead to elevated blood sugar levels, weight gain, disrupted digestion, immune system suppression, increased blood pressure, insomnia, and chronic fatigue syndrome, among other health problems. Leonard (as cited in Tseng et al.) reported that corticosteroid excess may contribute to

depression by reducing serotonin precursor levels and has been postulated as a mechanism of cognitive loss.¹³

Salivary cortisol properly collected before and after an intervention allows the researchers to quantify a possible change, and draw conclusions about the effectiveness or ineffectiveness of the intervention. A study was conducted by Murphy et al. with 20 female and 3 male undergraduate students enrolled in introductory psychology and biology courses in a college in Florida.¹⁴ The researcher collected saliva for cortisol and used the Perceived Stress Scale-10 (PSS-10) to ascertain a perceived stress score and a questionnaire that addressed specific academic pressures. Data were collected three weeks prior to an exam and then during the days leading up to the exam. There was a significant increase in cortisol during an examination week. There was also a significant relationship between high levels of acute perceived stress and reporting that examinations would impact their future.

A study out of Germany by Preub et al. suggests that a social-evaluative threat is a major determinant of the stress-elevated cortisol response.¹⁵ Students who had to give oral presentations or take oral examinations were more stressed than students who had to take written examinations. The research was conducted using 35 undergraduate psychology students, 4 males and 31 females. An interesting result was that oral contraceptives taken by female students had no influence on their cortisol stress response. This contradicted former laboratory tests which showed that birth control pills would cause elevated cortisol levels. The authors credited Dickerson and Kemeny, 2004, for stating that “it has been hypothesized that a threat to self (e.g. status, reputation) is especially stressful for humans as social individuals.”¹⁵ Highly

competitive students can perceive testing and grades to be a constant threat to status and reputation, and therefore, even if they do well, they may compare themselves to others and become stressed.

Just as the body releases hormones during stress, it also releases hormones that try to calm the body and return it to homeostasis, or equilibrium.¹⁶ The trouble is that when stress hormones dominate, and there is no relief, the body experiences an ongoing state of internal imbalance. Therefore, a conscious effort needs to be made to initiate the body's relaxation response and reestablish equilibrium.

Interventions

In 2005, Kogan and McConell reported that after surveying 31 veterinary schools, they found that less than half of the veterinary schools in North America had in-house counseling even though 90% of them acknowledged a need for these services.⁶ More recently, in 2012, Kogan et al. found out that only 9 out of 26 U.S. veterinary schools had a designated counselor for their students, but 22 veterinary schools reported that students could access the general counseling center utilized by the entire university.⁷ Unfortunately, the stigma associated with counseling, scheduling conflicts and confidentiality concerns all hinder students from utilizing services. It is strongly suggested, that in order for students to feel comfortable utilizing mental health services, the administration and faculty need to be open and supportive.

A study out of Massey University in New Zealand suggests that veterinary students with more optimism and self-esteem were less stressed and had higher "life satisfaction."¹⁷ Therefore, improving social bonds can improve self esteem, building self

esteem can improve optimism, and optimism can reduce stress or at least increase one's ability to deal with it. This study suggests that veterinary students need initiatives that encourage teamwork, improve communication skills, and provide planned recreational activities.

Dayalan et al. performed an intervention to relieve the exam stress of medical students in India.¹⁸ The authors so eloquently stated, "There is an urgent need for effective strategies to promote psychological well-being in students and improve their mental health status as well as their academic performance." The intervention was called Mind Sound Technology (MST). The relaxation technique involved making vowel sounds in a chant while focusing on specific body parts. This relaxation technique was taught to 21 students over the course of two weeks. The technique was then practiced daily for 25 minutes in the presence of a trainer. The Dukes Health profile was used to measure the effects of the intervention. Anxiety and depression scores decreased significantly and mental health and self esteem increased among students who learned how to do MST.

Gelberg and Gelberg described the use of bibliotherapy at Oregon State University. Self-help materials, stress management books, and notes from workshops covering topics such as anxiety triggers, the physiology of stress, and personality characteristics which maintain anxiety were kept in containers in the library. These resources were placed in a highly visible area as reference so that students could access these materials as needed, but maintain anonymity.

Purpose of the Current Study

Professors and administrators in veterinary medicine programs may be asking themselves why the issue of student stress is now coming to the forefront. If students have always had to sit through lectures, memorize enormous amounts of information, and take high stakes examinations, then why is it suddenly a problem for current students? Additional answers may be found in the Pew Research Center's Internet & American Life Project.¹⁹ A survey was sent out to a non-random sample of 1,021 technology stakeholders and critics. The results were almost 50/50 on whether the younger generation's constant use of the Internet will have a positive or negative effect on their learning by the year 2020. Comments by those who felt it was already having a negative impact were shared. One respondent said that young people accustomed to a "diet of quick-fix information nuggets are less likely to undertake deep, critical analysis of issues and challenging information. Shallow choices, an expectation of instant gratification, and a lack of patience, are common results."¹⁹ Another respondent said that reform of the education system is necessary to help learners. Reform could start by recognizing that distractions of all kinds are the norm now, and that students need to learn an appreciation for silence and focused contemplation.

In keeping with the idea that interventions are necessary to reduce stress, and using the data above and the anecdotal reports from TCSVM students to guide our decision making process, we hypothesized that first and second year students would benefit, or experience less stress, if they attended a 75 minute support group meeting once a week for 7 weeks. The sessions would be facilitated by an experienced counselor who has worked with people in the animal rescue and veterinary medicine

fields for decades. In addition, self-report instruments and salivary cortisol levels would be used as quantitative indicators of stress.

Methods

The study protocol and all accompanying documents were approved by Tufts Medical Center and Tufts University Health Sciences IRB. Subjects were recruited from two academic classes via emails, flyers, and announcements. A brief information meeting was held and consent forms were signed by 11 volunteer subjects (n=11). The timeline was chosen so that data collection could begin the morning of an exam (exam #1) and then again 7 weeks later, after the intervention, on the morning of another exam (exam #2). At the first data collection meeting, subjects were asked to fill out a survey designed by the researchers (Appendix 1) as well as three self-report mental health symptom survey; Beck Anxiety Inventory (BAI), Beck Depression Inventory II (BDI II), and the Brief Symptom Inventory 53 (BSI 53).

The BAI is a 21 question multiple-choice self report inventory that is used for measuring the severity of a person's anxiety. The answers reflect how the subject has been feeling for the last month. Each question has four possible answers, not at all (0 points), mildly (1 point), moderately (2 points), and severely (3 points). The BAI has a maximum score of 63. A person is considered to have a minimal level of anxiety with a score of 0-7, a mild level of anxiety with a score of 8-15, a moderate level of anxiety with a score of 16-25, and a severe level of anxiety with a score of 26-63.

The BDI II is a 21 question multiple-choice self report inventory for measuring the severity of a person's depression. The answers reflect how the subject has been

feeling for the last week. Each question has four possible answers that range from 0 to 3. The BDI II has a maximum score of 63. A person is considered to have minimal depression with a score of 0-9, mild depression with a score of 10-18, moderate depression with a score of 19-29, and severe depression with a score of 30-63.

The BSI 53 is a multiple choice self report inventory for measuring a person's current, point in time, psychological symptom status. The answers reflect how the subject has been feeling for the past week. The main question is, "How much were you distressed by...?" The subject is presented with 53 symptoms and responds by choosing, 0=not at all, 1=a little bit, 2=moderately, 3=quite a bit, or 4=extremely. The results are then tabulated on a worksheet that divides the symptoms into 9 categories: Somatization (SOM), Obsessive-Compulsive (O-C), Interpersonal Sensitivity(I-S), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic Anxiety Scale (PHOB), Paranoid Ideation (PAR), and Psychoticism (PSY). From there, the raw scores are converted to t scores, and plotted on a grid. T scores up to 63 are considered High Average. Scores above this threshold range from Superior (64-69) to Very Superior (70-80+).

As per IRB regulations, all documents contained no identifying information and were placed in folders to ensure confidentiality. Each subject was then asked to donate a saliva sample using the salivary oral swabs and conical tubes from Salimetrics. The subjects had to drink a cup of water ten minutes prior to the collection. Each student was handed a sterile oral swab and was instructed to place it under their tongue in the front of their mouth and hold it there for 2 minutes. The subjects then "spit" the swabs into a small tube that was coded, placed into a box, and placed into a freezer (-20° C) in

the Peabody Pavillion on the TCSVM campus with other biological samples. The same collection procedure was repeated after exam #2, minus the survey designed by the researchers. All pre and post intervention salivary cortisol samples were sent to Salimetrics Laboratory for analysis at the conclusion of the study. Both data collection meetings took place between 7:30 and 9:30 am and began 30 minutes prior to examinations. On April 2, 2013, second year students met at 7:30am before a Gastrointestinal exam and first year students met at 8:30am before a Physiology exam. On May 23, 2013, second year students met at 9:30am for a Clinical Pathology final exam, and on May 24, 2013, first year students met at 8:00am or 9:00am (the professor gave the students the option to start early) for a Physiology final exam.

During the 7 week interim, subjects were asked to attend a 75 minute support group meeting lead by the Group Facilitator and the Research Coordinator. During two sessions, the Group Facilitator was out of town and the Research Coordinator ran the meetings alone. The meetings were held in the evenings, in a classroom in the administration building on the TCSVM campus. The days and times alternated to accommodate the schedules of the subjects and facilitators.

During the first meeting, the ground rules were established and subjects were asked to share their family backgrounds as they pertained to shaping their personal drive for higher education. During the second session, the Group Facilitator started the discussion about expectations. Subjects talked about their own expectations of veterinary school, and the expectations that their professors had for them. The discussion also shifted to ethnic backgrounds and cultural influences as they pertained

to personalities. The Group Facilitator also shared her knowledge of relaxation and meditation techniques.

During the third meeting, students were scheduled to share study habits, talk about learning styles, and try using foam rollers on the floor for stretching and unwinding. A few minutes were devoted to this, but the group met the night after the Boston Marathon bombing. The discussion naturally transitioned to the tragedy and ended with subjects sharing their memories of the 9/11 tragedy.

The fourth session, which was one when the Group Facilitator was absent, was a hands-on art session facilitated by the Research Coordinator. A brief description and an elapsed time video clip of Buddhist monks creating a Mandala was followed by a painting session. Each subject chose to use acrylic paints to create her individual mandala on a small canvas. Mandala, the Sanscrit word for sacred circle, is an art form made from circles. It has spiritual significance in several cultures and is most popularly practiced by Tibetan Buddhists who spend days making them out of colored sand, and then dismantling them in a ceremony and pouring the sand into the river to symbolize impermanence. Western psychoanalysts and art therapists ask clients to create mandalas because it is believed that they convey one's current physical, emotional, and spiritual condition in the moment.²⁰

At the fifth session, the Group Facilitator talked about support systems and subjects shared who they turn to in their lives for emotional support. They also talked about choosing healthy people for friendships. The discussion shifted to the topic of competition and grades, and whether or not the subjects shared academic information with their classmates.

The sixth meeting was another hands-on art session. The Group Facilitator was not present, and the Research Coordinator used play-dough as a vehicle for self reflection. After free molding time, free conversation time, and several laughs, the subjects were asked to create a symbol of themselves, and then share with the group and explain its meaning. Clay is often used by art therapists to facilitate the expression of emotions and to facilitate verbal communication.²¹

The final session was lead by the Group Facilitator. She had recently spoken to the TCSVM graduating class about compassion fatigue (witnessing too much death and tragedy in the workplace) and wanted to share her experiences. She used a Power-point presentation to display statistics about problems that plague the veterinary profession. The slides contained information about the high incidence of alcohol abuse, depression, and suicide among practicing veterinarians. The discussion centered on ways to find professional help to avoid these problems. Some of the subjects shared their experiences with the TCSVM part time counselor.

The grade point averages of the subjects from Fall, 2012 were obtained from the administration, and this data was added to the results of the BAI, BDI II, and BSI 53 inventories.

A few weeks after the end of the study when the students were on their summer vacation, subjects were sent an email containing five open ended questions about their experiences as subjects in the study (Appendix 2). At the same time, a voluntary and anonymous survey was posted online using Surveymonkey(Appendix 3). All first and second year students (190) were invited to take the survey. A link was posted on their

class Facebook pages, and it was also emailed to them using the administration's class lists. The questions on the survey were taken from Susana Kent-Arce's dissertation defended at the University of Illinois at Urbana-Champaign in 1991. She designed a 55 item inventory. The significance of her study was to assess the possible need for psychologists or other mental health professionals to provide services to the college, and to help administrators identify aspects of the curriculum which could be modified to alleviate the students' stress.²² Gelberg and Gelberg said that little research had been done in the area of developing indexes for stressors unique to veterinary students, but this dissertation could be used to supplement the general assessment of stress in veterinary students.⁹ The response rate to this survey was 74% (n=141). Two additional items were added to the survey. The first was a list of interventions that the students could check off if they would utilize if offered on campus, and the second was an open text box for comments or suggestions.

Limitations

The first of many obstacles in this study started with IRB approval. Permission to recruit subjects from the first year class was granted on a Tuesday, and the study was scheduled to begin the Friday of the same week. Less than ten students expressed interest and only two showed up to read the consent form. An impending snowstorm made matters worse. The study was placed on hold.

The study was modified to include second year students, which would open up the potential subject pool, the intervention timeline was shortened by a week, and the time of the intervention was changed to accommodate more students. After getting IRB approval for the modifications, changing the recruitment strategy to include faculty

announcements, and editing the posters and emails to give a more scientific appearance to the study, the results were not much different. Several students inquired, but only 11 followed through. The entire design of the study had to be scrapped. Rather than three parallel groups, one intervention cohort (support group), one placebo cohort (monitored quiet study group) and one control cohort (no intervention), the study would have to consist of only one intervention group.

Since the goal of the study was to serve as a pilot, and it was not expected that the sample size originally proposed would attain statistical significance (at $P < 0.05$) anyway, we proceeded because we believed that we were breaking ground. We could still learn from this effort, and we could share our results with faculty and administration in the hopes that changes could be made to address the needs of the students at TCVSM.

The survey that was designed by the researchers (Appendix 1) was not completely filled out by most of the subjects. They were only useful in providing their exact dates of birth. After one week into the study timeline, a student identified herself as an outlier and did not want to adversely affect the study. This student was removed amicably. Another student, however, who did not volunteer for the study, began attending the support group sessions at the suggestion of a friend. We gladly welcomed this student into the group, but did not include her in the statistical analysis ($n=10$).

The timing of the study during the academic year was not optimal. Exam #1 took place in April and exam #2 took place during finals week in May. Subjects expressed concern that their stress levels would have been much higher if the study had taken

place earlier in the year. The Center for Animals and Public Policy curriculum dictated this schedule.

The support group topics were loosely organized and in hindsight, the topics could have been presented in a better sequence. The topic of depression and suicide should not have been discussed at the final session. Having second year and first year students in one group was a positive experience for the first years, but not helpful to the second years. The reason for this decision was practical rather than intentional, and was only made to expand the potential subject pool. The two different interruptions in the support group schedule was based on special occasions happening in the Group Facilitator's life, and they could not have been anticipated. The day and time of the support group was in constant flux due to room availability, the schedules of first year students, the schedules of second year students, and the schedules of the Group Facilitator and the Research Coordinator. The fluctuating meeting times created some complications for subjects. Only 3 students had 100% attendance, 5 students had 86% attendance, and the rest were only able to attend 57% of the time.

When the subjects were asked why they thought their classmates were unwilling to volunteer for the study, the overwhelming response was that they could not spare the time, and the thought of adding another responsibility to their packed schedules only stressed them more. It wasn't until the study was completed that the survey results from the 141 first and second year students were analyzed. Of all proposed interventions, support group therapy ranked lowest in terms of interventions that TCSVM students would choose if available.

Results

The Intervention

Paired t tests were used to compare all combinations of pre and post results. These included salivary cortisol levels, BAI and BDI-II scores, and raw scores on all subscales of the BSI 53 (including the 3 global indices). No statistically significant effects were observed (all P's >0.05) for any pre versus post intervention comparison. This finding is likely due to the small sample size and the low power of the experimental design (power < 50%).

Salivary Cortisol

The cortisol samples were reported by Salimetrics in micrograms per deciliter (μ /dL). Most pre and post intervention cortisol levels fell within the normal morning range for females between the ages of 21 and 30 (0.272 -1.348 μ /dL). The average age of the subjects was 23.8. Only one student's post intervention cortisol level was above the normal range. All of the second year students (3/3) had lower cortisol levels post intervention and before exam #2. Most of the first year students (6/7) had higher cortisol levels post intervention and before exam #2.

Pre Intervention Self Report Inventories

Though there was no effect of intervention on various measures of stress and overall psychological functioning, there was a statistically significant relationship between various scores in the pre intervention self report inventories. Correlations between pre intervention measures showed convergent validity (Table 1a. & 1b.) of the diagnostic tools used in this study. This means that we were able to show that measures that should be related, are related. Thus, the scores that subjects received

on the BAI and the BDI II correlated with scores they received on corresponding subscales of the BSI 53 (i.e. depression, anxiety). In addition, there were clear correlations within the BSI 53 itself. For instance, the depression (DEP) subscale of the BSI 53 correlated well with the OC, IS, HOS, and PSY subscales (as well as the global scales GSI, PST, and PSDI). This makes sense, given that the BSI 53, as a global psychological symptom screening instrument, correlates well with the Symptom Checklist 90 – Revised (SCL-90-R), an instrument used by mental health professionals to evaluate a broad range of psychological problems and symptoms of psychopathology²³ Forty eight of the pre intervention comparisons were statistically significant ($P<0.05$).

The pre intervention BAI results showed that 5 students were minimally anxious, 4 students were mildly anxious, and 1 student was moderately anxious. The pre intervention BDI II results showed that 6 students were minimally depressed, 2 students were mildly depressed, and 2 students were moderately depressed.

Post Intervention Self Report Inventories

There was also a statistically significant relationship between various scores obtained upon post intervention testing, with convergent validity as well (Table. 2a & 2b). Forty six percent of the post intervention scores were statistically significant ($P<0.05$).

The post intervention BAI results showed that 2 students were mildly anxious, 6 students were minimally anxious, and 2 students were moderately anxious. The post intervention BDI II results showed that 6 students were minimally depressed, 3 students were mildly depressed, and 1 student was severely depressed.

Pre Levels Versus Post Levels

In terms of change between pre and post intervention results, 5 students' levels of anxiety stayed the same, 3 students' levels went up, and 2 students' levels went down. In terms of change between pre and post intervention results, 6 students' levels of depression stayed the same. 2 students' levels went up, and 2 students' levels went down.

Post Intervention Questions

When asked if they thought that the intervention was helpful (Appendix 2), 4 students said yes, 4 students said no, and 2 students said yes and no. When asked what worked, 5 students wrote that the art therapy sessions stood out for them. When asked what did not work, 4 students mentioned having suicide as the topic of the final session. First year students mentioned that they appreciated hearing from second year students, but the second year students would have preferred being with their classmates. A few students admitted that the sessions themselves were enjoyable, but that when they left, they felt the stress return. Two students mentioned that they had no interest in participating in the intervention, but they wanted to volunteer because they believed that the study was important.

The survey

The responses to the survey that was sent out to all of the first and second year students (Appendix 3) corroborated the statistics found in the literature and reinforced the need for this study. When asked to rate their level of stress on a scale of 1 to 7 as it related to failing an exam (Table 3), 40.4% of the 141 first and second year students selected level 7, the highest possible level. When all other responses to this question were averaged, the level was 5.64. When asked to rate their level of stress as it related

to failing a course (Table 4), 48.2% selected level 7, and the average was 5.55. When asked to rate their level of stress as it related to their inability to absorb all information (Table 5), 34% selected level 6, and the average was 5.57. When asked to rate their level of stress as it related to tests, the testing system, number of tests, and types of tests (Table 6), 36.2% selected level 7, and the average was 5.43.

On the other end of the spectrum, when asked to rate their level of stress as it related to their interactions with administrators (Table 7), 24.8% selected level 1, and the average was 2.76. When asked to rate their stress level as it related to interactions with other students (Table 8), 27.7% selected level 2, and the average was 2.96. When asked to rate their stress level as it related to the attitude of science faculty toward students (Table 9), 25.5% selected level 2, and the average was 3.44.

Finally, the students were given a list of activities and were asked to select the ones they would choose for stress reduction (Table 10), if offered on campus. The number one choice (45.5%) was one to one therapy. The least desired option (22.8%) was support group therapy. Other top choices were pet therapy (43.9%), yoga (43.1%), and organized recreational time (42.3%).

Discussion

The topic of stress among the student body has been increasingly salient at TCSVM for the past few years. Anecdotal reports suggest that the Administration and Faculty are aware of the issue, and are trying to develop solutions to the problem. It was the serendipitous meeting of the authors and their shared desire to help these students that created the momentum that not only put a spotlight on the issue, but brought about real change. At the time of the submission of this study to the Director of

the Center for Animals and Public Policy, the arrangements were being finalized to increase the counseling capacity for all TCSVM students..

The statistical results of the intervention were much less important than the fact that a real pilot was designed, received administrative support, received IRB approval, and was carried out to completion. The feedback from the subjects was very valuable and could be used to improve future attempts to form support groups. It is also important to note that the subjects that volunteered for this study were not in academic jeopardy, and in fact had solid GPA's. As per the selection criteria set forth in the study protocol, subjects could not have failed any courses in the fall of 2012. The rationale was that those students would already be meeting with an administrator for academic counseling. It is safe then to infer that students with lower GPA's would have higher levels of stress.

Most of the subjects agreed that it was beneficial to get to know other students in an intimate setting, and to learn that other people were facing the same struggles. The idea of making small group meetings part of the curriculum was favorably received by the subjects. They believed that students who would not willingly attend meetings on their own time were the ones who would benefit the most. If the meetings were built into the schedule, then it wouldn't feel like an additional commitment.

The survey results showed that the students are not stressed by their peers and would enjoy participating in recreational activities, yoga, and Zumba with their classmates. These seem like feasible solutions. The survey also revealed that students are not stressed by their professors, which suggests that faculty, rather than outside professionals could play a role in addressing the issue of stress reduction on

campus. Perhaps the administration could seek special training for the staff so they are better prepared to help the students.

Experimenting with art therapy turned out to be a positive experience for many of the subjects. It was also selected by 37.4% of the students on the survey. It would also be a simple activity to offer, and may appeal to students looking for a low key activity. The students in the support group who enjoyed it were not necessarily artistic. It can offer students who are constantly using the logical left sides of their brains to tap into the creative right sides of their brains.

Moving forward, it is the hope of the authors of this study that the lines of communication surrounding this issue open up between the faculty and the administration, and that more stress reduction interventions are piloted. Ultimately, the goal is that Tufts students will graduate and enter the veterinary profession with the tools they need to be happy, healthy, and successful.

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Table 1a.

Pre Intervention Correlations

	Cort	BDI-II	BAI	SOM	OC	IS	DEP	ANX
GPA	0.673	0.772	0.373	0.277	0.354	0.373	0.388	0.910
Cort		0.289	0.794	0.901	0.282	0.953	0.851	0.108
BDI-II			0.00731	0.383	0.00477	0.0188	0.0355	0.00205
BAI				0.144	0.00980	0.00596	0.00973	0.0666
SOM					0.512	0.210	0.402	0.504
OC						0.0115	0.00301	0.0100
IS							0.00007	0.151
DEP								0.251

Table 1b.

Pre Intervention Correlations, cont.

	HOS	PHOB	PAR	PSY	GSI	PST	PSDI
GPA	0.143	0.183	0.208	0.416	0.239	0.189	0.809
Cort	0.735	0.475	0.447	0.882	0.686	0.719	0.841
BDI-II	0.130	0.544	0.786	0.171	0.0249	0.0105	0.164
BAI	0.0255	0.394	0.395	0.148	0.0130	0.00101	0.250
SOM	0.0835	0.388	0.500	0.618	0.179	0.110	0.759
OC	0.0931	0.315	0.306	0.00650	0.00196	0.00402	0.0282
IS	0.00475	0.202	0.0333	0.00461	0.00007	0.00036	0.0224
DEP	0.0294	0.192	0.0552	0.00256	0.00041	0.00178	0.0362
ANX	0.244	0.650	0.924	0.182	0.0666	0.0586	0.0937
HOS		0.0168	0.00463	0.0382	0.00126	0.00021	0.120
PHOB			0.0211	0.197	0.0599	0.0427	0.415
PAR				0.00953	0.0146	0.0450	0.0448
PSY					0.00046	0.0164	0.00069
GSI						0.00003	0.0116
PST							0.0732

Table 2a.

Post Intervention Correlations

	Cort	BDI-II	BAI	SOM	OC	IS	DEP	ANX
GPA	0.754	0.926	0.430	0.904	0.633	0.320	0.646	0.525
Cort		0.196	0.209	0.190	0.350	0.258	0.355	0.309
BDI-II			0.00300	0.0608	0.00081	0.00463	0.0332	0.0196
BAI				0.0179	0.00412	0.00003	0.00144	0.00125
SOM					0.0123	0.0360	0.276	0.00038
OC						0.00473	0.120	0.00039
IS							0.00600	0.00340
DEP								0.0731

Table 2b.

Post Intervention Correlations, cont.

	HOS	PHOB	PAR	PSY	GSI	PST	PSDI
GPA	0.393	0.889	0.666	0.346	0.453	0.489	0.501
Cort	0.158	0.510	0.349	0.522	0.158	0.0610	0.309
BDI-II	0.555	0.319	0.564	0.0945	0.00107	0.00486	0.00938
BAI	0.724	0.577	0.260	0.0124	0.00001	0.00019	0.00106
SOM	0.834	0.130	0.975	0.714	0.00625	0.0460	0.00167
OC	0.879	0.389	0.774	0.321	0.00094	0.0342	0.00063
IS	0.393	0.321	0.179	0.0335	0.000004	0.00051	0.00029
DEP	0.970	0.704	0.0870	0.00057	0.0128	0.00297	0.109
ANX	0.949	0.448	0.999	0.324	0.00040	0.0170	0.00020
HOS		0.0668	0.0898	0.864	0.395	0.199	0.468
PHOB			0.505	0.582	0.244	0.386	0.107
PAR				0.0483	0.307	0.0632	0.591
PSY					0.0715	0.0173	0.276
GSI						0.00013	0.00004
PST							0.00866

Table 3.

3. Failing an exam										Create Chart	Download
	1	2	3	4	5	6	7	N/A	Rating Average	Rating Count	
	2.8% (4)	4.3% (6)	6.4% (9)	7.1% (10)	11.3% (16)	25.5% (36)	40.4% (57)	2.1% (3)	5.64	141	
answered question										141	
skipped question										0	

Table 4.

4. Failing a course										Create Chart	Download
	1	2	3	4	5	6	7	N/A	Rating Average	Rating Count	
	5.7% (8)	5.7% (8)	7.8% (11)	3.5% (5)	5.7% (8)	9.9% (14)	48.2% (68)	13.5% (19)	5.55	141	
answered question										141	
skipped question										0	

Table 5.

6. Inability to absorb all information										Create Chart	Download
	1	2	3	4	5	6	7	N/A	Rating Average	Rating Count	
	0.0% (0)	1.4% (2)	10.6% (15)	7.1% (10)	19.1% (27)	34.0% (48)	27.7% (39)	0.0% (0)	5.57	141	
answered question										141	
skipped question										0	

Table 6.

14. Tests, the testing system, number of tests, type of tests										Create Chart	Download
1	2	3	4	5	6	7	N/A	Rating Average	Rating Count		
2.8% (4)	3.5% (5)	9.2% (13)	9.2% (13)	18.4% (26)	20.6% (29)	36.2% (51)	0.0% (0)	5.43	141		
answered question									141		
skipped question									0		

Table 7.

18. Interactions with administrators										Create Chart	Download
1	2	3	4	5	6	7	N/A	Rating Average	Rating Count		
24.8% (35)	22.7% (32)	17.0% (24)	14.2% (20)	8.5% (12)	3.5% (5)	2.1% (3)	7.1% (10)	2.76	141		
answered question									141		
skipped question									0		









Table 8.

21. Interactions with other students										Create Chart	Download
1	2	3	4	5	6	7	N/A	Rating Average	Rating Count		
19.1% (27)	27.7% (39)	21.3% (30)	13.5% (19)	10.6% (15)	3.5% (5)	4.3% (6)	0.0% (0)	2.96	141		
answered question									141		
skipped question									0		

Table 9.

17. Attitudes of science faculty toward students										Create Chart	Download
	1	2	3	4	5	6	7	N/A	Rating Average	Rating Count	
	15.6% (22)	25.5% (36)	10.6% (15)	13.5% (19)	17.7% (25)	8.5% (12)	6.4% (9)	2.1% (3)	3.44	141	
answered question										141	
skipped question										0	

Table 10.

25. Please check all that apply If offered here on campus, I would try the following activities to relieve my stress				Create Chart	Download
				Response Percent	Response Count
Yoga				43.1%	53
Zumba				41.5%	51
One on one therapy				45.5%	56
Support group therapy				22.8%	28
Organized recreational time				42.3%	52
Pet therapy				43.9%	54
Art therapy				37.4%	46
Guided Meditation				26.0%	32
answered question					123
skipped question					18

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Appendix 1

Stress Levels of First Year Veterinary Medicine Students Studying Gross Anatomy

This information is being collected for research purposes only. It will remain confidential.

1. Sex: ___M ___F 2. Age: _____ 3. Date of birth: _____

4. Have you had any past psychological/psychiatric problems (such as significant stress, anxiety, depression, ADHD, trauma (or PTSD), other? (please explain)

5. At what age did your symptoms first emerge? _____

6. Are you currently receiving treatment for this condition(s)? _____

If so, do your treatments include psychotherapy, medications, both? _____

7. How long have you been receiving treatment? _____

8. Do you have a psychiatrist? psychologist? counselor or social worker? _____

(if yes, please specify) _____

9. How often do you meet with each of these? _____

10. Has treatment alleviated your symptoms? _____

11. If you are receiving medications for the condition, please list _____

12. How long have you been on these medications? _____

13. In general, are you satisfied with your current treatment options? _____

14. Would you find a counseling center at the TCSVM helpful? Would you take advantage of it? _____

Researcher use only: Study ID _____

Appendix 2

Post Intervention Questions

1. Do you think this intervention helped with your stress level? How?
2. What worked (sessions, topics, group dynamics, etc)?
3. What didn't work (sessions, topics, group dynamics, etc)?
4. In your opinion, what would make it better?
5. Do you think this type of intervention would be helpful to other students? Why or why not?

Appendix 3

Veterinary Medical Student Stressors Inventory

Your responses to the items in this inventory will help us (the research team) evaluate the amount of stress students experience in the DVM program, and to determine which interventions you would be willing to try. Your participation could help promote strategies for reducing stress among fellow students. This survey is voluntary and anonymous. Click the level of stress you have experienced when thinking about each item during this academic year. If the statement does not apply to you, click N/A. Please complete all of the questions before submitting. If you have any questions or concerns, please contact Terri Ciaramello vetstudentstress@tufts.edu.

1 = No Stress 7 = Great Deal of Stress N/A = Does Not Apply

1.	Beginning a new school experience (starting professional school)	N/A	1	2	3	4	5	6	7
2.	Your fear of some of the faculty	N/A	1	2	3	4	5	6	7
3.	Failing an exam	N/A	1	2	3	4	5	6	7
4.	Failing a course	N/A	1	2	3	4	5	6	7
5.	Financial problems concerning school	N/A	1	2	3	4	5	6	7
6.	Inability to absorb all information	N/A	1	2	3	4	5	6	7
7.	Failing out of the program	N/A	1	2	3	4	5	6	7
8.	The faculty's perception of you	N/A	1	2	3	4	5	6	7
9.	Experiencing the pace of the curriculum	N/A	1	2	3	4	5	6	7
10.	Graduation from the DVM program	N/A	1	2	3	4	5	6	7
11.	Limited recreational and social outlets	N/A	1	2	3	4	5	6	7
12.	Loneliness	N/A	1	2	3	4	5	6	7
13.	The number of hours one has to study to keep up	N/A	1	2	3	4	5	6	7
14.	Test, the testing system, number of tests, type of tests	N/A	1	2	3	4	5	6	7
15.	Lack of time, not having enough time for family and friends	N/A	1	2	3	4	5	6	7
16.	Attitudes of clinical faculty toward students	N/A	1	2	3	4	5	6	7
17.	Attitudes of science faculty toward students	N/A	1	2	3	4	5	6	7
18.	Interactions with administrators	N/A	1	2	3	4	5	6	7
19.	Grades, the grading system	N/A	1	2	3	4	5	6	7
20.	Peer competition	N/A	1	2	3	4	5	6	7
21.	Interactions with other students	N/A	1	2	3	4	5	6	7
22.	How I usually feel this year with when I am on campus	N/A	1	2	3	4	5	6	7
23.	How I usually feel this year when I am at home	N/A	1	2	3	4	5	6	7
24.	Failing out of the program through uncontrollable events	N/A	1	2	3	4	5	6	7

Please check all that apply. If offered here on campus, I would try the following activities to relieve my stress

Yoga	
Zumba	
One on one therapy	
Support group therapy	
Organized recreational time	
Pet therapy	
Art therapy	
Guided Meditation	