University of Cincinnati

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I, Afton M Erbe, hereby submit this original work as part of the requirements for the degree of Doctor of Philosophy in Nursing Research.

It is entitled:

Beyond the Stethoscope: Exploring Mental Health Issues and Suicide Risk Among Veterinarians

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This work and its defense approved by:

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Beyond the Stethoscope: Exploring Mental Health Issues and Suicide Risk Among Veterinarians

A dissertation submitted to the

Graduate College

of the University of Cincinnati

in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

of the College of Nursing

by

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Abstract

Background: Veterinarians are a high-risk population for mental health issues and suicide. These individuals often experience stressors unique to their practice that may impact their mental health and psychological wellbeing. Outcomes such as burnout have potential to exacerbate mental health problems such as substance abuse, anxiety, and depression. These mental health problems may then contribute to suicidal ideation and suicide attempts.

Methods: This dissertation used a manuscript format. Project 1 was an integrative review that sought to identify major salient factors contributing to mental health issues and suicide among veterinarians. Project 2 was data-based, using a cross-sectional survey design in order to explore mental health and suicide among veterinarians while looking specifically at prevalence rates of burnout, substance abuse, anxiety, depression, and suicidal ideations and comparing between veterinary specialties, career stages (establishment, maintenance, or decline), and role (practice owner or associate veterinarian). Project 3 was a policy-based in order to explore health policy pertaining to suicide prevention.

Findings: In Project 1, five main themes surrounding mental health issues and suicide among veterinarians were found: (1) occupational stress and burnout; (2) increased risk of mental health issues and suicide; (3) risk factors for the development of mental health issues and suicide; (4) mental health stigma and access to care; and (5) euthanasia and access to means. Project 2 identified that personal burnout, work-related burnout, client-related burnout, substance use, anxiety, depression, and suicide risk are prevalent among veterinarians. It also determined that there is a relationship between career stage and personal burnout; career stage and work-related burnout; career stage and alcohol use; veterinary practice specialty and alcohol use; and veterinary role and alcohol use. Project 3 identified the importance of universal prevention

strategies, selective prevention strategies, and indicated prevention strategies, and discussed the importance of a comprehensive suicide prevention program tailored to veterinarians.

Conclusion: Mental health and suicide are multifaceted complex issues and a better understanding of mental health and suicide risk among veterinarians will allow for future research and development of prevention strategies and interventions to improve resilience, mental health outcomes, and reduce the number of suicides in this population.

Dedication

To my family and friends, mentors and colleagues, and the veterinarians that have supported me from day one, I could not have done this without your guidance and support. Thank you for everything.

To my mom and dad, thank you for always encouraging me to ask questions and keep learning. It's been a long journey, but I would have never become who I am today without your unconditional love and support. Words can't even begin to express how grateful I am to have you as parents. I love you both, forever and always.

To my sister, Brittany – it took me long enough, but I'm finally a doctor! Thank you for everything – for the unwavering support and the tough love when needed. Thank you for answering all of my questions about veterinary medicine, no matter how silly of a question it may have been. I love you very much and I hope that this dissertation makes both you and your profession proud.

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Dr. Gordon Gillespie, thank you for taking on the responsibility of being my committee chair for not only this PhD but also my DNP. Your knowledge, expertise, and guidance throughout this program has been invaluable to me, and I have learned so much from you during my time at the University of Cincinnati. Dr. Carolyn Smith, thank you for the encouragement and support to branch out on my research topic and choose something that really resonates with me. Your mastery of occupational health nursing was invaluable as my research topic and dissertation expanded and evolved. Dr. Kermit Davis, thank you for being on my committee and providing an interdisciplinary viewpoint on my research topic. Your knowledge and insight, suggestions, and timely feedback were greatly appreciated.

Although not on my committee, I would like to also extend a sincere thank you to Dr. Joshua Lambert for assisting me with the statistical analysis portion of the dissertation.

Lastly, this dissertation could not have been completed without funding provided by the University of Cincinnati Education and Research Center, which is sponsored by the National Institute of Occupational Safety and Health.

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List of Abbreviations

AA – Alcoholics Anonymous

AAEP – American Association of Equine Practitioners

AAVMC – American Association of Veterinary Medical Colleges

AFSP – American Foundation for Suicide Prevention

APA – American Psychiatric Association

APA – American Psychological Association

AVMA – American Veterinary Medical Association

CBI – Copenhagen Burnout Inventory

CDC – Centers for Disease Control and Prevention

C-SSRS – Columbia Suicide Severity Rating Scale

EAP – Employee Assistance Program

DSM-5 – Diagnostic and Statistical Manual of Mental Disorders

GAD-7 – General Anxiety Disorder

ICD-10 – International Statistical Classification of Diseases and Related Health Problems

NAVLE – North American Veterinary Licensing Examination

NORA – National Occupational Research Agenda

ODPHP – Office of Disease Prevention and Health Promotion

PHQ-9 – Patient Health Questionnaire

PPE – Personal Protective Equipment

RMSEA – Root Mean Square Error of Approximation

SAMSHA – Substance Abuse and Mental Health Services Administration

SES – Socioeconomic Status

SPRC – Suicide Prevention Resource Center

SUD – Substance Use Disorder

TAPS – Tobacco, Alcohol, Prescription medication, and other Substance use

USDA – United States Department of Agriculture

WHO – World Health Organization

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CHAPTER ONE

Mental Health and Suicide Among Veterinarians: A Dissertation Proposal

Veterinarians are individuals qualified to provide care to sick and-or injured animals (Merriam-Webster, n.d.). Animal populations served by veterinarians range from domestic animals such as dogs and cats, farm animals such as horses and cattle, and laboratory animals such as mice (CDC, 2018d). According to the American Veterinary Medical Association (AVMA), there were 124,069 licensed veterinarians practicing within the United States during 2022 (AVMA, 2022). The veterinary profession is predominantly female, at approximately 66% (AVMA, 2022). Most veterinarians work in private clinical practice, most commonly in companion animal, mixed practice, equine, or food animal practice. Those who do not work in private practice are employed in public and corporate settings (AVMA, 2022).

There are many occupational hazards veterinarians are exposed to including physical, chemical, reproductive, and biological hazards. Physical hazards include animal bites, scratches, kicks, and crushing injuries. Chemical and reproductive hazards include exposure to hazardous drugs and anesthetic gases. Biological hazards include exposure to bodily fluids and zoonotic infectious diseases (CDC, 2018a; CDC, 2018b; CDC, 2018c). Lastly, euthanasia is an important factor to consider with veterinarians. Not only do veterinarians have exposure and access to euthanasia agents, but euthanasia has been shown to place emotional strain on providers (Dawson & Thompson, 2017).

Merck Animal Health completed the Veterinary Wellbeing Study III (Volk et al., 2022) to assess the overall wellbeing and mental health of veterinarians. Key findings of this study included that veterinarians experience increased levels of burnout, levels of serious psychological distress among veterinarians have increased (9.7%) in comparison to 2020 (6.4%),

and veterinarians are more likely to experience suicidal ideation in comparison to the public. The Veterinary Wellbeing Study II (Volk et al., 2020) showed that 7,455 per 100,000 veterinarians have had thoughts about killing themselves, in comparison to 3,600 per 100,000 individuals in the public. Rates were also higher among veterinarians for planning to kill self (1,463 per 100,000) and attempted to kill self (174 per 100,000) in comparison to the public (882 per 100,000 and 64 per 100,000, respectively). The Veterinary Wellbeing Study III (Volk et al., 2022) shows that 59% of respondents who indicated high levels of psychological distress did not or could not seek treatment. Despite many not seeking treatment, the estimated spending on mental health services within the U.S. in 2020 was approximately $280 billion (The White House, 2022).

Additional research supports that veterinarians experience increased rates of mental health issues and suicide when compared to the general population (Tomasi et al., 2019; Schwerdtfeger et al., 2020; Dalum et al., 2022). Some influential factors of suicidal ideation among veterinarians have been identified, including work schedule, workload, workplace relationships, level of responsibility, income, work-life balance, and outside life stressors (Platt et al., 2012; Kersebohm et al., 2017; Dalum et al., 2022). However, previous studies have used a multitude of instruments to measure mental health outcomes including but not limited to the Acquired Capability for Suicide Scale – Fearlessness About Death and the Euthanasia Distress Scale (Glaesmer et al., 2021), the Kessler-6 Psychological Distress Scale (Nett et al., 2015), and the Suicide Behaviours Questionnaire-Revised (Schwerdtfeger et al., 2020). Not all of these studies explicitly discussed reliability and validity. Only one used the PHQ-9 (Schwerdtfeger et al., 2020). In addition, many of these studies did not consider the participant's veterinary practice subspecialty or career stage (Schwerdtfeger et al., 2020; Dalum et al., 2022). In addition, much

of the previous research has been done by individuals within the veterinary industry, which limits the contribution of interprofessional scientists to intervene in ways not realized by veterinarians themselves. The overall purpose of this dissertation is to explore mental health and suicide among veterinarians.

Study Framework

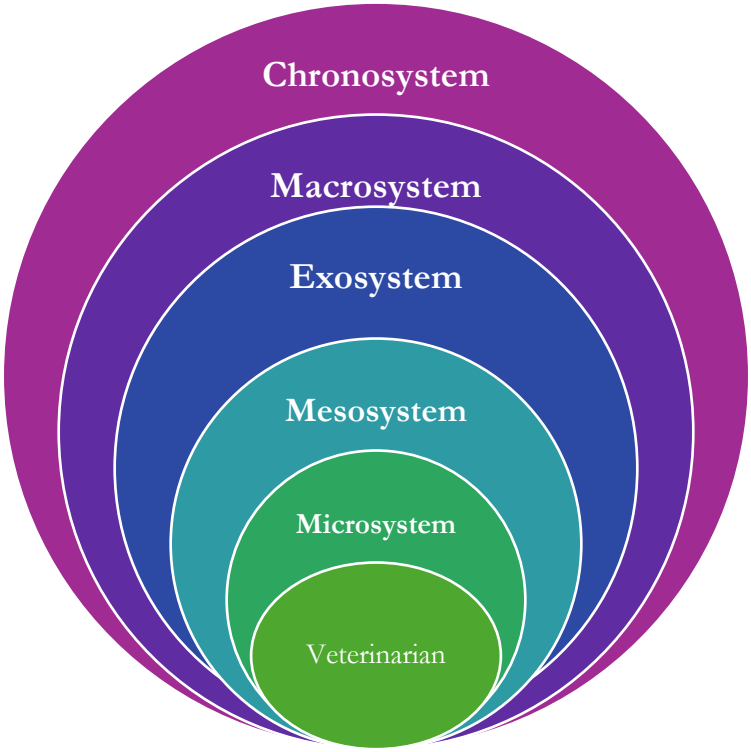
This research was guided by Urie Bronfenbrenner's Ecological Model and Donald Super and Jean Pierre Jordaan's Career Development Theory. The Bioecological Model (Figure 1.1) allows for a holistic approach to the individual and identification of stressors that may contribute to mental health issues and suicide within this population. It was originally introduced in 1977 and included four systems surrounding the individual: the microsystem, mesosystem, exosystem, and macrosystem (Bronfenbrenner, 1977). It was later modified to include a fifth system, the chronosystem (Bronfenbrenner, 1986).

The microsystem within the Bioecological Model includes the immediate environment surrounding the individual and may include family, place of employment, and neighborhood (Bronfenbrenner, 1977; Hamway et al., 2019). The mesosystem includes the major settings surrounding an individual and the relationship between two or more settings (Bronfenbrenner, 1977; Hamway et al., 2019). For example, this would include interactions among family and workplace. The exosystem includes both formal and informal social structures, including employment industry, social networks, communication, and agencies of government that may indirectly influence the individual (Bronfenbrenner, 1977; Hamwey et al., 2019). The macrosystem includes overarching cultures or subcultures that influence social, economic, and political systems (Bronfenbrenner, 1977; Hamwey et al., 2019). The macrosystem is abstract, whereas the micro-, meso-, and exosystems are concrete in nature (Bronfenbrenner, 1977).

Lastly, the chronosystem includes time and its effect on an individual's development (Bronfenbrenner, 1977; Hamwey et al., 2019). For the purposes of this dissertation, the chronosystem focused on the individual's career development.

Figure 1.1

Bronfenbrenner's Ecological Model

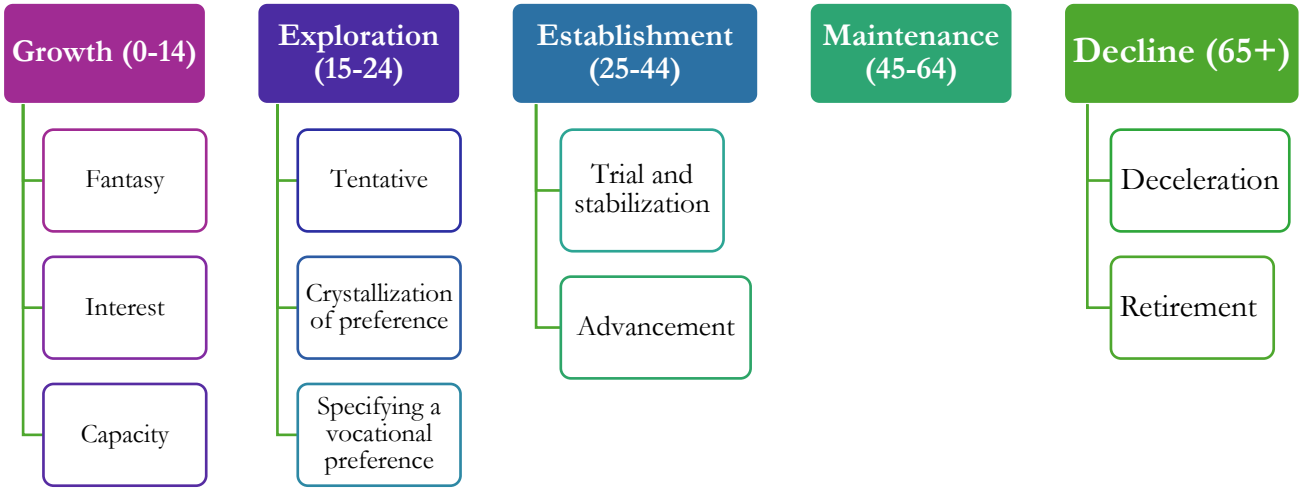


The Career Development Theory (Figure 1.2) was used to define career stages (establishment, maintenance, decline) within the veterinary profession to identify stressors within each. The establishment career stage includes ages 25 through 44 and is divided into two substages: trial - commitment and stabilization (ages 25-30) and advancement (ages 31-44) (Super & Jordaan, 1973). During the trial with commitment substage, the individual uses their knowledge and previous training to establish themselves in their career. The advancement

substage allows them to further develop their experience and independence, in addition to building security and stability within their career (Super & Jordaan, 1973). The maintenance career stage includes ages 44 through 64 and allows for the individual to maintain their established work status (Super & Jordaan, 1973). The decline career stage includes individuals aged 65 and older and is divided into two substages: deceleration (ages 65-70) and retirement (ages 71 and up) (Super & Jordaan, 1973). The disengagement substage allows for the individual to delegate tasks and shift duties to others in anticipation of retirement. The retirement substage is when the individual transitions out of their employment and begins participating in other roles and hobbies (Super & Jordaan, 1973).

Figure 1.2

Super & Jordaan's Career Development Theory



Project 1: Integrative Review

Project one was an integrative review. The aim of this project was to explore the major salient factors contributing to mental health issues and suicide among veterinarians. It was done using Whittemore and Knafl's (2005) five-step methodological approach – problem identification, literature search, data evaluation, data synthesis, and presentation.

Method

This integrative review was done using Whittemore and Knafl's five-step methodological approach – problem identification, literature search, data evaluation, data synthesis, and presentation (Whittemore & Knafl, 2005).

Problem Identification

Much of the available literature on mental health and suicide risk among veterinarians identifies that it is problematic; however, there is limited information as to contributing risk factors, protective factors, and interventions to address it. A synthesis of available literature will identify and summarize salient factors contributing to poor mental health outcomes and suicide among veterinarians so that future research can work toward the development of prevention strategies and interventions to mitigate the issue.

Literature Search & Study Selection

Inclusion criteria were determined before the literature search. Inclusion criteria included articles published in academic journals in the English language between the years 2012-2023 and included veterinarians within the sample. Six databases were used in this literature search: Academic, CINAHL Plus with Full Text, Embase, MEDLINE, PsycINFO, and PubMed. The following terms were used for all databases: "veterinarians" AND "risk factors" AND "suicide".

The literature search took place between January 2022 and February 2024. The search resulted in 127 articles; however, 72 of the articles were duplicates and removed. The remaining 55 articles were reviewed for inclusion; 13 were removed based on their title, 7 were removed based on their abstract, and 17 were removed due to being a general review article on the topic or not applicable. Eighteen articles were identified for inclusion in the integrative review. This process is outlined in the PRISMA diagram found in Figure 2.1.

Data Evaluation and Synthesis

Each of the 18 articles was outlined, including hypotheses and aims, design, population, materials, procedures, and results. A constant comparison method was used to identify key themes within each article and group them into systematic themes. Each article was evaluated for strength and overall quality using the Johns Hopkins evidence-based practice for nurses and healthcare appraisal system (Dang et al., 2022).

Project 2: Data-Based Manuscript

Project two was data-based and described a study done with the purpose of exploring mental health and suicide among veterinarians. The specific aim of this study was to determine the prevalence of burnout, substance abuse, anxiety, depression, and suicidal ideation among veterinarians and compare rates between veterinary subspecialties and career stages (establishment, maintenance, decline).

The aims of this study were to (a) identify prevalence rates of burnout, substance use, anxiety, depression, and suicidal ideation among veterinarians; and (b) determine if career stage, veterinary specialty practice, and role impact the outcomes of burnout, substance use, anxiety, depression, and suicidal ideation among veterinarians. This study was exploratory in nature so that associations between variables could be determined.

Study Design

A cross-sectional survey design was used to explore demographic factors, including specialty of veterinary medicine and length of time in practice, and rates of burnout, substance abuse, anxiety, depression, and suicidal ideation in veterinarians.

Setting and Sample

Women veterinarians experience higher levels of psychological distress (8.1%) in comparison to men (3.9%), and the American Veterinary Medical Association (AVMA) estimates that as of 2019, the veterinarian workforce was 63% female (Nolen, 2020). Recruitment occurred by partnering with the American Veterinary Medical Association (AVMA) for use of their mailing list. A simple random sampling was done, and the survey was sent via postal mail, per AVMA protocol, to the addresses registered with the professional organization. Inclusion criteria was practicing licensed veterinarians in the United States.

Measures/Instrumentation

Respondents completed five measures: Copenhagen Burnout Inventory (CBI); Tobacco, Alcohol, Prescription medication, and other Substance use (TAPS-1) questionnaire; General Anxiety Disorder (GAD-7) questionnaire; Patient Health Questionnaire (PHQ-9); and Columbia Suicide Severity Rating Scale (C-SSRS).

Copenhagen Burnout Inventory (CBI)

The CBI is a 19-item tool consisting of three subscales: personal burnout, work-related burnout, and client-related burnout (The National Research Center for Work Environment, n.d.). It has been used to measure burnout among preschool teachers in Serbia (Piperac et al., 2021) and pharmacists (Fadare et al., 2021). Piperac et al. (2021) found an overall Cronbach's alpha of 0.936 for the CBI, whereas individual subscales were found to have strong internal consistency

reliability with score for personal burnout, work-related burnout, and client-related burnout were 0.906, 0.765, and 0.901, respectively. Fadare et al. (2021) found similar Cronbach's alpha for the personal burnout, work-related burnout, and patient-related burnout with scores of 0.93, 0.81, and 0.89, respectively. Fadare et al. (2021) also found that the CBI demonstrated criterion validity through testing correlations with workload and work-life integration.

Response categories within the personal burnout subscale include never/almost never, seldom, sometimes, often, and always. The work-related burnout subscale responses are divided into two response categories. Responses to the first category include to a very low degree, to a low degree, somewhat, to a high degree, and to a very high degree. Responses to the second category include never/almost never, seldom, sometimes, often, and always. The last item of this subscale is reversed-scored. Responses to client-related burnout items also are divided into two response categories. Responses to the first category include to a very low degree, to a low degree, somewhat, to a high degree, and to a very high degree. Responses to the second category include never/almost never, seldom, sometimes, often, and always (The National Research Center for Work Environment, n.d.). Each subscale is scored independently; totals of individual subscales are not summed to provide a total burnout score.

Tobacco, Alcohol, Prescription medication, and other Substance use Questionnaire-1 (TAPS-1)

The TAPS-1 questionnaire is a 4-item questionnaire that is often utilized in the primary care setting to screen for tobacco, alcohol, illicit, and prescription drugs. McNeely et al. (2016) found that it had a specificity of 0.75 (95% CI 0.72, 0.78) for any problem use and 0.84 (95% CI 0.81, 0.86) for substance use disorder (SUD) criteria. In addition, they found it has a sensitivity of 0.82 (95% CI 0.77, 0.87) for any problem use and 0.79 (95% CI 0.72, 0.785) for criteria of

SUD. Similarly, Gryczynski et al. (2017) found that the TAPS-1 had a strong sensitivity for identifying problem use of tobacco (0.98), alcohol (0.85), illicit drugs (0.91), and prescription drugs (0.85). It also was shown to have high specificity for tobacco use (0.80), alcohol (0.70), illicit drugs (0.89), and prescription drugs (0.91). When looking at SUD, the TAPS-1 resulted with a strong sensitivity for tobacco use (0.93), alcohol (0.79), illicit drugs (0.95), and prescription drugs (0.96), and a strong specificity for tobacco use (0.71), alcohol (0.82), illicit drugs (0.83), and prescription drugs (0.90)

TAPS-1 asks about use in the past 12 months and response categories include never, less than monthly, monthly, weekly, and daily/almost daily (National Institute on Drug Abuse, n.d.). Results were recoded to reflect SAMSHA's classification of alcohol, tobacco, and other drugs. Responses would indicate if substance use is problematic within this population and if future research needs to be done on the topic.

General Anxiety Disorder Questionnaire (GAD-7)

The GAD-7 is a 7-item screening tool used to assess symptoms of generalized anxiety. The GAD-7 has been used in a multitude of settings and it is available in over 20 languages (Spitzer et al., 2006; Health Navigator New Zealand, 2021). Spitzer et al. (2006) found a Cronbach's alpha of 0.92, indicating strong internal consistency reliability. Johnson et al. (2019) found a Cronbach's alpha ranging from 0.83 to 0.93 in multiple settings, including outpatient, outpatient trauma, and inpatient. In addition, it has shown good test-retest reliability with a result of 0.83 (Spitzer et al., 2006).

The GAD-7 is a tool that can be used for screening, diagnosing, and assessing severity of anxiety symptoms (Spitzer et al., 2006). It asks about anxiety symptoms an individual has experienced over the past two weeks and is scored using a 4-point Likert Scale (0=not at all, 1=

several days, 2=more than half the days, 3=nearly every day). Responses to the GAD-7 are summed in order to provide score ranging from 0 to 21. Scores between 0-4 are considered minimal anxiety, 5-9 are considered mild anxiety, 10-14 are considered moderate anxiety, and 15-21 are considered severe anxiety (Spitzer et al., 2006).

Patient Health Questionnaire (PHQ-9)

The PHQ-9 is a 9-item questionnaire used to assess symptoms of depression. It has been tested in multiple settings, including primary care and obstetrics-gynecology (Kroenke et al., 2001). When used in the primary care setting, Kroenke et al. (2001) found a Cronbach's alpha score of 0.89 and when used in obstetrics-gynecology, it had a Cronbach's alpha of 0.86. It has resulted in a Cronbach alpha score of 0.892 when used in a psychiatric hospital setting (Sun et al., 2020). A test-retest reliability assessment was done for the total scores, which resulted in 0.737 ($p<0.01$) and scores for individual items within the scale ranging from 0.567-0.789 ($p<0.01$) (Sun et al., 2020). A Pearson correlation analysis was completed for both the total scores and individual items resulting in a range from 0.567-0.789 ($p<0.01$) and 0.233-0.747 (Sun et al., 2020).

The PHQ-9 is a tool that can be used to identify the presence and severity of depression (Kroenke et al., 2001). It asks about depressive symptoms an individual has experienced over the past two weeks. It is scored using a 4-point Likert Scale (0=not at all, 1=several days, 2=more than half the days, 3=nearly every day). Scores are summed and severity of symptoms can be categorized into minimal (1-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27) (Kroenke et al., 2001).

Columbia Suicide Severity Rating Scale (C-SSRS)

The C-SSRS is a 6-item screening tool used to assess suicidal ideation, suicidal intent, suicidal behavior, suicidal ideation intensity and severity (Columbia University, n.d.). It has been tested with the veteran population (Matarazzo et al., 2019). The C-SSRS was tested for convergent validity using the Suicide Screening Inventory, resulting in a Rho score of 0.50 (95% CI 0.40, 0.59) for the severity subscale and 0.52 (95% CI 0.41, 0.60) for the intensity subscale (Matarazzo et al., 2019). It was also tested for divergent validity using the Attitudes Toward Seeking Professional Psychological Health measure. This resulted in a Rho score of -0.10 (95% CI -0.23, 0.03) for the severity subscale and -0.08 (95% CI -0.21, 0.05) for the intensity subscale (Matarazzo et al., 2019).

When looking at predictive validity, the C-SSRS severity subscale resulted in an odds ratio of 2.93 (97% CI 1.06, 8.13) for an actual suicide attempt, interrupted attempt (3.23; 97% CI 0.92, 11.3), aborted attempt (1.14; 97% CI 0.68, 1.91), preparatory behavior (1.95; 97% CI 1.14, 3.32), and any suicidal behavior (1.84; 97% CI 1.23, 2.75). The C-SSRS intensity subscale resulted in an odds ratio of 1.19 (97% CI 1.02, 1.40) for actual suicide attempt, interrupted attempt (1.21; 97% CI 1.01, 1.45), aborted attempt (1.04; 97% CI 0.91, 1.20), preparatory behavior (1.12; 97% CI 1.001, 1.26), and any suicidal behavior (1.15; 97% CI 1.05, 1.27) (Matarazzo et al., 2019).

Scoring for suicidal ideation and suicidal plan and intent are assessed within the past month, whereas suicidal behavior asks about experiences within the past three months and lifetime (Columbia University, n.d.). If an individual responded, ‘yes’ to questions one or two (‘have you wished you were dead or wished you could go to sleep and not wake up?’ and ‘have you actually had any thoughts about killing yourself?’), they were identified as low-risk. If they

responded ‘yes’ to question three (‘have you been thinking about how you might do this?’), they were identified as moderate-risk and, if they responded ‘yes’ to questions four, five, or six (‘have you had these thoughts and had some intention of acting on them?’, ‘have you started to work out or worked out the details of how to kill yourself? Did you intend to carry out this plan?’, and ‘have you done anything, started to do anything, or prepared to do anything to end your life?’), they were identified as high-risk.

Procedures

The recruitment strategies noted above consisted of mailing a physical survey to the veterinarian’s address on file with the AVMA. Surveys were returned via prepaid postage and addressed envelope. The survey took approximately 40 minutes to complete. Responses to the survey were voluntary and participant data and responses were kept confidential. Double data entry occurred to ensure data integrity. An insert identifying the Suicide and Crisis Lifeline and the Crisis Text Line was included in the survey packet, as was a link to Not One More Vet, which has a list of additional mental health resources on their website (Not One More Vet, n.d.).

Data Analysis

The aim of this study was to determine the prevalence of burnout, substance abuse, anxiety, depression, and suicidal ideation among veterinarians and compare rates between veterinary subspecialties and among veterinarians at different stages of one’s career (establishment, maintenance, decline). Descriptive statistics were used to describe the study sample. Data were recoded for career stage, veterinary specialty, role, TAPS-1, and C-SSRS. Summative scores from the GAD-7, CBI subscales, and PHQ-9 were used in analyses.

The aims of this study included (a) identification of prevalence rates of burnout, substance use, anxiety, depression, and suicidal ideation among veterinarians; and to (b)

determine if career stage, veterinary specialty practice, and role impact the outcomes of burnout, substance use, anxiety, depression, and suicidal ideation among veterinarians.

Descriptive statistics were used to summarize the characteristics of the study population. Demographics included sex, age, race/ethnicity, veterinary practice specialty, and role in practice. Questions also included previous psychiatric treatment, current psychiatric treatment, and history of psychiatric admissions. Prevalence rates of burnout, substance use, anxiety, depression, and suicide risk were also identified.

A path analysis was done in order to determine relationships between veterinary practice specialty, career stage, and role in practice with the outcome variables. Outcome variables included burnout, substance use, anxiety, depression, and suicide risk. Once the models were run, Wald Z scores were used to remove variables that were not contributing to the prediction of dependent variables. Absolute Wald Z scores under 0.5 were initially removed and a follow up analysis was run. The second model removed absolute Wald Z scores of less than one. The third model removed absolute Wald Z scores of less than 1.5. This patterned continued until the sixth model, which resulted in all variables having an absolute Wald Z score of greater than 2.5 and p-value of <0.05. The final model demonstrated an RMSEA of 0.059, indicating a good fit as the value is less than 0.06. In addition, the final model demonstrated a CFI of 0.969, indicating a good fit as the value is over 0.95 (Hu & Bentler, 2009). The final path analysis demonstrated relationships between career stage and personal burnout; career stage and work-related burnout; career stage and alcohol use; veterinary practice specialty and alcohol use; and veterinary role and alcohol use.

Study Limitations

Limitations of the study included a low sample size based on the choice of statistical test. In addition, the recoding the variable of veterinary specialty led to vagueness as to which specialties fell under the 'other' category. Future consideration should be given to exploring specific individual specialties outside of small animal general practice in order to identify problematic issues among each. Lastly, this study utilized the TAPS-1 questionnaire which looks at substance use in the past year; however, in the practice setting, if an individual were to have screened positive on the TAPS-1, then it would be followed with the TAPS-2, which would provide more specific information as to substance use in the past three months.

Strategies to Ensure Quality of Data

Potential threats to validity within this study included temporal ambiguity, researcher expectancies, and interactions between relationships and people. Temporal ambiguity influences the ability to determine if the resumed cause preceded the outcome (Polit & Beck, 2021). This may occur if individuals were diagnosed with anxiety, depression, or experienced suicidal ideation prior to their career and any career-related burnout. Lastly, an interaction between relationships and people may occur because this study only included veterinarians. Because of this, other professions who experience burnout, anxiety, depression, and suicidal ideations were not included, and results of the study may not be generalizable to them (Polit & Beck, 2021).

There were ways to address the threats to validity discussed above. Temporal ambiguity can be addressed by assessing whether a participant had previous diagnoses of anxiety and-or depression, in addition to whether they have experienced suicidal ideation prior to veterinary school. The interaction between relationships and people can be addressed by including both

genders in the study, in addition to minorities within the veterinary profession. Exclusion criteria were limited as much as possible.

Human Subject Protection

Subject Source

The American Veterinary Medical Association (AVMA) is a national professional organization for veterinarians within the United States. There were 124,069 licensed veterinarians practicing within the United States during 2022 (AVMA, 2022).

Recruitment Plan

Veterinarians were recruited to participate in the survey. Recruitment was done by partnering with the AVMA for use of their mailing list.

Protection of Human Subjects

This study was approved by the University of Cincinnati's Institutional Review Board (IRB) to ensure the protection of human subjects (see Appendix A). Consent was obtained from each participant prior to their completion of the survey and each participant was made aware that the survey is voluntary, and they could have chosen to remove themselves from the study at any time. The collected data remained confidential; however, there was the potential need for a participant to be contacted by a trained mental health professional if there are concerns regarding their personal safety based on responses. Data were kept on encrypted servers at the University of Cincinnati.

Inclusion of Women and Minorities

The AVMA reported that in 2021, there were a total of 41,658 male veterinarians, 82,036 female veterinarians, 70 nonbinary veterinarians, 4 identifying with a gender not listed on the survey, and 301 not providing an answer (AVMA, 2022). It is estimated that 87.5% of

veterinarians are White, followed by Asian (4.43%), two or more races (2.24%), African American (1.48%), Other (0.445%), and American Indian (0.145%) (Data USA, 2020). A total of 4.7% of veterinarians are Hispanic or Latino (Zippia, 2024). The remaining value included Native Hawaiian and Other Pacific Islander, Alaska Native, or Other Native, however, specific percentage values for these races were not provided (Data USA, 2020). See Table 1.1 for original planned enrollment.

Table 1.1. Planned Enrollment Report

Ethnic Categories	**Females n (%)**	**Males n (%)**	**Total n (%)**
Hispanic or Latino	5 (4.7%)	3 (4.7%)	8 (4.7%)
Not Hispanic or Latino	103 (95.3%)	60 (95.3%)	163 (95.3%)
Total:	108 (100%)	63 (100%)	171 (100%)
Racial Categories	**Females n (%)**	**Males n (%)**	**Total n (%)**
African American	2 (1.48%)	1 (1.48%)	3 (1.76%)
Alaska Native	0 (0.00%)	0 (0.00%)	0 (0.00%)
American Indian	0 (0.145%)	0 (0.145%)	0 (0.00%)
Asian	5 (4.43%)	3 (4.43%)	8 (4.68%)
Native Hawaiian or Other Pacific Islander	0 (0.00%)	0 (0.00%)	0 (0.00%)
Two or more races	2 (2.24%)	1 (2.24%)	3 (1.75%)
White	95 (87.5%)	56 (87.5%)	151 (88.3%)
Not reported	4 (3.76%)	2 (3.76%)	6 (3.51%)
Total:	108 (100%)	63 (100%)	171 (100%)

Inclusion of Children

Individuals under the age of 18 were not included in the study.

Project 3: Health Policy Manuscript

Project three was a health policy manuscript. This was an in-depth exploration as to how mental health and suicide among veterinarians relates to health policy. Current policies within the United States, if any, were identified, as well as current gaps.

Suicide prevention strategies must be comprehensive to be effective and must address multiple levels of risk in multiple settings. The Centers for Disease Control and Prevention (CDC), Suicide Prevention Resource Center (SPRC), World Health Organization (WHO), and Zero Suicide, an organization dedicated to preventing suicides in health and behavioral health care systems, offer approaches on how to decrease risk and prevent suicide (Table 4.1). These approaches to suicide prevention were discussed in relation to how they intertwine with the Institute of Medicine's Universal, Selective, and Indicated prevention model.

The Institute of Medicine's Universal, Selective, and Indicated prevention model notes three levels of prevention. Universal prevention strategies address an entire population through the use of interventions such as awareness and education campaigns, in addition to reducing access to lethal means for suicide (O'Connell et al., 2009). Selective prevention strategies focus on a subgroup within a population that may be at increased risk of suicide (O'Connell et al., 2009). Interventions at this level may include screening, gatekeeper training, and skill building groups for those identified at increased risk. For those who screen positive for concerns of suicide, there is a need for the use of standardized risk assessment tools, risk formulation, and collaborative suicide safety planning (Zero Suicide, 2022). Indicated prevention strategies focus on specific high-risk individuals who were identified during other levels of prevention strategies (O'Connell et al., 2009). This project discussed universal, selective, and indicated prevention strategies and their applicability to veterinary medicine.

Acknowledgement

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Conclusion

All three projects within this dissertation provided insight and data into the prevalence of mental health issues and suicide among veterinarians, in addition to how these findings influence health policy. The first project, in the form of an integrative review, provided a baseline of current literature when it comes to mental health and suicide among veterinarians. The second project addressed a current gap in literature by assessing prevalence of burnout, substance abuse, anxiety, depression, and suicidal ideation among veterinary practice subspecialties and career stages. The last project, in the form of a health policy manuscript, explored current health policies that address mental health and suicide among this population. Findings from this dissertation can be used to inform future research, development, and implementation of mental health interventions to mitigate and prevent these issues amongst this population. The long-term goal in this line of research is to provide an interdisciplinary approach when addressing mental health issues and preventing suicides among veterinarians.

CHAPTER TWO

Project 1: Mental Health and Suicide Among Veterinarians: An Integrative Review

Veterinarians are individuals qualified to provide care to sick and/or injured animals (Merriam-Webster, n.d.). Animal populations served by veterinarians range from domestic animals such as dogs and cats, farm animals such as horses and cattle, and laboratory animals such as mice (Centers for Disease Control and Prevention [CDC], 2018d). According to the American Veterinary Medical Association (AVMA), there were a total of 127,131 licensed veterinarians practicing within the United States during 2023 (AVMA, n.d.). The veterinary profession is predominantly female, at approximately 67% (AVMA, n.d.). The majority of veterinarians work in clinical practice, most commonly in companion animal, mixed practice, or equine. Those who do not work in private practice are employed in public and corporate settings (AVMA, 2023).

There are many occupational hazards that veterinarians are exposed to including physical, chemical, reproductive, and biological. Physical hazards include animal bites, scratches, kicks, and crushing injuries. Chemical and reproductive hazards include exposure to hazardous drugs and anesthetic gases. Biological hazards include exposure to bodily fluids and zoonotic infectious diseases (CDC, 2018a; CDC, 2018b; CDC, 2018c). Lastly, euthanasia is an important factor to consider with veterinarians. Not only do veterinarians have exposure and access to euthanasia agents, but the procedure of euthanasia has been shown to place emotional strain on providers (Dawson & Thompson, 2017).

Individuals who work in the veterinary and animal care industry are considered a high-risk, understudied population for mental health issues, suicidal ideation, and suicide attempts (NORA, 2019). The Veterinary Wellbeing Study 2020, completed by Merck Animal Health,

sought to assess the overall well-being and mental health of veterinarians. Key findings of this study included that burnout and mental health concerns are prevalent among practicing veterinarians. Veterinarians report a higher level of burnout in comparison to their physician counterparts (Volk et al., 2020). In addition, there has been an increase in serious psychological distress among women veterinarians, and 52% of all veterinarians, both male and female, who reported high levels of psychological distress in the Veterinary Wellbeing Study noted they did not seek treatment (Volk et al., 2020). Psychological distress is defined as mental health issues that are severe enough to cause impairment within social, occupational, or other areas of functioning (CDC, 2015b), and it is a predictor of suicide (Hockey et al., 2021; Nie et al., 2021).

Burnout is defined as an occupational phenomenon by the World Health Organization (WHO), and it is included in the 11th edition of the International Classification of Diseases (ICD-11). According to the ICD-11, "burnout is a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed. It is characterized by three dimensions: (1) feelings of energy depletion or exhaustion; (2) increased mental distance from one's job, or feelings of negativism or cynicism in relation to one's job; and (3) a sense of ineffectiveness and lack of accomplishment" (WHO, 2019). It can lead to mental health issues such as depression, anxiety, and posttraumatic stress disorder (Cocker & Joss, 2016). The Veterinary Wellbeing Study 2020 identified attributes that may contribute to increased levels of burnout. These include demographic factors such as gender, marital status, and children, in addition to work schedule, hourly pay versus salary, amount of debt, and a personality scoring high in neuroticism (Volk et al., 2020).

Veterinarians are more likely to experience suicidal ideations and attempt suicide in comparison to the general public (Volk et al., 2020). One in six veterinarians have contemplated

suicide (CDC, 2015a). Between the years of 1979 and 2015, there were more than 11,000 U.S. veterinarians that died, with a total of 398 being suicides (Tomasi et al., 2019). Male veterinarians were more likely to die from firearms, whereas female veterinarians were more likely to die from pharmaceutical poisonings. Other methods of suicide included hanging or suffocation, inhalation of gases or vapors, and drowning (Tomasi et al., 2019). Because the procedure of euthanasia involves knowledge of lethal medications and dosage calculations, in addition to having access to these agents, veterinarians may be less likely to survive a suicide attempt (Nett et al., 2015). This integrative review aims to explore the major salient factors that contribute to mental health issues and suicide among veterinarians.

Methods

This integrative review was done using Whittemore and Knafl's five-step methodological approach – problem identification, literature search, data evaluation, data synthesis, and presentation (Whittemore & Knafl, 2005).

Problem Identification

Much of the available literature on mental health and suicide risk among veterinarians identifies that it is problematic; however, there is limited information as to contributing risk factors, protective factors, and interventions to address it. A synthesis of available literature will identify and summarize salient factors contributing to poor mental health outcomes and suicide among veterinarians so that future research can work toward the development of prevention strategies and interventions to mitigate the issue.

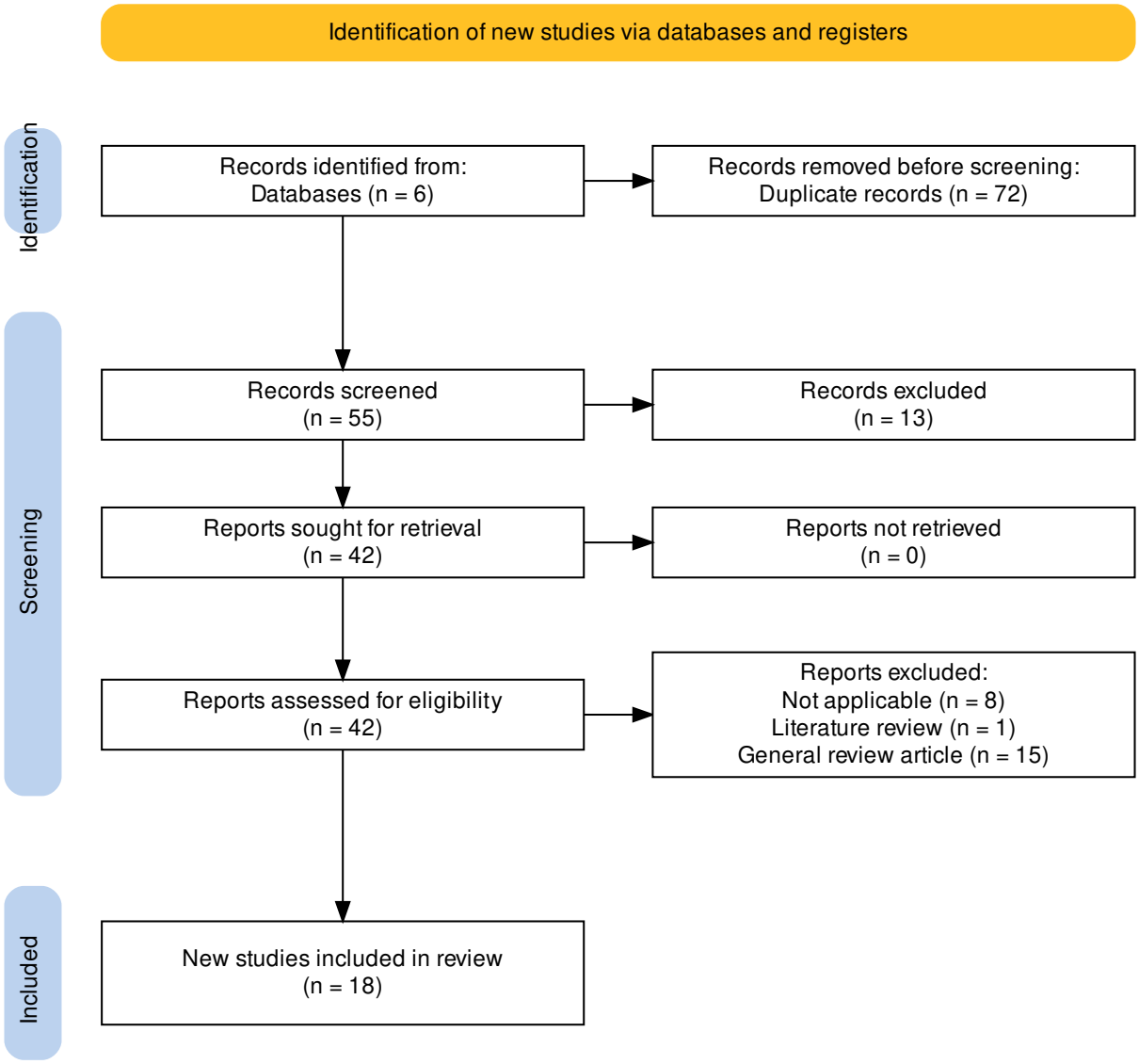
Literature Search & Study Selection

Inclusion criteria were determined before the literature search. Inclusion criteria included articles published in academic journals in the English language between the years 2012-2023 and

included veterinarians within the sample. Six databases were used in this literature search: Academic, CINAHL Plus with Full Text, Embase, MEDLINE, PsycINFO, and PubMed. The following terms were used for all databases: “veterinarians” AND “risk factors” AND “suicide”. The literature search took place between January 2022 and February 2024. The search resulted in 127 articles; however, 72 of the articles were duplicates and removed. The remaining 55 articles were reviewed for inclusion; 13 were removed based on their title, 7 were removed based on their abstract, and 17 were removed due to being a general review article on the topic or not applicable. Eighteen articles were identified for inclusion in the integrative review. This process is outlined in the PRISMA diagram found in Figure 2.1.

Figure 2.1

Prisma Diagram



Data Evaluation and Synthesis

Each of the 18 articles was outlined, including hypotheses and aims, design, population, materials, procedures, and results. A constant comparison method was used to identify key themes within each article and group them into systematic themes. Each article was evaluated for strength and overall quality using the Johns Hopkins evidence-based practice for nurses and healthcare appraisal system (Dang et al., 2022).

Findings

Upon review of the included articles, five overarching themes were identified. These included occupational stress and burnout, increased risk of mental health issues and suicide, risk factors for the development of mental health issues and suicide, mental health stigma and access to care, and euthanasia and access to means. The findings of each study are included in Table 2.1.

Table 2.1

Findings from Individual Studies

Author (Year) Country	Aim/Purpose	Sample	Method/Design	Results	Limitations	Evidence Level
Bryce et al. (2019) United States	Investigate effect of client complaints of welfare, job satisfaction, and medical practices of small animal internists	n=92	Cross-sectional	▪ 64.1% had a client complaint in the past six months ▪ 43.5% worried about client complaints "to some extent", "most of the time" (22.8%), "nearly all of the time" (13%) ▪ 34.8% were verbally assaulted by clients during the past six months ▪ 29.4% were threatened with litigation in the past six months ▪ 71.8% agreed or strongly agreed with the statement "I feel more depressed because of the complaint made against me" ▪ 43.5% agreed or strongly agreed with the statement "I have considered changing my career because of complaints made against me"	▪ Small sample size ▪ Only evaluated small animal internist veterinarians ▪ Potential for stigma and participation bias ▪ Psychiatric history of participants unknown	III-B
Chan & Wong (2023) Hong Kong	Examine how burnout, secondary traumatic stress, and compassion satisfaction affect levels of anxiety, depression, and suicidality among veterinarians	n=56	Cross-sectional	▪ Veterinarians were found to have increased risk for suicide (22%), current suicidal ideation (19.6%), depression (29.4%), and anxiety symptoms (29.4%) ▪ Burnout was a predictor of depressive symptoms ▪ Secondary traumatic stress has the potential to predict suicide risk	▪ Small sample size ▪ Missing gender values ▪ Multiple methods of recruitment but did not ask participants to identify how they were recruited ▪ Doesn't take into consideration the potential influence of COVID-19	III-A
Crane et al. (2017) Australia	Determine if barriers to occupational	n=161	Cross-sectional (two waves)	▪ 24.8%-26.10% of veterinarians were in the high suicide-related cognitions and behavior category	▪ Attrition ▪ Participation bias	III-B

	mobility influenced suicidal ideation and behaviors			▪ Suicide-related cognitions and behavior increased when skill transferability was perceived to be limited	▪ Limited generalizability ▪ No causal relationships can be determined	
Dalum et al. (2022) Norway	Explore the prevalence of suicidal ideation and behaviors, in addition to contributing factors among veterinarians in Norway	n=2,596	Cross-sectional	▪ 27% felt that life was not worth living; had thoughts of suicide with no intent (20%); had serious suicidal thoughts (5%); had attempted suicide (0.2%) ▪ Work problems and suicidal thoughts were more common in females ▪ Work problems, (48%), personal problems (37%), family problems (31.6%), other problems (27.4%), and social problems (18.8%) were reported ▪ Predictors of serious suicidal thoughts included being single, negative life events, economic problems, mental distress ▪ Interaction between gender and work/life imbalance was stronger among males	▪ Design limits conclusions regarding causality ▪ Limited generalizability	III-A
Dawson & Thompson (2017) United Kingdom	Determine if personality is a better predictor of job stress than the environment	n=311	Within-groups correlational	▪ Personality has a significant effect on stress ▪ Neuroticism is the only significant predictor of stress ▪ Length of time in practice acted as a mediator between depression and occupational stress ▪ Length of time in practice moderated the relationships of emotional exhaustion and depersonalization with regard to OS	▪ Potential for measurement error	III-B
Glaesmer et al. (2021) Germany	Determine if fearlessness about death is increased among veterinarians in comparison to the general population,	n=3,118	Cross-sectional	▪ Higher levels of fearlessness about death among males and in order veterinarians ▪ Male veterinarians experienced lower levels of euthanasia distress	▪ Design leads to limited interpretation and generalizability ▪ The Euthanasia Distress Scale was not psychometrically tested	III-B

	if it varies between veterinary specialties, and whether fearlessness about death is associated with euthanasia distress					
Houtsma et al. (2022) Global	Determine the relationship between accessibility to lethal medications in the veterinary setting and recent suicidal ideation (SI) and perceived likelihood of a future suicide attempt	n=310	Cross-sectional	▪ 11% reported experiencing 1 day of suicidal ideation in the past week, 2 days (4%), 3 days (2.9%), 4 or 5 days (0%), 6 days (0.6%), and 7 days (2.3%) ▪ Interaction of the past week's SI and lethal medication storage was associated with an increase in the perceived likelihood of a future suicide attempt	▪ Potential for participation bias ▪ Design limits conclusions regarding causality and generalizability of findings ▪ Low perceived future suicide attempt scores and actual suicidal behavior were not measured ▪ Broad terminology was used	III-B
Kersebohm et al. (2017) Germany	Identify the association between work satisfaction and life satisfaction of veterinary practitioners, and rank them by strength of association	n=1,930	Cross-sectional	▪ Work satisfaction in male employed practitioners, female self-employed practitioners, and male self-employed practitioners was mostly associated with income; work satisfaction in female employed practitioners was mostly associated with supervisor ▪ Differences between employed versus self-employed, however, a good working atmosphere' was most important job characteristic, followed by reasonable salary and holidays and leisure time ▪ Differences between males and females in both employed and self-employed practitioners; for FEP the good working atmosphere and family friendly arrangements were more	▪ Copy of survey not provided in text ▪ The authors noted that a copy of the German questionnaire can be requested from the corresponding author, however, it does not indicate if it has been translated into other languages ▪ Reliability and validity were not explicitly stated	III-A

				important than for MEP; the reasonable salary was more important for MEP than for FEP; for FSEP good working atmosphere, professional development, and family-friendly arrangements were more important than for MSEP; the reasonable salary was more important for MSEP compared with FSEP		
Nett et al. (2015) United States	Evaluate the prevalence of risk factors related to suicide, attitudes toward mental health, and veterinary practice related stressors	n=11,627	Cross-sectional	▪ 9% of participants had serious psychological distress ▪ 31% have experienced depressive episodes ▪ 17% have experienced suicidal ideations ▪ 1% have attempted suicide ▪ 19% were currently in active mental health treatment ▪ Stigma is still an issue when it comes to addressing mental health concerns	▪ Possibility of nonresponse bias and recall bias ▪ Recruitment was via electronic means and may create limited accessibility ▪ Possibility of over- or under estimation of stressors and mental health concerns ▪ Substance use, personality type, family history, and other factors that may contribute to mental health were not addressed ▪ Reliability and validity were not explicitly stated	III-A
Pilgrim et al. (2016) Australia	Examine fatal drug toxicities to determine the rate of deaths, key characteristics, and relationship between occupational role and drug type used	n=404 (21 vets)	Retrospective cohort study	▪ Alcohol and barbiturates were the most commonly reported substances among veterinarian deaths ▪ Pentobarbitone and/or phenobarbitone (used for animal sedation and euthanasia) were used in almost all veterinarian deaths	▪ Small sample size ▪ Limited data availability using the NCIS database ▪ Potential for over-estimation of mortality rate due to registration in multiple jurisdictions	III-B

					▪ Cases under investigation were not included ▪ Medico-legal case reports may limit available data	
Platt et al. (2012) United Kingdom	Explore factors associated with suicide and suicidal ideation in veterinarians with a history of suicidal ideation or behaviours	n=1,946 questionnaires, 21 interviews	Concurrent mixed methods	▪ Veterinarians tend to have high rates of perfectionism and pressure to succeed ▪ The majority thought work had been an important contributory factor for their previous suicidal ideation or attempt ▪ A most common method of attempts was self-poisoning Being a veterinarian influenced the choice of the method due to ease of access, but this was not the sole reason for suicidal behavior, and limiting access would not necessarily reduce rates ▪ 11 knew at least 1 veterinarian who died by suicide, 8 knew 2-3; 1 veterinarian discovered a colleague ▪ Guilt or shame were primary factors as to why people did not seek help, in addition to concern for losing their job or the ability to practice veterinary medicine ▪ Personality traits may make suicide prevention difficult but raising awareness might encourage veterinarians to seek support	▪ Potential for response bias ▪ Veterinarians who have experience with therapy may have felt more comfortable reporting and discussing experiences in comparison to those who do not	III-B
Rhodes et al. (2022) Global	Examine how client interactions contribute to burnout and depression	n=222	Cross-sectional	▪ 41% reported moderate levels of depression, severe (26.1%), and extremely severe (32.9%) ▪ 20.3% reported moderate levels of anxiety, severe (25.7%), and extremely severe (54.1%) ▪ 24.3% reported moderate levels of stress, severe (31.5%), and extremely severe (32.4%)	▪ Small sample size ▪ Potential for participant bias ▪ Female-only sample, limiting generalizability ▪ Convenience sampling ▪ Limited survey tool	III-A

				▪ Negative experiences in the work environment predicted higher levels of depression, anxiety, stress, and burnout ▪ Burnout was positively correlated to all of the mental health measures ▪ The number of euthanasia was positively related to self-reported negative experiences but was not related to any of the mental health or burnout measures ▪ Age and length of time in practice were negatively correlated with anxiety		
Schwerdtfeger et al. (2020) Germany	Determine the prevalence of depression, suicidal ideation, and suicide risk among German veterinarians, in addition to comparing these findings to the general German population (GP)	n=3,118	Cross-sectional	▪ 17.45% displayed moderate symptoms of depression, moderately severe to severe (10.33%); compared to 3.99% of the general population ▪ 19.2% experienced SI in the past 2 weeks (5.7% in the general population) ▪ 32.11% of veterinarians classified as increased suicide risk (6.62% of GP) ▪ 2.7% of veterinarians have attempted to kill themselves at least once (1.5% of GP)	▪ Lack of access for even distribution as not all veterinarians provided email addresses ▪ Some may feel more comfortable completing an electronic survey ▪ Sampled veterinarians may work in multiple settings	III-A
Skipper & Williams (2012) United States	Assess attitudes concerning mental health issues in the veterinary industry	n=701	Cross-sectional	▪ 66% indicated that they had been clinically depressed; 68% had received treatment ▪ 24% reported that they had considered suicide since starting veterinary school ▪ Only 11% believed that suicide rates were higher among veterinarians than among other groups	▪ Potential for participant bias ▪ The sample of veterinarians did not represent the gender distribution of veterinary medicine ▪ Did not discuss the reliability or validity of the survey tool	III-B
Tomasi et al. (2019) United States	Conduct an updated assessment of proportionate mortality ratios for suicide among male	n=398 (out of 11600 veterinarian deaths)	Secondary data analysis	▪ Of those who completed suicide, 79% worked in a clinical setting, nonclinical (17%), unknown (4%)	▪ Standardized mortality ratios could not be determined ▪ Cause-specific PMRs are mutually	III-A

	and female veterinarians in the U.S.			▪ Males were 2.1x more likely to die by suicide in comparison to the general public; females were 3.5x more likely ▪ A most common method was the use of firearms and pharmaceuticals; others included hanging or suffocation, inhalation of gases or vapors, drowning ▪ Males mostly died from firearms, whereas women died from pharmaceutical poisoning	dependent and may not consider variables within the population ▪ Assumed that all decedents were accurately matched with cause-of-death but the cause of death may be listed incorrectly on the death certificate	
Tran et al. (2014) Australia	Assess the relationship between frequency of euthanasia, depression, and suicide risk	n=540	Cross-sectional	▪ Practicing in a low socioeconomic status area almost doubled the risk of being in the suicide-risk category compared to average SES; 4x more likely to be in the at-risk compared to high SES ▪ Depression was negatively correlated with years since graduation ▪ Hours worked per week were weakly positively related to depression ▪ Depression was weakly positively related to overall euthanasia frequency ▪ Euthanasia frequency moderated the impact of depression on suicide risk	▪ Design limits the determination of causation ▪ Cannot state that the frequency of euthanasia has a buffering effect on suicide risk	III-A
Waitz-Kudla et al. (2023) United States	Examine the acceptability and feasibility of limiting access to means of suicide within the veterinary industry	n=43	Mixed methods	▪ Most (65.1%) store pentobarbital locked at all times except when in use; some (30.3%) store it unlocked either during business hours or always ▪ Ease of access and euthanasia experience were perceived contributing factors to suicide but changing storage protocols may not be enough to prevent suicide ▪ Only 3 of 6 who use firearms for euthanasia reported storing them locked at all times ▪ Poor work/life balance, feeling overwhelmed, being hard on oneself,	▪ Potential for participant bias ▪ The majority of the sample was female ▪ Low number of participants using firearms	III-A

				lack of appreciation, financial debt, and feeling stuck in the profession were perceived contributing factors to suicide ▪ Perceived barriers included the veterinary culture surrounding mental health ▪ Normalizing mental health, increasing organizational and outside support, and improving access to mental health care were themes of suicide prevention		
Zimmerman et al. (2023) Austria	Assess the suicide risk of health professionals and other high-skilled occupations compared to the general population; determine the most commonly used method of suicide	n=2,627 (178 vets; 36 suicides)	Secondary data analysis	▪ Male veterinarians had a significantly elevated suicide risk (more than twice as high compared to the general male population) ▪ Female veterinarians were almost three times as likely to die from suicide compared to women of the general population ▪ Poisoning was the predominant suicide method among veterinarians (64%)	▪ Limited number of suicide rates for gender comparison in some occupations ▪ Ages included in the study don't account for people working past average retirement age ▪ Underestimation of standardized mortality ratios due to data quality	III-B

Occupational Stress and Burnout

Occupational stress is problematic for both an individual and their employer. It often results from emotional demands, work-life balance, and fear of complaints (Dalum et al., 2022). Approximately 24% of veterinarians report moderate levels of stress, severe levels (32%), and extremely severe levels (32%) (Rhodes et al., 2022). Work environment and occupational stress may contribute to increased levels of compassion fatigue, burnout, and suicide. Burnout levels among veterinarians' range between moderate (73.2%) and high (3.6%) (Chan & Wong, 2023). Burnout has been shown to have a positive correlation with all mental health measures (Chan & Wong, 2023).

Increased Risk of Mental Health Issues and Suicide

Mental distress is a significant predictor of serious suicidal thoughts (Dalum et al., 2022). It has been established that veterinarians are at increased risk of mental health issues and suicide in comparison to the general public (Nett et al., 2015; Schwerdtfeger et al., 2020; Tomasi et al., 2019).

Anxiety. Although less studied in the articles included in this review, anxiety is prevalent among veterinarians. Approximately 30% of veterinarians self-reported symptoms of anxiety (Chan & Wong, 2023). Rhodes et al. (2022) found that veterinarians self-reported moderate (20%), severe (26%), and extremely severe (54%) levels of anxiety. Anxiety has the potential to contribute to burnout, depression, and suicidal ideation.

Depression. Depression is the most common mental health diagnosis associated with suicide (Pilgrim et al., 2016). Levels of self-reported moderate depression among veterinarians have ranged from 17% to 41% (Schwerdtfeger et al., 2020; Rhodes et al., 2022); moderately severe to severe (10%) (Schwerdtfeger et al., 2020) or severe (26%) (Rhodes et al., 2022); and

extremely severe (33%) (Rhodes et al., 2022). Skipper and Williams (2012) found that 66% of veterinarians in their study had been clinically depressed, with only 68% receiving some type of treatment.

Secondary Traumatic Stress Disorder. Although only one study discussed secondary traumatic stress, it is important to note as it can contribute to the development and exacerbation of mental health issues and suicide. Secondary traumatic stress occurs through indirect exposure to threatening events (Marsac & Ragsdale, 2020). Chan and Wong (2023) found that 66.1% of veterinarian participants reported moderate levels of secondary traumatic stress, but no participant reported high levels. Secondary traumatic stress is a significant predictor of suicide risk (Chan & Wong, 2023).

Suicidal Ideation. Veterinarians have an increased risk of suicidal ideations and suicide attempts in comparison to other occupational groups and the general population (Pilgrim et al., 2016). Female veterinarians have a higher prevalence of suicidal thoughts and feelings compared to their male counterparts (Dalum et al., 2022). Estimates have shown that male veterinarians are over two times more likely to die by suicide compared to the general public; whereas female veterinarians are 3 to 3.5 times more likely (Zimmerman et al., 2023; Tomasi et al., 2019).

Rates of suicidal ideation among veterinarians range from about 17% to 34% (Nett et al., 2015; Schwerdtfeger et al., 2020; Houtsma et al., 2022; Skipper & Williams, 2012; Dalum et al., 2022; Chan & Wong, 2023). The prevalence of actual suicide attempts within this population is about 1% (Nett et al., 2015) to 2.7% (Schwerdtfeger et al., 2020). Platt et al. (2012) report that eleven participants in their study knew at least one veterinarian who died by suicide and eight knew two or three. One study participant discovered a colleague after they died by suicide.

Risk Factors for the Development of Mental Health Issues and Suicide

The development of mental health issues and suicidal ideation is multifaceted. It can include social and demographic factors, personality, work-related factors, work-life balance, and life stressors.

Social and Demographic Factors. Multiple social and demographic factors have been identified as risk factors. These include: the female sex; 20 to 49 years of age; marital status of separated, divorced, or single; and having no children (Dalum et al., 2022; Nett et al., 2015; Tran et al., 2014). In addition, female veterinarians are more likely to report work problems such as emotional demands, work-life balance, and fear of complaints (Dalum et al., 2022), the experience of which may contribute to the development of mental health issues.

Personality. Personality can have a significant effect on occupational stress and the development of mental health issues (Dawson & Thompson, 2017). Veterinarians have been identified as having high rates of neuroticism, which demonstrates the characteristics of anxiety, depression, anger hostility, and self-consciousness, among others (Dawson & Thompson, 2017). They have been identified to have high levels of perfectionism (Platt et al., 2012). A perceived contributing factor to suicide among this population is veterinarians' tendencies to be hard on themselves, which may be driven by their personalities (Waitz-Kudla et al., 2023). Platt et al. (2012) identify that personality traits may prevent individuals from seeking treatment and may make suicide prevention strategies more difficult to implement but increasing awareness of the issue may help encourage individuals to seek support.

Work-Related Factors. The workplace environment influences occupational stress (Rhodes et al., 2022). Negative experiences in the occupational setting predict increased levels of mental health issues such as burnout, anxiety, and depression (Platt et al., 2012; Rhodes et al.,

2022). Work problems (Dalum et al., 2022) and demands of practice (Nett et al., 2015) are the most commonly self-reported contributing factors to suicidal ideation. Many veterinarians with a history of suicidal ideation and/or behaviors identified work as a significant contributing factor to their attempt (Platt et al., 2012). The role, length of time in practice, practice setting, number of hours worked, feeling stuck in one's profession, and client interactions are additional identified risk factors (Crane et al., 2017; Nett et al., 2015; Rhodes et al., 2022; Tomasi et al., 2019; Tran et al., 2014; Waitz-Kudla et al., 2023).

Both employed and self-employed veterinarians identify a good working atmosphere as the most important job characteristic, followed by a reasonable salary and holiday or leisure time (Kersebohm et al., 2017). However, there are differences in work-related stressors between these two groups. Employed veterinarians identified professional mistakes, unclear management or work roles, lack of autonomy in decision making, and educational debt as primary sources of stress (Nett et al., 2015; Waitz-Kudla et al., 2023). Self-employed veterinarians are more likely to identify management responsibilities and competition with other veterinary practices as sources of stress (Nett et al., 2015).

There are also differences among the sexes. Female-employed veterinarians found a good working atmosphere and family friendly arrangements to be more important in comparison to male-employed veterinarians (Kersebohm et al., 2017). Female self-employed veterinarians also identified a good working atmosphere and family friendly arrangements as more important, in addition to professional development in comparison to males (Kersebohm et al., 2017). Both male employed and self-employed veterinarians identified a reasonable salary as the most important in comparison to females (Kersebohm et al., 2017). Female and male self-employed

veterinarians identified independent work and diversified occupations as being important (Kersebohm et al., 2017).

Length of time in practice can contribute to the development or progression of mental health issues and suicidal ideation. Newly licensed veterinarians are at higher risk of experiencing occupational stress (Dawson & Thompson, 2017). Depression is negatively correlated with length of time of practice (Tran et al., 2014), and length of time in practice acts as a mediator between occupational stress and depression (Dawson & Thompson, 2017). It also is negatively correlated with anxiety (Rhodes et al., 2022). In addition, the length of time in practice moderates the relationships between occupational stress, emotional exhaustion, and depersonalization (Dawson & Thompson, 2017). Ultimately, the longer a veterinarian is in practice, the more resilience they can develop.

The veterinary practice setting can increase the risk of mental health issues and suicide. Nett et al. (2015) identified that veterinarians practicing shelter medicine, exotics, academia, and small animal medicine had the highest rates of current serious psychological distress. In addition, practicing veterinary medicine in a low socioeconomic status (SES) setting almost doubles the risk of being identified as having a higher suicide risk when compared to an average SES; whereas the risk is increased 4 times compared to a high SES (Tran et al., 2014). Of those who completed suicide, 79% worked in the clinical setting compared to the nonclinical setting (17%) or unknown setting (4%) (Tomasi et al., 2019). Limited role transferability, or feeling stuck in one's profession, has been associated with increased suicidal ideations and behavior (Crane et al., 2017; Waitz-Kudla et al., 2023).

Lack of appreciation has been identified as a perceived contributing factor to suicide (Waitz-Kudla et al., 2023). Many veterinarians identify client complaints as a significant source

of stress and mental health issues (Bryce et al., 2019; Dalum et al., 2022). Veterinarians worry about client complaints to some extent (44%), most of the time (23%), or nearly all of the time (13%) (Bryce et al., 2019). Almost 72% either agreed or strongly agreed with the statement "I feel more depressed because of the complaint made against me" and have thought about changing their occupation because of it (44%) (Bryce et al., 2019). Approximately 35% were verbally abused by clients in the past six months, and 30% were threatened with litigation (Bryce et al., 2019). Negative experiences with clients show a direct pathway to client-related and work-related burnout, in addition to a non-direct pathway to depression (Rhodes et al., 2021).

Work-Life Balance. Work-life balance and feeling overwhelmed contribute to occupational stress and mental health issues among veterinarians and are perceived to be contributing factors to suicide (Waitz-Kudla et al., 2023). Number of hours worked per week has a weak positive relationship with depression (Tran et al., 2014). Work-life balance has a stronger influence on suicidal thoughts among male veterinarians in comparison to females (Dalum et al., 2022).

Life Stressors. Negative life events are significant predictors of mental health issues and serious suicidal thoughts (Dalum et al., 2022; Rhodes et al., 2022). The most commonly reported life stressor was personal problems (37%), followed by family problems (32%) and social problems (19%) (Dalum et al., 2022). Economic problems have been identified as problematic (Dalum et al., 2022; Nett et al.; 2015; Waitz-Kudla et al., 2023). Among veterinarians who attempted suicide, two-thirds reported co-occurring life stressors along with workplace stress (Platt et al., 2012).

Mental Health Stigma and Access to Care

Stigma related to mental health and suicide often precludes individuals from accessing treatment, which may lead to the development or worsening of mental health disorders. This trend continues within the veterinary profession. Veterinarians may fear acknowledging that they need help or seeking out treatment due to concerns of losing their jobs or the ability to practice veterinary medicine (Platt et al., 2012). Nett et al. (2015) showed that U.S. veterinarians had less positive attitudes toward mental illness and mental health treatment in comparison to the general public. Results also showed that veterinarians who were identified as experiencing serious psychological distress were less likely to believe that others are caring toward individuals with mental illness.

The veterinary culture does not often discuss mental health (Waitz-Kudla et al., 2023), and many veterinarians feel pressure to succeed within the industry, because everyone else seems to be coping well (Platt et al., 2012). Skipper and Williams (2012) identified that only 11% of veterinarians believed that suicide rates were higher among their occupations in comparison to others. Primary factors for not seeking mental health treatment among this population include experiencing guilt or feeling ashamed (Platt et al., 2012). Another reason why individuals do not seek care is because of a lack of accessibility. Nett et al. (2015) found that 17% of veterinarians were either unsure, disagreed, or strongly disagreed with the statement that mental health treatment is accessible and only 19% of those who met the criteria for serious psychological distress were receiving some form of treatment. Normalizing mental health, increasing support, and improving access to quality mental health care may help prevent suicide among this population (Waitz-Kudla et al., 2023). Because there are experiences and barriers within the veterinary profession that are unique to this population, peer/mentor support programs run by

individuals within the field or those who have experienced mental health issues or suicidal ideation would be beneficial. Addressing stigma is a key part of suicide prevention.

Euthanasia and Access to Means

Regular euthanasia is unique to the field of veterinary medicine and may influence suicidal ideation and behavior (Platt et al., 2012). Frequent euthanasia procedures are associated with higher levels of depression (Tran et al., 2015), and it is a perceived contributing factor to suicide (Waitz-Kudla et al., 2023). In addition, euthanasia frequency has been identified as being positively related to self-reported negative experiences (Rhodes et al., 2022) and as a moderator of the relationship between depression and suicide (Tran et al., 2014). Female veterinarians have been found to experience higher levels of euthanasia distress in comparison to male veterinarians (Glaesmer et al., 2021).

Firearms and poisoning are the two most common methods of suicide among veterinarians (Tomasi et al., 2019; Platt et al., 2012; Zimmerman et al., 2023), and pentobarbitone and/or phenobarbitone are commonly used (Pilgrim et al., 2016). Because the procedure of euthanasia involves knowledge of lethal medications and dosage calculations, in addition to access to these agents, veterinarians may be less likely to survive a suicide attempt. A participant in an interview study done by Platt et al. (2012) with veterinarians who had a history of suicidal ideation, or behaviors noted "…if I hadn't been a vet and didn't have access to pentobarbitone or other methods, it would have been much more difficult to consider suicide" (p. 283). However, another stated, "I think they [veterinarians] are quite susceptible to euthanasia because they have access to the drugs, but I don't think it makes them more blasé about taking their own life…" (2012, p.4).

While many veterinarians keep these types of medications locked at all times when not in use, some (30%) store them unlocked either during business hours or at all times (Waitz-Kudla et al., 2023). Having access to unlocked lethal agents and experiencing suicidal ideation in the past week increases the risk of a future suicide attempt (Houtsma et al., 2022). However, many veterinarians identify that changing storage protocols may not be sufficient for preventing suicide (Platt et al., 2012; Waitz-Kudla et al., 2023). For individuals who utilize firearms for euthanasia, only 50% acknowledged that they stored firearms locked at all times (Waitz-Kudla et al., 2023). Ultimately, the act of euthanasia, in addition to the knowledge and access to means may be a contributing factor to suicidal ideation or attempts; however, it cannot be identified as a cause.

Discussion

Because mental health issues and suicide are prevalent among veterinarians, it is important to determine the risk factors associated with them. This integrative review indicated five themes that contribute, which include occupational stress and burnout, an overall increased risk of experiencing mental health issues and suicidal thoughts or behaviors, risk factors specific to veterinarians that may lead to the development of mental health issues and suicidal thoughts, stigma associated with treatment, and the procedure of euthanasia.

Veterinarians are at increased risk of experiencing mental health issues and suicide (Chan et al., 2023; Nett et al., 2015; Pilgrim et al., 2016; Schwerdtfeger et al., 2020; Tomasi et al., 2019). They also report an increased risk of burnout in comparison to their physician counterparts (Volk et al., 2020). Occupational stressors including, but not limited to, work environment and schedule, lack of autonomy, client expectations, and poor work-life balance have been found to contribute to the development of burnout (Dalum et al., 2022; Nett et al.,

2015; Tran et al., 2014; Waitz-Kudla et al., 2023). Other risk factors such as gender and marital status may contribute to the development of burnout (Volk et al., 2020). Many of these risk factors have been identified as ones that contribute to the development of mental health issues and suicidal ideation (Dalum et al., 2022; Dawson & Thompson, 2017; Kersebohm et al., 2017; Nett et al., 2015; Schwerdtfeger et al., 2020; Tran et al., 2014; Waitz-Kudla et al., 2023). While euthanasia may be a contributing factor to poor mental health and suicidal ideation, it cannot be identified as a cause.

Lastly, the stigma associated with mental health treatment precludes individuals from seeking help (Nett et al., 2015; Platt et al., 2012; Skipper & Williams, 2012; Waitz-Kudla et al., 2023). This can worsen mental health, leading to a higher prevalence of these issues among veterinarians.

What the Review Adds to Existing Knowledge

As research on mental health and suicide among veterinarians is limited, with years between published studies and a lack of interdisciplinary research teams, there is a shortage of synthesized data available for researchers and healthcare providers. A thorough understanding of the risk factors contributing to poor mental health outcomes and suicide within this population can be applied in future research regarding prevention strategies and interventions to improve resilience, decrease rates of burnout and serious psychological distress, and reduce suicide prevalence within the veterinarian population.

Limitations & Strengths

A strength of this paper is that it includes studies on veterinarians in multiple countries, supporting the idea that mental health issues and suicidal ideation are universal and not limited to just one geographical area. However, it is important to note that this could also be a limitation of

the study as social and cultural factors in varying countries may influence the presentation and treatment of stress, mental health disorders, and suicidal ideation. This could impact the universal applicability of the findings discussed in this paper. Another limitation is that research on veterinarians is not done consistently, with years going in between conducted research and publications. Many of the studies included in this integrative review used convenience sampling or cross-sectional methods, which contributes to bias. In addition, some studies did not report the surveys used or their reliability or validity. Lastly, the entirety of this review was done by one individual. These limitations may influence the validity and generalizability of the findings of this integrative review.

Implications for Future Research

Most articles included in this integrative review were done in developed, Western countries. These countries vary in their educational pathway to becoming a veterinarian, which allows for future research opportunities to determine if education style may impact mental health outcomes and suicide risk among this population. In addition, no studies included in this review were done in countries in Central or South America, the Middle East, or Africa. This provides opportunities to expand research done on mental health and suicide risk among veterinarians in countries found in those geographical locations. Future research also should consider the potential for bias secondary to stigma surrounding mental health diagnoses.

Implications for Mental Health Nursing Practice

Mental health nurses and nurse practitioners provide care to individuals in a multitude of professions. While the Diagnostic and Statistical Manual of Mental Disorders offers a taxonomic approach to diagnosing, mental health nurses and nurse practitioners also must consider the lived experiences of individuals within the veterinary industry and how these experiences may

influence symptomatology. As there are stressors unique to veterinarians, it is important to have a thorough understanding of them to build and maintain a therapeutic relationship with these individuals. This integrative review identifies salient factors that may contribute to the development of mental health issues and suicide among this population.

Psychiatric nurses and nurse practitioners can provide a unique perspective when it comes to the development and implementation of mental health treatment interventions for veterinarians. These interventions can seek to address occupational stress and burnout, risk factors and symptomatology of various mental health issues, and stigma associated with mental health disorders. This can be done through awareness campaigns, screening of veterinary practitioners, teaching of self-awareness and coping techniques, and ensuring quick access to care for those identified at increased risk.

Conclusion

Researchers have consistently shown that veterinarians are at increased risk of experiencing occupational stress, mental health issues, and suicide. While the knowledge of this issue is established within the veterinary industry, there is not enough research being done to address it. As such, veterinarians have been added to the United States' National Occupational Research Agenda as a high-priority, understudied population (NORA, 2019).

The themes identified in this review of occupational stress and burnout, increased risk of mental health issues and suicide, risk factors for the development of mental health issues and suicide, stigma, and euthanasia provide insight into what current literature identifies as factors contributing to these issues within the industry. These are factors that need to be further explored so that future research and practice can work toward the development of prevention strategies

and interventions to mitigate burnout, serious psychological distress, and suicide among veterinarians.

CHAPTER THREE

Project 2: Silently Suffering – Prevalence Rates and Relationships Between Mental Health Issues and Suicide Risk Among Veterinarians

The National Institute for Occupational Safety and Health identifies individuals who work in the veterinary industry as a high-risk, understudied population when it comes to occupational hazards (National Occupational Research Agenda, 2019). Individuals who work in the veterinary industry include veterinarians, veterinary technicians, and veterinary students, among others. These individuals are not only at risk for physical, chemical, or biological occupational hazards (CDC, 2018a; b; c) but current evidence shows that these individuals are also at increased risk of mental health issues and suicide (Nett et al., 2015; Pilgrim et al., 2016; Rhodes et al., 2022; Schwerdtfeger et al., 2020; Tomasi et al., 2019).

Mental health is multi-faceted and exists on a complex continuum. Oftentimes, the focus is on the presence or absence of diagnoses when defining mental health; however, mental health also includes physical, mental, and social well-being (World Health Organization [WHO], 2024). Physical well-being is properly maintaining one's body, through a healthy diet, physical exercise, rest, and avoiding harmful behaviors (University of North Georgia, 2024). According to the WHO (2024), mental well-being consists of an individual's self-awareness, and ability to regulate and respond to and cope with normal life stressors, continue to work productively, and contribute to their community. Social well-being is defined as creating and maintaining healthy relationships with others, while also fostering a sense of belonging, community, and respect (Boston University, 2022).

Merck Animal Health has conducted multiple landmark studies on veterinarian well-being between 2017 and 2023. Volk et al. (2023) found that 10% of veterinarians suffer from

serious psychological distress, which is an increase from 2017 (5.3%), 2019 (6.4%), and 2021 (9.7%) (Volk et al., 2017; 2019; 2021). These levels are higher than the general population (3.4%) (Weissman et al., 2015). Serious psychological distress is defined as mental health problems that are severe enough to impair daily functioning within the social, educational, and occupational realms and require treatment (Weissman et al., 2015). Serious psychological distress is more common among veterinarians under the age of 45, those in specific veterinary specialties or roles, and those with high amounts of student debt (Volk et al., 2023). Veterinarians practicing in shelter medicine, exotics, academia, and small animal medicine have the highest rates of serious psychological distress (Nett et al., 2015). It was found that the amount of debt is related to severity of suffering. Volk et al. (2023) found that approximately 20% of veterinarians with $300,000 or more in student debt were suffering in their wellbeing. Similarly, a significant percentage with lower amounts of student debt also identified that their wellbeing was suffering. In addition, personality and high levels of perfectionism and neuroticism contribute to the development of serious psychological distress (Platt et al., 2012; Dawson & Thompson, 2017). Serious psychological distress does not delineate between mental health diagnoses but is characterized by anxiety and depression (Belay et al., 2021).

While burnout is not a mental health diagnosis found in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), it is included in the International Classification of Diseases (WHO, 2019). Burnout is a significant factor that can contribute to the development or exacerbation of mental health disorders, and it is characterized by three dimensions: (1) exhaustion, (2) distancing, negativism, or cynicism related to one's job, and (3) decreased efficacy (WHO, 2019). It is a result of prolonged stress (WHO, 2019) and is correlated with mental well-being, serious psychological distress, and suicide (Nie et al., 2021; Chan & Wong,

2023). Volk et al. (2019) found that over 30% of veterinarians were found to have high levels of burnout through the use of the Mayo Clinic Physicians Wellbeing Index, whereas 18% of veterinarians were found to have high levels of burnout in 2023 using the Burnout Assessment Tool. Despite this decrease in overall reported rates of burnout, it is important to note that the Burnout Assessment Tool found that veterinarians who reported burnout indicated high levels of exhaustion (61%), mental distance (28%), cognitive impairment (15%), and emotional impairment (12%) (Volk et al., 2023). Factors that influence levels of burnout among veterinarians include age, with higher levels between ages 18-44; veterinary specialty, with companion animal having the highest levels; and role in practice, with associate veterinarian having higher levels (Volk et al., 2023).

Chronic and severe stress has been identified as a risk factor for alcohol and drug use. Veterinarians are often exposed to chronic and severe stress, therefore increasing their risk for substance use and abuse. Substance use among veterinarians includes current tobacco use (19.2%) and high-risk alcohol use (31.9%) (Harling et al., 2009). Harling et al. (2009) found that a total of 57.4% of veterinarians had taken a medical drug in the past 30 days from the following classifications: analgesics (18.3%), antidepressants (1.6%), sedatives or tranquilizers (1.3%), appetite suppressants or stimulants (0.4%), and neuroleptics (0.2%). Only 5% of the medical drugs taken were prescribed by a medical provider. Other substances used among veterinarians include marijuana (7%) and other illicit drugs or substances (1%). No participant identified the use of crack, cocaine, heroin, LSD, ecstasy, or mushrooms (Volk et al., 2019).

Generalized anxiety disorder (GAD) is characterized by excessive anxiety, worry, and fear. Diagnosis of GAD must have three or more of the following symptoms which cause significant distress or interfere with social, occupational, or other important areas of functioning:

(1) restlessness or feeling on edge; (2) increased fatigue; (3) difficulty concentrating; (4) irritability; (5) muscle tension; and (6) sleep disturbance (APA, 2013). Anxiety can range from minimal, mild, moderate, and severe. Self-reported rates of anxiety among veterinarians include moderate (20%), severe (26%), and extremely severe (54%) (Rhodes et al., 2022).

Major depressive disorder is characterized by depressed mood and/or loss of interest or pleasure, in addition to five or more of the following symptoms: (1) appetite disturbance and unexpected weight changes; (2) sleep disturbance; (3) psychomotor agitation or retardation; (4) fatigue or loss of energy; (5) feelings of worthlessness or excessive guilt; (6) difficulty concentrating or indecisiveness; and (7) recurrent thoughts of death, suicidal ideation, or a suicide plan or attempt (APA, 2013). Nett et al. (2015) found that 31% of veterinarians had experienced depressive episodes since graduating from veterinary school. More recently, rates of depression among veterinarians have ranged from moderate (17-41%) (Schwerdtfeger et al., 2020; Rhodes et al., 2022), moderately severe (10%) (Schwerdtfeger et al., 2020), severe (26%) or extremely severe (33%) (Rhodes et al., 2022).

The American Veterinary Medical Association [AVMA] (2015) estimates that one in six veterinarians have considered suicide. Rates of suicidal ideation among veterinarians' range between 17% and 34% (Nett et al., 2015; Schwerdtfeger et al., 2020; Houtsma et al., 2022; Skipper & Williams, 2012; Dalum et al., 2022; Chan & Wong, 2023). Volk et al. (2017) found that approximately 25% of veterinarians had experienced suicidal ideation at some point in their lifetime and 1.6% had attempted suicide.

Despite the knowledge that burnout, anxiety, depression, and suicidal ideation, as well as plan(s) and attempt(s) are prevalent within the veterinary industry, there is minimal mental health research done within this population. In addition, current research is often done by individuals

within the veterinary industry, which introduces a gap that could be addressed through the introduction of research done by interdisciplinary scientists. This would allow for a new perspective, in addition to expertise within the field of mental health and suicide prevention. The purpose of this study was to explore mental health and suicide among veterinarians while looking specifically at prevalence rates of burnout, substance abuse, anxiety, depression, and suicidal ideations and comparing between veterinary specialties, career stages (establishment, maintenance, or decline), and role (practice owner or associate veterinarian).

The aims of this study were (a) identify prevalence rates of burnout, substance use, anxiety, depression, and suicidal ideation among veterinarians; and (b) determine if career stage, veterinary specialty practice, and role impact the outcomes of burnout, substance use, anxiety, depression, and suicidal ideation among veterinarians. This study was exploratory in nature in order to determine associations between variables.

Methods

Study Design

A cross-sectional survey design was used to explore demographic factors (specialty of veterinary medicine, and length of time in practice) and rates of burnout, substance abuse, anxiety, depression, and suicidal ideation among veterinarians.

Setting and Sample

Surveys were sent out via a mailing list to veterinarians registered with the AVMA as either a veterinary practice owner or an associate veterinarian. A simple random sampling was done. First, a random selection of veterinarians registered with the AVMA as either a practice owner or associate veterinarian was generated. Names were then randomly selected from the mailing list to be included in the study. The survey was sent by postal mail, per AVMA protocol,

to the addresses registered with the professional organization. A total of 500 surveys were distributed, with 174 completed and returned. Two were administratively removed, because they were retired from clinical practice, resulting in an approximate 34% response rate.

Measures/Instrumentation

Respondents completed five assessments: Copenhagen Burnout Inventory (CBI); Tobacco, Alcohol, Prescription medication, and other Substance use (TAPS-1) questionnaire; General Anxiety Disorder (GAD-7) questionnaire; Patient Health Questionnaire (PHQ-9); and Columbia Suicide Severity Rating Scale (C-SSRS).

Copenhagen Burnout Inventory

The CBI is a 19-item tool consisting of three subscales: personal burnout, work-related burnout, and client-related burnout (The National Research Center for Work Environment, 2024). The CBI has been used to measure burnout within a multitude of populations (The National Research Center for Work Environment, 2024). Piperac et al. (2021) applied the CBI to preschool teachers in Serbia, finding the Cronbach's alpha for the overall instrument was 0.936. Strong internal consistency reliability was found for personal burnout (0.906), work-related burnout (0.765), and client-related burnout (0.901). The researchers also completed an exploratory factor analysis to examine construct validity and found three factors with factor loadings ranging from 0.575 to 0.859. These three factors explained 67.2% of the variance (Piperac et al., 2021). Fadare et al. (2021) applied the CBI to pharmacists and completed a confirmatory factor analysis. They found that each of the subscales had high internal consistency reliability with Cronbach's alpha of 0.93 for personal burnout, 0.81 for work-related burnout, and 0.89 for patient-related burnout. They found that the CBI demonstrated criterion validity through testing correlations with workload and work-life integration (Fadare et al., 2021).

Response categories within the personal burnout subscale scores range from never/almost never (0) to always (100). Values are given to each response in increments of 25, and the total score is the averaged sum of the items. The total score of the personal burnout subscale is an average of the item scores. The work-related burnout subscale responses are divided into two response categories. Responses to the first category range from low (0) to very high (100). Responses to the second category range from never/almost never (0) to always (100). Scoring is the same as the personal burnout subscale; however, the last item of this subscale is reversed-scored. Responses to client-related burnout items also are divided into two response categories. Responses to the first category range from low (0) to very high (100). Responses to the second category range from never/almost never (0) to always (100) and scoring is the same as the other subscales (The National Research Center for Work Environment, 2024). Averaged scores were used for each subscale, ranging from 0 to 100, with higher scores indicating greater (worse) burnout. Scores from 50-74 are considered moderate levels of burnout, 75-99 are considered high levels, and a score of 100 is considered severe burnout (Borritz et al., 2006).

Tobacco, Alcohol, Prescription medication, and other Substance use (TAPS-1)

The TAPS-1 questionnaire is a 4-item questionnaire that screens for tobacco, alcohol, illicit, and prescription drugs. McNeely et al. (2016) applied the TAPS tool within the primary care setting and found that it successfully detected substance use among this population. Researchers identified diagnostic accuracy for individuals who completed the self-administered TAPS. It resulted in a specificity of 0.75 (95% CI 0.72, 0.78) for any problem use and 0.84 (95% CI 0.81, 0.86) for substance use disorder (SUD) criteria. They found a sensitivity of 0.82 (95% CI 0.77, 0.87) for any problem use and 0.79 (95% CI 0.72, 0.785) for criteria of SUD (McNeely et al., 2016). Gryczynski et al. (2017) found that the TAPS-1 screening tool had strong

sensitivity for tobacco use (0.98), alcohol (0.85), illicit drugs (0.91), and prescription drugs (0.85) when it came to identifying problem use. It also was shown to have high specificity for tobacco use (0.80), alcohol (0.70), illicit drugs (0.89), and prescription drugs (0.91). In regard to moderate to severe SUD, it resulted in a strong sensitivity for use of tobacco use (0.93), alcohol (0.79), illicit drugs (0.95), and prescription drugs (0.96). Moderate to severe SUD showed strong specificity for the use of tobacco (0.71), alcohol (0.82), illicit drugs (0.83), and prescription drugs (0.90) (Gryczynski et al., 2017).

TAPS-1 asks about use in the past 12 months and response categories include never (0), less than monthly (1), monthly (3), weekly (4), and daily/almost daily (5) (National Institute on Drug Abuse, 2024). Responses were classified to reflect the Substance Abuse and Mental Health Services Administration's (SAMHSA) (2023) classification of alcohol, tobacco, and other drugs. If respondents indicated any use, they were classified as a positive screen. If no use was indicated, they were classified as negative.

General Anxiety Disorder (GAD-7)

The GAD-7 is a 7-item screening tool used to assess for symptoms of generalized anxiety, which is one of the most common mental disorder diagnoses. The GAD-7 was developed in 2006, and it is available in over 20 languages (Spitzer et al., 2006; Health Navigator New Zealand, 2024). It has shown excellent internal consistency reliability, with a Cronbach alpha of 0.92 (Spitzer et al., 2006). Another study showed that the Cronbach alpha ranged from 0.83 to 0.93 across pre- and post-treatment in various settings, including an outpatient clinic, an outpatient trauma clinic, and inpatient clinics for depression, anxiety, and eating disorders (Johnson et al., 2019). It also showed good test-retest reliability with a result of 0.83 (Spitzer et al., 2006).

The GAD-7 asks about symptoms one has experienced over the past two weeks and is scored using a 4-point Likert Scale (0=not at all to 3=nearly every day). GAD-7 scores can help identify the presence and severity of anxiety symptoms in order to determine whether an individual needs referral to care or higher levels of treatment (Spitzer et al., 2006). Responses to the GAD-7 were summed to yield an anxiety score ranging from 0 to 21 and severity of symptoms can be further divided into minimal, mild, moderate, and severe (Spitzer et al., 2006). Higher scores indicate higher (worse) levels of anxiety.

Patient Health Questionnaire-9

The PHQ-9 is a 9-item questionnaire used to assess for symptoms of depression. The PHQ-9 was introduced in 2001 and is available in multiple languages (Multicultural Mental Health Resource Centre, 2024). Internal consistency reliability resulted in a Cronbach alpha of 0.89 when tested in a primary care setting and 0.86 when tested in an obstetrics-gynecology setting (Kroenke et al., 2001). It has shown a Cronbach alpha of 0.89 when used in a psychiatric hospital setting (Sun et al., 2020). A test-retest reliability assessment was done for the total scores, which resulted in 0.74 ($p<0.01$). Test-retest reliability also was measured for individual items on the scale ranging from 0.55-0.73 ($p<0.01$) (Sun et al., 2020). A Pearson correlation analysis was completed for both the total scores and individual items resulting in a range from 0.567-0.789 ($p<0.01$) and 0.233-0.747, with some p-values being <0.01 and some being <0.05 (Sun et al., 2020).

The PHQ-9 asks about symptoms an individual has experienced over the past two weeks and is scored using a 4-point Likert Scale (0=not at all to 3=nearly every day). It can help identify the presence and severity of depression symptoms to determine whether an individual needs referral to care or higher levels of treatment (Kroenke et al., 2001). Responses were

summed to yield a depression score ranging from 0 to 27 and severity of symptoms can be categorized into minimal (score = 1 to 4), mild (score 5 to 9), moderate (score 10 to 14), moderately severe (score 15 to 19), and severe depression (score 20 to 27) (Kroenke et al., 2001).

Columbia Suicide Severity Rating Scale (C-SSRS)

The C-SSRS is a 6-item screening tool used to assess suicidal ideation, suicidal intent, and suicidal behavior. It also measures suicidal ideation intensity and severity (Columbia University, 2016). Matarazzo et al. (2019) used the C-SSRS among the veteran population. Researchers found that the C-SSRS was psychometrically sound and that it showed good evidence for convergent and divergent validity (Matarazzo et al., 2019). For convergent validity, the C-SSRS was correlated with the Suicide Screening Inventory. When the C-SSRS severity subscale was compared to the SSI total score, it resulted in a Rho score of 0.50 (95% CI 0.40, 0.59). The C-SSRS intensity resulted in a Rho score of 0.52 (95% CI 0.41, 0.60) (Matarazzo et al., 2019). For divergent validity, the C-SSRS was compared to the Attitudes Toward Seeking Professional Psychological Health (ATSPPH). The C-SSRS severity subscale resulted in a Rho score of -0.10 (95% CI -0.23, 0.03). The C-SSRS intensity subscale resulted in a Rho score of -0.08 (95% CI -0.21, 0.05) (Matarazzo et al., 2019). In addition, predictive validity was assessed. The CSSRS severity subscale resulted in an odds ratio of 2.93 (97% CI 1.06, 8.13) for an actual suicide attempt, interrupted attempt (3.23; 97% CI 0.92, 11.3), aborted attempt (1.14; 97% CI 0.68, 1.91), preparatory behavior (1.95; 97% CI 1.14, 3.32), and any suicidal behavior (1.84; 97% CI 1.23, 2.75). The C-SSRS intensity subscale resulted in an odds ratio of 1.19 (97% CI 1.02, 1.40) for actual suicide attempt, interrupted attempt (1.21; 97% CI 1.01, 1.45), aborted

attempt (1.04; 97% CI 0.91, 1.20), preparatory behavior (1.12; 97% CI 1.001, 1.26), and any suicidal behavior (1.15; 97% CI 1.05, 1.27) (Matarazzo et al., 2019).

Procedures

The recruitment strategy consisted of mailing a physical survey to the veterinarian's address on file with the AVMA. Surveys were returned via prepaid postage and addressed envelope. The survey was estimated to take approximately 40 minutes to complete. Responses to the survey were voluntary and participant data and responses were kept confidential. Double data entry was used to ensure data integrity. An insert identifying the Suicide and Crisis Lifeline and the Crisis Text Line was included in the survey, as was additional nationwide mental health resources.

Data Analysis

Descriptive statistics were used to describe the study sample. Data were recoded for career stage, veterinary specialty, role, TAPS-1, and C-SSRS. Career stage was recoded to reflect establishment=0, maintenance=1, and decline=2. Due to a small representation for certain veterinary subspecialties, this variable was recoded to reflect small animal general practice=1 and other specialties=0. Role was recoded as practice owner=0 and associate veterinarian=1. The TAPS-1 questionnaire, which included questions on alcohol, tobacco, illicit, and prescription drug use was recoded to reflect SAMHSA's classification of alcohol, tobacco, and other drugs, and to reflect a negative screen=0 and a positive screen=1. The C-SSRS was recoded to reflect no risk=0, low risk=1, moderate risk=2, and high risk=3. Lastly, summative scores from the GAD-7, CBI subscales, and PHQ-9 were used in analyses.

A path analysis was run using JMP Pro 17 to explore associations between variables. The original path analysis model was refined using Wald Z scores. The Wald Z test helps determine if

independent variables within the model are contributing to the prediction of dependent variables. If the coefficient is small in comparison to the standard error, it is not doing much in regard to prediction and can be removed with limited risk of harming the fit of the model (Analyttica Datalab, 2021). Refinement was done in steps, first by removing any scores with an absolute value less than 0.5, 1, 1.5, 2, and lastly, 2.5, until all variables that were included in the final model had a p-value <0.05. Variables that had no pathways with others were removed.

Results

Descriptive Statistics

Descriptions of the study population can be found in Table 3.1. The majority of participants were self-identified as female (n=117; 68%) with the remaining self-identified as male (n=55; 32%). No participants identified as non-binary or other. Age of participants ranged from 26 to 79, with the average age being 50.8 years (std=13.4) and the median being 53 years. An individual's career stage was determined by their age, as defined in Super's Career Development theory, and participants were classified into the establishment (n=50; 29%), maintenance (n=90; 53%), and decline (n=31; 18%). Participants self-identified primarily as Caucasian (n=153; 88.9%). It is important to note that if a participant identified multiple individual races or ethnicities, the data were recoded to reflect a multiracial category.

Table 3.1

Sociodemographic Characteristics of Participants *(n=172 unless otherwise indicated)*

	n	%
Gender		
Female	117	68.0
Male	55	32.0
Race/Ethnicity[1]		
Asian or Asian American	3	1.8
Black or African American	4	2.4
Hispanic or Latino	2	1.2
White	153	90.0
Other	1	0.6
Multiple races/ethnicities identified	7	4.0
Specialty		
Small animal general practice	113	65.7
Large animal general practice	3	1.7
Mixed animal general practice	22	12.8
Equine medicine	4	2.3
Specialty practice	8	4.7
Emergency medicine	6	3.5
Shelter medicine	3	1.7
Other	3	1.7
Multiple	10	5.8

Career Stage[2]		
Establishment	50	29.2
Maintenance	90	52.6
Decline	31	18.1
Role[3]		
Associate	94	54.6
Owner	71	41.3
Past psychiatric care[2]		
No	96	56.1
Yes	75	43.9
Current psychiatric care[2]		
No	144	84.2
Yes	27	15.8
Medication management	18	10.5
Therapy	7	4.1
Both medication management and therapy	12	7.0
In-person	11	6.4
Telehealth	12	7.0
Both in-person and telehealth	8	4.7
Previous psychiatric admission[2]		
No	168	98.2
Yes	3	1.8

[1] n=170, [2] n=171, [3] n=165

The primary practice specialty that was most identified was small animal general practice (n=113; 65.7%), followed by mixed animal general practice (n=22; 12.8%). Some participants (n=10; 5.8%) identified multiple primary practice settings. Participants identified specialties or 'other' category as food and fiber production animal medicine, swine consultation, poultry, exotics, zoo medicine, small animal internal medicine, small animal surgery, small animal oncology, house calls, integrative medicine, acupuncture, chiropractic, and vaccination clinics. No participant was employed in the academia or industry settings. The majority of participants were associate veterinarians (n=94; 54.6%) with the remaining being practice owners (n=71; 41.3%). Some participants (n=7; 4.1%) did not indicate a role.

The majority of participants (n=96; 56.1%) identified that they had not received past psychiatric treatment in their lifetime whereas the remaining 75 (43.9%) participants had. However, only 27 participants (15.8%) identified that they are currently receiving outpatient psychiatric services. An overwhelming majority identified that they had never been psychiatrically hospitalized (n=168; 98.2%).

Prevalence rates of burnout (Table 3.2), substance use (Table 3.3), anxiety, depression, and suicide risk (Table 3.4) were also identified. This study identified that veterinarians have moderate (32.6%) and high levels (5.2%) of personal burnout, moderate levels (29.1%) and high levels (8.7%) of work-related burnout, and moderate levels (22.7%), high levels (6.9%), or severe levels (0.6%) of client-related burnout. This study also found that 36.6% of veterinarians screened positive for some level of alcohol use, tobacco use (5.8%), and other drug use (15.9%). Approximately 12% of veterinarians were classified as having either moderate or moderately severe depression. A total of 13.5% of veterinarians were considered low risk while 3.5% were moderate risk and 3.5% were high risk for suicide.

Table 3.2

Prevalence of Burnout Among Veterinarians *(n=172 unless otherwise indicated)*

Burnout								
	Low		**Moderate**		**High**		**Severe**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Personal burnout	107	62.2	56	32.6	9	5.2	0	0
Work-related burnout	107	62.2	50	29.1	15	8.7	0	0
Client-related burnout	120	69.8	39	22.7	12	6.9	1	0.6

Table 3.3

Prevalence of Substance Use Among Veterinarians *(n=172 unless otherwise indicated)*

Substance Use				
	Positive		**Negative**	
	n	**%**	**n**	**%**
Tobacco	10	5.8	162	94.2
Alcohol	63	36.6	109	63.4
Other drugs[1]	27	15.9	143	84.1

[1] n=170

Table 3.4

Prevalence of Anxiety, Depression, and Suicide Risk Among Veterinarians *(n=172 unless otherwise indicated)*

	n	%
Anxiety[2]		
Minimal	89	52.0
Mild	62	36.3
Moderate	15	8.8
Severe	5	2.9
Depression		
Minimal	93	54.1
Mild	59	34.3
Moderate	16	9.3
Moderately severe	4	2.3
Suicide Risk[1]		
No risk	135	79.4
Low risk	23	13.5
Moderate risk	6	3.5
High risk	6	3.5

[1] n=170, [2] n=171

Path Analysis

The initial path analysis included 27 regressions between career stage, specialty, and role with the predictive variables of anxiety, personal burnout, work-related burnout, client-related burnout, tobacco use, alcohol use, other drug use, depression, and suicidal ideations. Eight regressions (career stage and tobacco use; career stage and suicidal ideation; specialty and anxiety; specialty and personal burnout; specialty and work-related burnout; specialty and client-related burnout; specialty and tobacco use; and role and tobacco use) had an absolute Wald Z score of less than 0.5 and were removed from the model. The second model included 19 regressions with three (specialty and other drug use; specialty and depression; and role and anxiety) having an absolute Wald Z score of less than one and were removed. The third model included 16 regressions with six (career stage and other drug use; specialty and suicidal ideation; role and personal burnout; role and client-related burnout; role and other drug use; and role and depression) having an absolute Wald Z score of less than 1.5 and were removed. The fourth model included 10 regressions with three (career stage and depression; role and work-related burnout; and role and suicidal ideation) being removed due to an absolute Wald Z score of less than two. The fifth model included seven regressions with two (career stage and anxiety; career stage and client-related burnout) being removed due to an absolute Wald Z score of less than 2.5. The sixth and final model included five regressions, all of which had an absolute Wald Z score of greater than 2.5 and p-value of <0.05. The final model demonstrated an RMSEA of 0.059, indicating a good fit as the value is less than 0.06. In addition, the final model demonstrated a CFI of 0.969, indicating a good fit as the value is over 0.95 (Hu & Bentler, 2009).

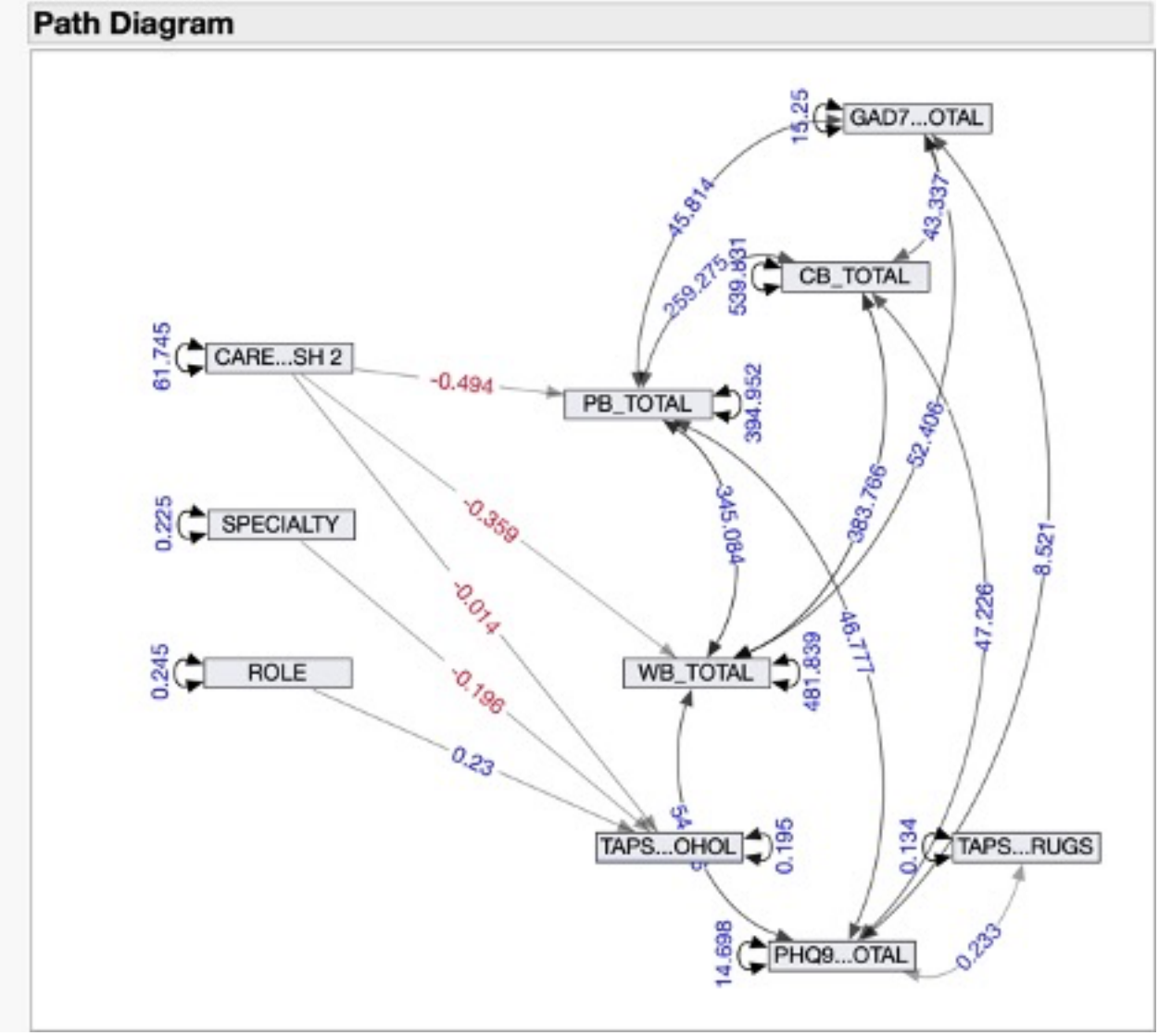
The final path analysis (Figure 3.1) showed relationships between the following: career stage and personal burnout; career stage and work-related burnout; career stage and alcohol use;

veterinary practice specialty and alcohol use; and veterinary role and alcohol use. For career stage and personal burnout, those in the establishment, or early career stage, had higher levels of personal burnout. The overall level of personal burnout is estimated to decrease when an individual transitions to maintenance stage (-0.494) and decline stage (-0.988). Similarly, when looking at work-related burnout, it is estimated that scores are highest for those in the establishment career stage, followed by a decrease with a transition to maintenance (-0.359) and decline (-0.718). Depending on what the individual's initial summative score was for these burnout subscales, they may decrease in severity classifications; for example, they may transition from severe burnout to moderate burnout.

The path analysis also demonstrated relationships between career establishment and alcohol use, veterinary practice specialty and alcohol use, and veterinary role and alcohol use. For career establishment, there was a small decrease as individuals transitioned from establishment career stage to maintenance (-0.014) and to decline (-0.028). For veterinary specialty, individuals who practice in any specialty outside of small animal general practice, such as large animal general practice, mixed animal general practice, equine medicine, shelter medicine, and exotics, are more likely to screen positive for alcohol use. This decreases in those who practice in small animal general practice (-0.196). Looking at veterinary role, it is less likely for practice owners to screen positive for alcohol use. This increases among the role of veterinary associate (0.23). This increase or decrease, depending on the variable being analyzed, may impact their TAPS-1 screening by changing negative screenings into positive and vice versa.

Figure 3.1

Path Analysis



CARE…SH2 – career stage
PB_TOTAL – personal burnout
CB_TOTAL – client-related burnout
WB_TOTAL – work-related burnout
TAPS…OHOL – alcohol use
TAPS…RUGS – other drug use
GAD-7 – anxiety
PHQ9…OTAL - depression

Discussion

The gender distribution of this study was similar to the overall population of veterinarians in the United States. This study resulted in 68% of participants being female; the AVMA (2023) reports that 67% of veterinarians are female. The average age of study participants (50.8 years) was slightly higher than the average age of 43 years (Zippia, 2024). The most common race identified within this study was Caucasian (90%), which was similar to that reported in available demographic statistics among veterinarians (83%) (Zippia, 2024). The most common identified veterinary subspecialty in this study was small animal general practice (65.7%), which is similar to the percentage of companion animal veterinarians (70.4%) reported by the AVMA (2023).

While the final path analysis did not include all original variables, it included outcome variables of personal burnout, work-related burnout, and alcohol use. This analysis showed that there was an estimate of a decrease in personal burnout and work-related burnout as an individual progresses through their career. As burnout is problematic within the veterinary industry, both in prevalence and in the career stage, it is important to identify and address this issue throughout the entire industry. However, special consideration should be given to assisting individuals transitioning from the role of a veterinary student to a veterinarian and among those early in their career to mitigate this issue and improve burnout rates. There are some mentoring programs available to assist with this transition; however, they are offered at the discretion of the employer. Intervention strategies to mitigate burnout can be implemented on an individual and organizational level. Evidence-based interventions to address burnout include ones that incorporate cognitive behavioral strategies, meaning-centered therapy strategies, mindfulness, and stress reduction (McFarland & Hlubocky, 2021).

The final path analysis identified a significant relationship between career stage and alcohol use, veterinary specialty and alcohol use, and veterinary role and alcohol use. There was an estimate of a small decrease in alcohol use as one progresses through the career stages. It also found that individuals who practice in any specialty outside of small animal general practice were more likely to screen positive for alcohol use. Lastly, this study estimated that it was less likely for practice owners to screen positive for alcohol use when compared to associate veterinarians; personality and stress levels may contribute to this occurring. Reducing alcohol use can be done at all stages of one's career through both education and interventions. Education may include awareness campaigns and interventions may include using Employee Assistance Programs (EAPs), support groups such as Alcoholics Anonymous (AA), and substance abuse treatment programs.

Covariances between the predictive variables were included in the final model as they have been shown to have comorbid relationships with one another. For example, there is evidence of a significant association between burnout and anxiety, and burnout and depression (Koutsimani et al., 2019). The National Alliance on Mental Illness identifies that 60% of individuals who have anxiety will also have symptoms of depression and vice versa (Salcedo, 2018). The DSM-5 identifies overlapping symptoms between anxiety and depression, including possible psychomotor agitation or restlessness, sleep disturbance, fatigue, and difficulty concentrating (APA, 2013). The presence of depression increases the risk of suicide among individuals with a substance use disorder (Conner & Ilgen, 2016).

A total of 27 participants indicated they were currently receiving outpatient psychiatric services; however, a total of 37 responded to the question 'if so, are you on medication management, therapy, or both?' and a total of 31 participants responded to 'if so, do you receive

your mental health services in-person, telehealth, or both?'. This discrepancy may lie in that some individuals may receive integrated mental health treatment through other services, such as medication management through a primary care provider or therapy services through a mindfulness-based app, and they may not consider these to be current outpatient psychiatric services. This specification of services was not within the scope of this study and may be worth exploring in the future. Further assessments of psychiatric services being utilized would provide additional insight.

Other Considerations

Future research should investigate the health outcome variables for veterinarians and underlying factors, some which were identified in the current study. First, a larger set of completed surveys would significantly improve the strength of the study with respect to identifying associations. Second, a prospective study will allow causal relationships to be investigated. Further, it is recommended that subcategories of veterinarians be investigated on their own (i.e., individual career stages, veterinary specialties, and veterinary roles) to further explore the prevalence of health outcomes and to develop, implement, and evaluate interventions that protect against the health outcomes.

A comprehensive intervention needs to be developed in order to address and mitigate these mental health issues. From a universal prevention strategy perspective, it would be beneficial for veterinary medicine professional organizations and other invested entities to do a situation analysis. This will allow for a thorough understanding of the severity of the issue. Selective prevention strategies can be implemented through mental health screenings offered in the veterinary school setting, in addition to continuing education and conference settings. For

those who screen positive for mental health concerns, indicated prevention strategies can be implemented.

In order to ensure better work-life balance as a veterinary student and resident, it is recommended that schools use duty hour limitations. The Student American Veterinary Medical Association has duty hour guidelines for veterinary students, which include duty hours being limited to 80 hours per week, averaged over the course of the rotation (Lederhouse, 2024). The AVMA recommends a duty hours limitation of 60 hours per week averaged over four weeks for veterinary residents (Lederhouse, 2024). Once veterinarians are in practice, it is recommended that they work with their employer and implement boundaries in order to ensure the best work-life balance possible.

In regard to managing stress, teaching good coping skills, and building resiliency, veterinary schools can incorporate these topics into their curricula. This will not only allow for individuals to develop a strong base of knowledge and skills that they can use in veterinary school, but these also can translate into practice. Education and interventions should focus on evidence-based practice, which include teachings skills based in therapies such as assertive community treatment, cognitive behavioral therapy, and dialectical behavior therapy. These topics can be of focus in continuing education, offered by veterinary schools and professional organizations, in order to reinforce the topics and ensure long-term mental health benefit. For those who struggle with mental health issues and need a higher level of care, evidence-based therapies and medication management can be provided through a mental health provider.

Conclusion

Veterinarians are at increased risk for poor mental health outcomes and suicide. The goal of this study was to explore mental health and suicide among veterinarians with special

consideration of prevalence rates of burnout, substance abuse, anxiety, depression, and suicidal ideations and comparing between veterinary specialties, career stages (establishment, maintenance, or decline), and role (practice owner or associate veterinarian). Findings of this study were similar to available literature, in that personal burnout, work-related burnout, client-related burnout, substance use, anxiety, depression, and suicide risk are present among the population. In addition, factors of career stage, veterinary specialty, and role within practice have relationships with certain mental health outcomes. These should be considered for future research. In addition, it is proposed that awareness, skills training, and interventions not only be introduced early during veterinary school but continued throughout one's veterinary career in order to improve long-term mental health outcomes and reduce suicidal ideation and suicide attempts.

CHAPTER FOUR

Project 3: Health Policy Related to Suicide Within the United States

There is a current mental health crisis within the United States. The prevalence rates of mental health issues among adults have been steadily increasing over recent years (White House, 2022; American Psychological Association [APA], 2023). In 2020, suicide was the eleventh leading cause of death among all ages within the United States (National Institute of Mental Health, 2024).

In addition to increasing rates of mental health diagnoses and suicide, spending on mental health treatments within the United States has increased. In 2020, it is estimated that $280 billion was spent on mental health services within the U.S. (White House, 2022). Despite Healthy People 2020's goal to decrease overall suicide rates by 10%, data show that there was an increase from 11.3 suicides per 100,000 individuals to 14.0 suicides per 100,000 individuals between 2007 and 2017 (Office of Disease Prevention and Health Promotion [ODPHP], 2020). Therefore, Healthy People 2030 has continued to identify mental health and suicide as primary objectives in order to improve prevention, screening, assessment, and treatment of mental health disorders (ODPHP, 2020).

Both physicians and veterinarians have been identified as at-risk populations for poor mental health outcomes and suicide. According to the American Foundation for Suicide Prevention (AFSP, 2018), male physicians are 1.4 times at higher risk for suicide as compared to the general male population, whereas female physicians are at 2.3 times increased risk compared to the general female population. Similarly, male veterinarians are 1.6 times at higher risk to die by suicide and female veterinarians are 2.4 times higher when compared to the general population (AFSP, 2021). According to Volk et al. (2022), the percentage of veterinarians

suffering from serious psychological distress has been increasing in recent years, which is a key predictor of suicide (Nie et al., 2020; Hockey et al., 2022).

Public Policy Regarding Suicide Among Physicians

Dr. Lorna Breen was a New York physician who died by suicide in April 2020. She was on the frontlines within the healthcare industry during the COVID-19 pandemic, working 12-hour shifts in addition to overtime. She dedicated her life to helping others but was unsuccessful in obtaining the help she needed before completing suicide. According to the Dr. Lorna Breen Heroes' Foundation (Dr. Lorna Breen Heroes' Foundation, n.d.):

> She was worried that she would lose her medical license, or be ostracized by her colleagues, because she was suffering due to her work… She was afraid to get help, because she was worried it would end the career that she had spent her entire life working for. At the time, we thought her fears were unfounded. What we learned after her death is that licensing boards throughout the country require disclosure by physicians of current or past mental health care (in some cases at any level), hospitals require disclosure for credentialing, and seeking mental health care is considered a sign of weakness amongst many medical professionals

After her death, the Dr. Lorna Breen Health Care Provider Protection Act was a federal act that passed into U.S. law in March 2022. It works to establish grants and other activities to address mental health and resiliency among health care providers, in addition to improving access to mental health care.

Despite physicians and veterinarians having been identified as increased risk of suicide, there are no known federal bills or laws that specifically address mental health, resiliency, and access to mental health care among veterinarians. Rather, these topics are most often addressed

through non-profit and grassroots organizations developed by individuals within the veterinary industry, therefore introducing a gap in interdisciplinary care when it comes to suicide prevention. Many of the same stigmas that are seen in the medical profession are also observed within the veterinary industry, further increasing the lack of access and utilization of services. Without the implementation of government programs to assist in bridging this gap, many veterinarians find themselves with limited resources for mental health care.

Suicide Prevention Strategies

Suicide prevention strategies must be comprehensive to be effective and must address multiple levels of risk in multiple settings. The Centers for Disease Control and Prevention (CDC), Suicide Prevention Resource Center (SPRC), World Health Organization (WHO), and Zero Suicide, an organization dedicated to preventing suicides in health and behavioral health care systems, offer approaches on how to decrease risk and prevent suicide (Table 4.1).

Table 4.1

Comprehensive Suicide Prevention Strategies

Level	Definition	Strategies
Universal	Strategies that address an entire population	Situation analysis [3] Multisectoral collaboration [3] Awareness raising and advocacy [3]
Selective	Strategies that focus on a subgroup within a population that may be at increased risk	Surveillance [3] Monitoring and evaluation [3] Strengthen economic supports [1,3] Improve policies and procedures addressing mental health [4] Lead system-wide culture change [4] Train others to respond effectively and appropriately during a mental health crisis [2,3,4] Identify and support people at risk [1,2,4] Increase help seeking [2]
Indicated	Strategies that focus on specific high-risk individuals within a population	Create protective environments [1] Promote healthy connections and support [1,2] Teach coping and problem-solving skills to build resilience [1,2] Ensure access to effective mental health and suicide care and treatment [1,2] Treat suicidal thoughts and behaviors using evidence-based treatments [4]

	Engage all individuals at-risk of suicide using a suicide care management plan [4]
	Lessen harm and prevent future risk by reducing access to means of suicide [1,2]
	Provide for immediate and long-term postvention [2]
	Ensure safe care transitions [2,4]

[1]Centers for Disease Control and Prevention
[2] Suicide Prevention Resource Center
[3] World Health Organization: Live Life
[4] Zero Suicide

The Institute of Medicine's Universal, Selective, and Indicated prevention model notes three levels of prevention. Universal prevention strategies address an entire population through the use of interventions such as awareness and education campaigns, in addition to reducing access to lethal means for suicide (O'Connell et al., 2009). Selective prevention strategies focus on a subgroup within a population that may be at increased risk of suicide (O'Connell et al., 2009). Interventions at this level may include screening, gatekeeper training, and skill building groups for those identified at increased risk. For those who screen positive for concerns of suicide, there is a need for the use of standardized risk assessment tools, risk formulation, and collaborative suicide safety planning (Zero Suicide, 2022). Indicated prevention strategies focus on specific high-risk individuals who were identified during other levels of prevention strategies (O'Connell et al., 2009). These may include individuals who are actively using substances, screened positive for anxiety or depression, or are exhibiting warning signs of suicide. Interventions may include more specified skill building groups, support groups, and case management services.

Universal Prevention Strategies

The WHO (2023) identifies suicide as a serious global public health problem. WHO's Live Life suicide prevention implementation guide acknowledges the need to understand this issue in order to properly address it. A situation analysis assesses an entire population to provide background, determine current status of the issue such as prevalence, and allows for awareness to be brought to the issue. It acts as a foundation for future planning and implementation prevention programs and allows for tracking in order to determine if interventions are effective. A situation analysis also allows for the use of multisectoral collaboration, bringing in not only the healthcare sector to combat the issue and create system-wide change, but also leaders in other governmental sectors such as education, social development, law, and other identified stakeholders (WHO, 2021; Zero Suicide, 2022).

Utilization of a veterinary specific situational analysis will provide industry tailored insight into the root causes of increased suicide within the profession, allowing for a streamlined approach to address key factors such as debt to income ratio, hours worked, caseload, situational stressors such as euthanasia and client interactions, and more. National and specialty veterinary organizations, such as the American Veterinary Medical Association (AVMA) and American Association of Equine Practitioners (AAEP), in addition to agencies such as the American Board of Veterinary Practitioners and the North American Veterinary Licensing Examination (NAVLE) have the capabilities to monitor and contribute to situational analyses of the industry. The associations can help identify issues that may be problematic among this population.

Advocacy is a key factor in suicide prevention as it creates awareness on the issue at hand. Individuals involved in advocacy and activism can range from individuals experiencing mental health issues, family and/or friends of a living or deceased individual, healthcare

providers, and others who have a vested interest in improving mental health outcomes. These individuals disseminate educational information surrounding the topic of mental health and suicide, which may include pamphlets, speaking engagements, and sharing of survivor stories (Menon et al., 2018). A systematic review done by Tam et al. (2024) found that mental health awareness campaigns not only impacted knowledge, attitudes, and beliefs, but also intent and engagement in treatment. One specific way that this could be utilized within the veterinary profession is the integration of awareness-raising programs and advocacy into AVMA accredited veterinary school curriculums. By integrating this into an established curriculum, it not only disseminates information to every student and future veterinarians, but also normalizes the stigma around discussion of the industry-specific risks and management techniques.

Selective Prevention Strategies

There are ways to strengthen support to provide relief to the current mental health crisis affecting the veterinary profession. Providing active labor market support for individuals who are unemployed or self-employed, providing assistance with debt relief programs, improving policies surrounding mental health, and accelerating mental health care reforms are examples of successful initiatives (Wahlbeck & McDaid, 2012; Zero Suicide, 2022). Active labor market support seeks to assist individuals in obtaining training and finding employment, therefore reducing the mental effects that recessions can cause. In addition, active labor market support helps provide mental health resources to individuals who are unemployed and lack insurance (Wahlbeck & McDaid, 2012).

Approximately 18% of veterinarians are self-employed (U.S. Bureau of Labor Statistics, 2024). The AVMA estimates an unemployment rate within the veterinary industry at 0.5% in 2022, which is decreased from 1.8% in 2021 and 0.7% in 2020 (Larkin, 2022; Nolen, 2020).

Despite this decrease in unemployment rates, Volk et al. (2023) found that 16% of veterinarians are dissatisfied with their career in veterinary medicine and 44% of veterinarians have considered leaving the veterinary profession (Nolen, 2021). In addition, it has been found that the veterinary industry is having higher turnover rates and a shortage of veterinary providers (Nolen, 2023). Therefore, having an active labor market support in place to support both self-employed and unemployed veterinarians will benefit the veterinary industry.

Debt relief programs are often a key factor discussed in global public health policy as they help individuals to maintain an economically active life, which can reduce financial related stress (Wahlbeck & McDaid, 2012). The average amount of student debt a veterinary medical graduate has is approximately $180,000 (AVMA, 2023). There are governmental agencies and veterinary organizations dedicated to helping alleviate veterinary medical debt. The United States Department of Agriculture (USDA) offers the Veterinary Medicine Loan Repayment Program which provides veterinarians a designated amount of loan repayment in exchange for a termed employment in designated, high priority veterinary food medicine settings (USDA, n.d.). For veterinarians who work in the public and nonprofit sectors, they may qualify for the federal Public Service Loan Forgiveness program, but a limited number actually receive it due to eligibility requirements (Tretina & Basile, 2022). The AVMA identifies key priorities of ensuring access to refinancing options, including low interest rates, deferring payments for those pursuing advanced education and training, and creating financial incentives for veterinary small business owners (AVMA, 2024). The American Association of Veterinary Medical Colleges (AAVMC) has developed a veterinary debt initiative to assist pre-veterinary students, veterinary students, and veterinarians to make informed financial decisions to ensure a financially successful and sustainable career (AAVMC, 2024).

Surveillance, monitoring, and evaluation monitors the current status of suicide within the population and relies on multiple data sources including, but not limited to, vital statistics, police records, health records, and autopsy reports (WHO, 2021). It can occur on the global, federal, state, and/or local level and there are multiple databases available on each level. Globally, the WHO is one entity that monitors suicide rates through the World Health Statistics database; however, it is noted that only 80 out of 194 member states of the WHO have data that can be used to estimate suicide rates (WHO, 2023; WHO, 2024). Within the United States, the CDC tracks suicide data on the federal level (CDC, 2023). States can also survey and monitor their own data; however, these rates are often reported to the federal level. Locally, public health departments often track and monitor suicide data. For example, the New York City Department of Health has a surveillance system in place that monitors emergency department visits for suicidal ideation and suicidal behavior (Prevention Institute, n.d.). There are also surveillance systems in place for specific groups, such as the White Mountain Apache Tribally Mandated Suicide Surveillance System or the Department of Defense Suicide Event Report (Ikeda et al., 2014).

Many of these systems are not specific to veterinarians, therefore providing an opportunity for organizations such as the AFSP, AVMA, and AAVMC to work together to develop one. Data collected from this type of veterinary-specific system can be used to improve policies, accelerate mental health reforms, and provide the needed financial support to fund mental health programs within the veterinary community, which will improve prevention and intervention methods and access to mental health treatment (Wahlbeck & McDaid, 2012).

It is important to note that there are some identified discrepancies among databases on suicide-related problems and suicide attempts. Some databases include non-fatal attempts and

non-suicidal self-injury behaviors whereas some do not. For example, the National Violent Death Reporting system tracks violent deaths including suicide; however, they do not track data on self-injury that does not result in death (CDC, 2024). The California Department of Public Health Injury and Violence Prevention Branch collected county-level data that includes deaths by suicide and emergency department visits for self-injury (Prevention Institute, n.d.). Some are specific to youths, and some include all ages (Ikeda et al., 2014). Identifying prevalence rates of suicidal ideation and suicidal behaviors is not simple but will help to identify the pervasiveness of the issue, and track if implemented prevention efforts are successful. Use of standardized evaluation tools will help to define parameters and improve tracking of various mental health issues across the veterinary industry.

Many individuals experiencing a mental health crisis do not seek help on their own and, as such, the identification of individuals at risk for suicide is key when it comes to suicide prevention (SPRC, 2018). Primary care providers can implement screening within their offices. In addition, gatekeeper training seeks to train individuals such as family, friends, and co-workers on how to recognize warning signs of suicide and help an individual experiencing suicidal ideation receive the care that they need (SPRC, 2018). There are multiple gatekeeper training programs available, and they can be tailored to specific groups who may be more likely to have contact with suicidal individuals. Gatekeeper training is a simple and easily implemented training at the local clinic level and is provided by the AVMA at no charge. Awareness and knowledge have been shown to contribute to utilization (Alordiah et al., 2023). Therefore, better awareness of gatekeeper training programs and other such tools that are available to individuals within the veterinary industry at no charge can improve rates of utilization.

In addition, capacity building can be further developed through the inclusion of suicide prevention training among police, emergency responders, and healthcare workers to ensure a competent and caring workforce. This allows for a better response to individuals who may be experiencing a mental health crisis (CDC, 2022; SPRC, 2020; WHO, 2021; Zero Suicide, 2022). Responding effectively to individuals in crisis can help reduce suicides. Implementation of this training as a requirement for state licensure, or inclusion of this knowledge on the North American Veterinary Licensing Examination (NAVLE) would be two effective ways to broadly disseminate the knowledge necessary to curb the suicide rate within the profession.

Indicated Prevention Strategies

Interpersonal relationships have the potential to be unhealthy or healthy. Unhealthy relationships consist of dishonesty, disrespect, criticism, and manipulation. They may be controlling or abusive in nature and contribute to increased stress, substance abuse, anxiety, depression, or suicidal thoughts (The University of Alabama, 2024; Bilodeau, 2021). Healthy relationships are rooted in equity, allowing for open communication, honesty, and support and can be protective in nature and prevent the worsening of mental health issues (The University of Alabama, 2024; Bilodeau, 2021). Healthy relationships and social connectedness are extremely important within suicide prevention as social connectedness acts as a protective factor against many mental health disorders. In addition, there is a causal relationship between isolation and suicide (Motillon-Toudic et al., 2022). Veterinary schools, professional organizations, and employers can promote connectedness and offer management training opportunities, focusing on developing and encouraging healthy relationships and protective environments in the workplace setting.

A protective environment can be physical or emotional in nature. Providing individuals with safe and stable environments can help prevent the development and exacerbation of mental health disorders (WHO, 2022). Emotional protective environments allow individuals to express emotions, develop confidence and resilience, obtain the skills needed to develop and support healthy relationships with both themselves and others, and enhance life skills (National Center on Safe Supportive Learning Environments, 2024). Resilience is defined as the ability to successfully adapt to stressors and experiences (APA, 2022). Strong life skills capabilities act as a protective factor against suicide and help build resilience (SPRC, 2020). Resilience also acts as a protective factor for mental health disorders and suicide by allowing an individual to adapt to stressors quickly and successfully (Shrivastava & Desousa, 2016). The ability to successfully adapt to stressors and change will help encourage healthy workplace settings and relationships.

Healthy coping skills allow individuals who are experiencing internal and external stressors to better manage their symptoms. In contrast, maladaptive coping skills are associated with poor mental health outcomes; these include avoidance, denial, negative self-talk, emotional suppression, and disengagement (Sutton, 2020; Wadsworth, 2015). Healthy coping skills can be reactive, or in response to a stressor, or proactive, trying to prevent future stressors (Algorani & Gupta, 2023). In addition, they can be classified into problem-focused, emotion-focused, meaning-focused, and social-focused (Algorani & Gupta, 2023). Veterinary schools have the opportunity to implement teachings on emotional intelligence, emotional regulation, and healthy coping skills into their schema. In addition, it would benefit the industry to provide continuing education on these topics to ensure continued success throughout one's veterinary career.

Problem-focused coping skills seek to identify, address, and potentially eliminate a stressor (Algorani & Gupta, 2023; Schoenmakers et al., 2015). These coping skills may include

breaking a problem down into steps and smaller attainable goals, creating a to-do list, and prioritizing needs (Gillis, K., 2023). Emotion-focused coping skills aim to regulate and reduce the negative emotions that are brought on by a stressor (Algorani & Gupta, 2023; Schoenmakers et al., 2015). These include journaling, mindfulness, meditation, and radical acceptance (Des Marais, 2022). Meaning-focused coping skills use cognitive strategies to determine and address the meaning of the situation (Algorani & Gupta, 2023). In this type of coping, an individual focuses on things such as beliefs, values, and goals to drive their coping response (Schoenmakers et al., 2015). Lastly, social-related coping skills seek to reduce stress and emotional response through seeking help and support from family, friends, and community (Algorani & Gupta, 2023).

Evidence-based practice and interventions within the mental health field include assertive community treatment, cognitive behavioral therapy, social skills training, and dialectical behavioral therapy, among others (Vita & Barlati, 2019, Zero Suicide, 2018). In addition to therapy options, medications can be used to help manage symptoms. Evidence-based guidelines for medication management can be used by providers to ensure optimal treatment of individuals (Mellman et al., 2001).

The top reasons for not receiving mental health care services in 2020 include inability to afford the cost of treatment (46%), unsure of where to go (29%), or having insurance that does not cover mental health services (19%) (White House, 2022). Additional factors contributing to lack of care include stigma surrounding mental health, a limited number of provider options, and long wait times for services (National Council for Mental Wellbeing, 2024). Many non-corporate owned veterinary clinics struggle to offer affordable healthcare coverage, which further contributes to increased out of pocket costs and lack of mental health care accessibility.

Some employers may offer an employee assistance program (EAP). These programs offer free mental health assessments and counseling to employees. In addition, they can refer individuals to higher levels of care, if warranted. EAPs can also work with managers and supervisors to help manage workplace stressors to ensure a healthy and safe working environment (U.S. Office of Personnel Management, n.d.). However, not all employers offer EAP services. According to the United States Department of Labor (1990), for every dollar that employers invest into an EAP, they will save on average $5 to $16. However, the cost-benefit analysis for a small private practice may not produce as much return on investment as compared to a corporate owned veterinary practice.

There are mental health disparities between geographic locations. There are often significantly less services in the rural setting when compared to urban or suburban settings. This may introduce a barrier to private practice rural veterinary clinics that don't offer EAP services. In addition, average wait times for mental health services vary between in-person and virtual visits. On average, it takes 67 days to be seen by a psychiatric provider in-person and 43 days to be seen by a psychiatric provider via virtual visit (Sun et al., 2023). This is often due to a shortage of psychiatric providers and that approximately 54% are unable to accept new patients (Sun et al., 2023). This can be significantly problematic for veterinarians that are in an active mental health crisis. As a result, veterinary-specific nonprofits have started developing and implementing mental health initiatives. For example, Not One More Vet (2024) has introduced the Veterinary Mental Health Support program, which provides free individual and group psychoeducation sessions to veterinarians.

One of the greatest risk factors for future suicide attempts are previous suicidal ideation and/or attempts (Riera-Serra et al., 2023; Zero Suicide, 2022). Therefore, the primary goal of

preventing future risk stems from supporting safe care transitions for continuity of care and ensuring that individuals get the proper care they need after a crisis, hospitalization, or attempt (SPRC, 2018; Zero Suicide, 2022). It is estimated that only half of individuals discharged from inpatient psychiatric hospitals receive some type of mental health follow-up in the first week post-discharge, whereas one-third receive no mental health services within the first month post-discharge (Zero Suicide, 2022). Safe care transitions may include involving an individual's support network and community-based mental health providers. Utilization of an individual's support network introduces the opportunity to develop, introduce, and strengthen veterinary-specific support groups. These could be through professional organizations, grassroots organizations, social media, or word of mouth.

Another approach of preventing future risk includes limiting access to means for suicide (SPRC, 2018). This could include limiting access to lethal medications and/or firearms. However, veterinarians have regular access to lethal agents due to the nature of their job. Therefore, when a suicide does occur, having proper support within the veterinary community is necessary for those directly and indirectly affected (CDC, 2022; SPRC, 2018).

Conclusion

Despite physicians and veterinarians having similar rates of risk for suicide in comparison to the general public, there are little to no policies in place to address this issue among veterinarians. There is a deficit in both the advocacy and activism of acknowledging and addressing this issue through similar legislation that is currently in place for physicians. Implementing a comprehensive suicide prevention program, specifically one that is designed with consideration to the unique stressors that veterinarians are exposed to, would help to reduce the number of suicides among this population.

CHAPTER FIVE

Summary Discussion and Implications

Veterinarians are at increased risk of mental health issues and suicide. Volk et al. (2022) found that levels of serious psychological distress increased from 6.4% in 2020 to 9.7%. It has been found that 18-30% of veterinarians have high levels of burnout, and identify exhaustion, mental distance from one's job, cognitive impairment, and emotional impairment as being problematic (Volk et al., 2019). In addition, approximately 30% of veterinarians' self-reported symptoms of anxiety (Chan & Wong, 2023), and self-reported rates of depression have ranged from 17-41% (Schwerdtfeger et al., 2020; Rhodes et al., 2022). Volk et al. (2017) identified that approximately 25% of veterinarians have experienced suicidal thoughts and 1.6% had attempted suicide.

The first paper of this dissertation was an integrative review which explored the salient factors identified within the literature contributing to mental health issues and suicide among veterinarians. The second paper explored mental health issues and suicide risk among veterinarians while looking specifically at prevalence rates of burnout, substance abuse, anxiety, depression, and suicidal ideations. In addition, it compared rates between veterinary specialties, career stages (establishment, maintenance, or decline), and role (practice owner or associate veterinarian). The third paper looked at health policy pertaining to suicide prevention within the United States. Universal, indicated, and selective prevention levels were discussed, as were potential interventions and collaborators at each level.

Discussion

Project 1: Mental Health and Suicide Among Veterinarians – An Integrative Review

An integrative review was done using Whittemore and Knafl's (2005) five-step methodological approach in order to explore the major salient factors that contribute to mental health issues and suicide among veterinarians. Five overarching themes were identified: occupational stress and burnout; increased risk of mental health issues and suicide; risk factors for the development of mental health issues and suicide; mental health stigma and access to care; and euthanasia and access to means.

Veterinarians experience increased levels of occupational stress. This can lead to the development of burnout and secondary traumatic stress, in addition to the exacerbation of other mental health issues such as substance abuse, anxiety, and depression. These mental health issues often co-occur and contribute to suicidal ideations and suicide attempts. There are multiple factors that contribute to the development of mental health issues and suicide. These include social and demographic factors, such as sex, age, and marital status; personality traits including neuroticism and perfectionism; work-related factors such as occupational stress, role, veterinary practice setting, length of time in practice, demands of practice, salary, and client interactions; work-life balance; and life-stressors outside of work.

Stigma is also problematic when it comes to identifying and addressing mental health concerns. Many veterinarians voice concern that acknowledging that they need mental health support or that seeking treatment will preclude them from being able to practice. Barriers to seeking mental health treatment include feelings of guilt and shame, and lack of access to care. It also has been identified that regular exposure to euthanasia can influence mental health outcomes and a veterinarian's knowledge of lethality and access to means may contribute to suicide rates.

Project 2: Silently Suffering – Prevalence Rates and Relationships Between Mental Health Issues and Suicide Risk Among Veterinarians

The purpose of this study was to explore mental health issues and suicide risk among veterinarians, while looking specifically at prevalence rates of burnout, substance abuse, anxiety, depression, and suicidal ideations. In addition, prevalence rates among veterinary practice specialties, career stages (establishment, maintenance, or decline) and role (practice owner or associate veterinarian) were explored.

A cross-sectional survey design was used. Demographic information such as sex, age, veterinary practice specialty, and length of time in practice were collected. In addition, respondents completed five assessments: Copenhagen Burnout Inventory (CBI); Tobacco, Alcohol, Prescription medication, and other Substance use (TAPS-1) questionnaire; General Anxiety Disorder (GAD-7) questionnaire; Patient Health Questionnaire (PHQ-9); and Columbia Suicide Severity Rating Scale (C-SSRS).

Results from this study indicated that moderate to severe levels of personal burnout, work-related burnout, and client-related burnout are prevalent among this population. It also found that over one-third of respondents screened positive for some level of alcohol, tobacco, or other drug use. Approximately 12% had moderate or severe levels of anxiety and, similarly, approximately 12% had moderate to moderately severe levels of depression. A total of 13.5% of veterinarians were considered low risk while 3.5% were moderate risk and 3.5% were high risk for suicide. The path analysis indicated relationships between career stage and personal burnout; career stage and work-related burnout; career stage and alcohol use; veterinary practice specialty and alcohol use; and veterinary role and alcohol use.

Demographics of this study were similar to those published in available literature in regard to sex, ethnicity, and veterinary practice specialty. The final path analysis indicated relationships between career stage and personal burnout, career stage and work-related burnout, career stage and alcohol use, veterinary specialty and alcohol use, and veterinary role and alcohol use. Future research should explore these topics further, in addition to developing, implementing, and evaluating evidence-based interventions to prevent poor mental health outcomes and suicide.

Project 3: Health Policy Related to Suicide

Both physicians and veterinarians have been identified as high-risk populations for mental health issues and suicide. While there have been federal policies put into place regarding mental health, resiliency, and access to care among physicians, there are no known federal bills or laws addressing these among veterinarians. Rather, much of the mental health and suicide prevention advocacy among veterinarians is done by non-profit and grassroots organizations made up of those within the veterinary industry. This introduces a significant interdisciplinary gap when it comes to improving overall mental health and preventing suicides among this population.

Suicide prevention strategies are multi-level. They include universal prevention strategies, selective prevention strategies, and indicated prevention strategies. Universal prevention strategies focus on entire populations, whereas selective prevention strategies focus on those at increased risk, and indicated prevention strategies focus on specific high-risk individuals. By integrating all three levels of prevention, national and specialty veterinary organizations, such as the AVMA and AAEP, in addition to the American Board of Veterinary Practitioners and NAVLE, have a unique opportunity to contribute to better suicide prevention efforts. In addition, AVMA accredited veterinary programs can contribute to suicide prevention

efforts by integrating educational programs and mental health advocacy into their curricula and providing continuing education opportunities. Teachings should focus on developing and maintaining protective work environments and healthy relationships with clients and colleagues, in addition to emotional intelligence, emotional regulation, healthy coping skills, and building resiliency. These skills can then be used by veterinarians to improve mental health outcomes and reduce the number of suicides. There is also an opportunity to expand suicide prevention efforts among veterinarians into an interdisciplinary approach. This could be done by working with mental healthcare providers to ensure access to care, in addition to working with organizations such as the AFSP.

Theoretical Framework

These projects were guided by two theoretical frameworks: Urie Bronfenbrenner's Ecological Model (Bronfenbrenner 1977; Bronfenbrenner, 1986) and Donald Super and Jean Pierre Jordaans's Career Development Theory (Super & Jordaan, 1973). The Bioecological Model was used as it looks at multiple systems surrounding an individual including the microsystem, mesosystem, exosystem, macrosystem, and chronosystem. These systems look at various aspects of an individual's life such as family, employment, social structures, cultures, and subcultures that may influence an individual's mental health. In addition, it looks at interactions and relationships between these influences (Bronfenbrenner, 1977; Bronfenbrenner, 1986). As mental health is multifaceted and influenced by a number of factors, use of this model allows for a holistic approach when looking at mental health issues and suicide risk among veterinarians.

The Career Development Theory was used to define career stages (establishment, maintenance, decline) based on an individual's age. Establishment career stage (ages 25-44) is when an individual establishes themselves within their career, in addition to develop experience

and independence. The maintenance stage (ages 44-64) is when an individual maintains their career status. Lastly, the decline career stage (ages 65 and up) is when individuals prepare to transition out of their career by delegating tasks and duties ultimately resulting in retirement (Super & Jordaan, 1973). This theory was used to help identify specific stressors or mental health issues that may be more prevalent at certain points throughout one's career.

Bronfenbrenner's Ecological Model is a good option when looking at models pertaining to behavior and mental health. It not only considers the individual at its core, but it also considers systems surrounding the individual that may influence mental health outcomes. It is recommended that future researchers look outside Super & Jordaan's Career Development Theory. A significant limitation of this theory is that career stage classification is based on age, rather than years in practice, therefore making it not inclusive to individuals who became a veterinarian as a second career.

Implications

Implications for Occupational Health Nursing

Veterinarians are exposed to a significant number of occupational hazards, including physical, chemical, reproductive, and biological hazards. Although many occupational health nurses do not work in the veterinary medicine setting, they can still contribute to maintaining the safety of individuals employed in the field. Occupational health nurses can be involved with the implementation and evaluation of protocols pertaining to personal protective equipment (PPE), bloodborne pathogens, infection control, and radiation safety, in addition to treatment of various occupational related illnesses and diseases, and disability management (American College of Occupational and Environmental Medicine, 2024).

The U.S. Occupational Safety and Health Administration's Standard 1926.95 addresses the use of PPE when there are environmental, chemical, radiological, and/or mechanical hazards in the workplace (U.S. Department of Labor, n.d.b). Veterinarians regularly use PPE in the forms of gloves, surgical gowns, and masks in order to prevent exposure to animal bodily fluids and infection. The U.S. Bloodborne Pathogens Standard (29 CFR 1910.1030) includes provisions for exposure control plans, engineering and work practice infection controls, vaccinations, hazard communication and training, and record keeping (U.S. Department of Labor, n.d.a). As bloodborne pathogens, infections, and radiation can have both short and long-term detrimental health effects, it is important for occupational health nurses to be involved firsthand in education, prevention, and treatment of these issues.

Available literature shows that individuals employed in the veterinary industry are at increased risk of experiencing mental health issues such as depression, anxiety, substance abuse, and suicide (Tomasi et al., 2019; Schwerdtfeger et al., 2020; Dalum et al., 2022). As such, it is prudent for occupational health nurses to be aware of mental health services available should an employee need them. Employee assistance programs (EAPs) often offer mental health services and may be available through an individual's employer. In addition, EAPs can refer individuals to higher levels of care such as support groups and community-based mental health care providers.

Implications for Occupational Health Policy

There is a significant deficiency when it comes to health policy pertaining to mental health issues and suicide among veterinarians. Despite veterinarians and physicians having similar rates of suicide compared to the general public, the federal bills and laws within the United States that are currently active do not focus on veterinarians. An example of this is the Dr.

Lorna Breen Health Care Provider Protection Act (H.R. 1667), which became federal law in 2022. This requires grants to be awarded to hospitals, medical professional associations, and other health care entities in order to promote mental health and resiliency among health care providers (H.R. 1667, 2022). Despite this being an important need on the human healthcare front, this law notably lacks inclusion of animal health care providers.

Another active bill is the REACHING Improved Mental Health Outcomes for Patients Act of 2022 (H.R. 7237). This bill seeks to reauthorize grants and assistance for mental health programs of regional and national significance through improving suicide prevention programs, awareness of available services and resources, ensuring access to mental health treatment, and building and strengthening community support for those in mental health crisis (H.R. 7237). Although this bill is not specific to veterinarians, it identifies that grants should be allotted to address mental health needs of regional and national significance. Since those who work in the veterinary industry have been identified by NIOSH's National Occupational Research Agenda as being high-risk for mental health issues and suicide, this should provide the opportunity to expand this act to include veterinarians.

The National Institute for Occupational Safety and Health introduced the Total Worker Health approach in 2014. Total Worker Health is an approach to occupational health and safety that includes policies, programs, and practices that promote a hazard-free work environment and prevention of illness and injury (NIOSH, 2024). It is a holistic approach that not only includes focus on physical work environments, but also psychosocial ones. The lack of current occupational health policies in place to protect veterinarians' mental health introduces a unique opportunity for occupational health policy within the United States to expand in order to incorporate this population and better address these issues.

Implications for Occupational Health and Safety Research

While this dissertation helps identify and elaborate on the issue of mental health and suicide among veterinarians, there remains a significant need for continued work on the topic. Future research should focus on further exploration of mental health among veterinary subspecialties, career stage, and role in practice, so that problematic issues can be identified among each. This will allow for future development, implementation, and evaluation of programs into practice in order to address mental health issues and suicide risk among veterinarians.

Much of the current research pertaining to mental health and suicide risk among veterinarians are done by individuals within the industry or by grass roots organizations with a vested interest in the industry. Future research should be expanded to not only look at U.S.-based veterinarians but also veterinarians in other countries. This will help determine if stressors and mental health issues are similar across the globe or if differences are present. It should also include interdisciplinary approaches and expertise in order to allow for a thorough and more holistic understanding of the issues at hand. By incorporating veterinary medicine and occupational health and safety research, not only can physical and environmental hazards be identified and addressed, but so can those that impact mental health, therefore improving overall total worker health. Ultimately, interventional research is needed to test strategies to promote the mental health and total worker health of veterinarians.

Limitations

This dissertation adds valuable knowledge to the literature and introduces an interdisciplinary approach to identifying and addressing mental health issues and suicide prevention among veterinarians; however, it is important to identify some limitations. One

limitation is the individuality of mental health when it comes to diagnosis and treatment. Individuals may not present the same and may not find certain symptomatology problematic. Also, social and cultural factors may influence both the presentation and treatment of various mental health issues and suicidal ideation. In regard to the theoretical framework, the Career Development Theory classified career stages by age and did not factor in non-traditional students who may have become a veterinarian as a second career. Lastly, sampling methods and a small sample size for the choice of statistical test may contribute to bias and lack of generalizability of the results.

Conclusion

Veterinarians are at increased risk of mental health issues and suicide. Volk et al. (2023) found that 10% of veterinarians suffer from serious psychological distress, which severe enough to impair daily functioning in the social, educational, or occupational settings and require treatment. This study identified that approximately 40% of veterinarians experience personal and work-related burnout, while approximately 30% experience client-related burnout. In addition, this study found that approximately 12% of veterinarians experience moderate to severe anxiety or moderate to moderately severe depression. Lastly, this study identified 20.5% of veterinarians being at some level of risk of suicide.

Mental health issues experienced among veterinarians at different career stages, veterinary specialties, and role in practice necessitates mental health interventions. Findings from this study can be used to inform future research, and contribute to the development, implementation, and evaluation of mental health interventions within the veterinary industry to improve mental health outcomes and prevent suicide.

References

Algorani, E.B. & Gupta, V. (2023). *Coping mechanisms.* https://www.ncbi.nlm.nih.gov/books/NBK559031/

American Association of Veterinary Medical Colleges. (2024). *Veterinary debt initiative.* https://www.aavmc.org/becoming-a-veterinarian/funding-your-degree/veterinary-debt-initiative-old/

American College of Occupational and Environmental Medicine. (2024). *What is OEM?* https://acoem.org/Careers/What-Is-OEM

American Foundation for Suicide Prevention. (2018). *Facts about mental health and suicide among physicians.* https://www.datocms-assets.com/12810/1578319045-physician-mental-health-suicide-one-pager.pdf

American Foundation for Suicide Prevention. (2021). *Facts about mental health and suicide among veterinarians.* https://www.datocms-assets.com/12810/1631641129-facts-about-mental-health-and-suicide-risk-among-veterinarians2021.pdf

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

American Psychological Association. (2022). *Resilience*. https://www.apa.org/topics/resilience

American Psychological Association. (2023). *Stress in America 2023: A nation recovering from collective trauma.* https://www.apa.org/news/press/releases/stress/2023/collective-trauma-recovery

American Veterinary Medical Association. (2015). *Study: 1 in 6 veterinarians have considered suicide.* https://www.avma.org/javma-news/2015-04-01/study-1-6-veterinarians-have-considered-suicide

American Veterinary Medical Association. (2022). *U.S. veterinarians*. https://www.avma.org/resources-tools/reports-statistics/market-research-statistics-us-veterinarians

American Veterinary Medical Association. (2023). *Chart of the month: Good news on student debt.* https://www.avma.org/blog/chart-month-good-news-student-debt

American Veterinary Medical Association. (2023). *U.S. veterinarian numbers*. https://www.avma.org/resources-tools/reports-statistics/market-research-statistics-us-veterinarians

American Veterinary Medical Association. (2024). *Student debt advocacy.* https://www.avma.org/advocacy/student-debt

Analyttica Datalab. (2021). *Understanding – 'Wald Test'.* https://medium.com/@analyttica/understanding-wald-test-2e3fa7723516

Belay, A. S., Guangul, M. M., Asmare, W. N., & Mesafint, G. (2021). Prevalence and associated factors of psychological distress among nurses in public hospitals, Southwest, Ethiopia: A cross-sectional study. *Ethiopian Journal of Health Science,31*(6), 1247-1256. https://doi.org/10.4314/ejhs.v31i6.21

Bilodeau, K. (2021). *Fostering healthy relationships.* https://www.health.harvard.edu/mind-and-mood/fostering-healthy-relationships

Borritz, M., Rugulies, R., Villadsen, E., Mikkelsen, O.A., Kristensen, T.S., & Bjorner, J.B. (2006). Burnout among employees in human service work: Design and baseline findings of the PUMA study. *Scandinavian Journal of Public Health,* 34(1), 49–58. 10.1080/14034940510032275

Boston University, (2022). *Social wellbeing.* https://www.bu.edu/studentwellbeing/what-is-wellbeing/social-wellbeing/

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist,* 513-531. https://doi.org/10.1037/0003-066X.32.7.513

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology, 22*(6), 723-742. https://doi.org/10.1037/0012-1649.22.6.723

Bryce, A. R., Rossi, T.A., Tansey, C., Murphy, R. A., Murphy, L. A., & Nakamura, R. K. (2019). Effect of client complaints on small animal veterinary internists. *Journal of Small Animal Practice*, *60*, 167-172. https://doi.org/https://doi.org/10.1111/jsap.12936

Centers for Disease Control and Prevention. (2015). *Notes from the field: Prevalence of risk factors for suicide among veterinarians – United States, 2014*. https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6405a6.htm

Centers for Disease Control and Prevention. (2015). *Serious psychological distress among adults: United States, 2009-2013.* https://www.cdc.gov/nchs/products/databriefs/db203.htm

Centers for Disease Control and Prevention. (2018a). *Veterinary safety & health: Biological safety.* https://www.cdc.gov/niosh/topics/veterinary/biological.html

Centers for Disease Control and Prevention. (2018b). *Veterinary safety & health: Chemical safety.* https://www.cdc.gov/niosh/topics/veterinary/chemical.html

Centers for Disease Control and Prevention. (2018c). *Veterinary safety & health: Physical safety.* https://www.cdc.gov/niosh/topics/veterinary/physical.html

Centers for Disease Control and Prevention. (2018d). *Veterinary workers and workplaces*. https://www.cdc.gov/niosh/topics/veterinary/work.html

Centers for Disease Control and Prevention. (2022). *Suicide prevention: Prevention strategies.* https://www.cdc.gov/suicide/prevention/index.html

Centers for Disease Control and Prevention. (2023). *Suicide data and statistics.* https://www.cdc.gov/suicide/facts/data.html?CDC_AAref_Val=https://www.cdc.gov/suicide/suicide-data-statistics.html

Centers for Disease Control and Prevention. (2024). *About the national violent death reporting system.* https://www.cdc.gov/nvdrs/about/index.html

Chan, C. K. Y., & Wong, P. W. C. (2023). Predictors of suicide risk and mental health outcomes among Hong Kong veterinarians: A cross-sectional study. *Behavioral Sciences*, *13*(770), 1-11. https://doi.org/https://doi.org/10.3390/bs13090770

Cocker, F., & Joss, N. (2016). Compassion fatigue among healthcare, emergency, and community service workers: A systematic review. *International Journal of Environmental Research and Public Health, 13(*618*),* 1-18. http://doi.org/10.3390/ijerph13060618

Columbia University. (2016). *Columbia-Suicide Severity Rating Scale (C-SSRS).* https://cssrs.columbia.edu/wp-content/uploads/Columbia_Protocol.pdf

Conner, K. R. & Ilgen, M., A. (2016). *Substance use disorders and suicidal behavior a conceptual model the international handbook of suicide prevention.* Hoboken: Wiley and Sons.

Crane, M. F., Phillips, J. K., & Karin, E. (2017). "I've been a long time leaving": The role of limited skill transferability in increasing suicide-related cognitions and behavior in veterinarians. *Suicide and Life-Threatening Behavior*, *47*(3), 309-320. https://doi.org/https://doi.org/10.1111/sltb.12279

Dalum, H.S., Tyssen, R., & Hem, E. (2022). Prevalence and individual and work-related factors associated with suicidal thoughts and behaviours among veterinarians in Norway: A cross-sectional, nationwide survey-based study (the NORVET study). *BMJ Open, 12*, 1-9. https://doi.org/10.1136/bmjopen-2021-055827

Dang, D., Dearholt, S., Bissett, K., Ascenzi, J., & Whalen, M. (2022). *Johns Hopkins evidence-based practice for nurses and healthcare professionals: Model and guidelines.* 4th ed. Sigma Theta Tau International

Data USA. (2020). *Veterinarians*. https://datausa.io/profile/soc/veterinarians

Dawson, B. F. Y., & Thompson, N. J. (2017). The effect of personality on occupational stress in veterinary surgeons. *Journal of Veterinary Medical Education*, *44*(1), 72-83. https://doi.org/10.3138/jvme.0116-020R

Des Marais, S. (2022). *Five emotion-focused coping techniques and exercises.* https://psychcentral.com/health/emotion-focused-coping-examples

Dr. Lorna Breen Heroes' Foundation. (n.d.). *Dr. Lorna Breen*. Retrieved June 4, 2024, from https://drlornabreen.org/about-lorna/

Fadare, O.O., Andreski, M., & Witry, M.J. (2021). Validation of the Copenhagen Burnout Inventory in pharmacists. *Innovations in Pharmacy, 12*(2). https://doi.org/10.24926/iip.v12i2.3699

Gillis, K., (2023). *Problem-focused coping: Definition, examples and strategies.* https://www.choosingtherapy.com/problem-focused-coping/

Glaesmer, H., Bahramsoltani, M., Schwerdtfeger, K., & Spangenberg, L. (2021). Euthanasia distress and fearlessness about death in German veterinarians. *Crisis, 42*(1), 71-77. https://doi.org/10.1027/0227-5910/a000689

Gryczynski, J., McNeely, J., Wu, L.T., Subramaniam, G.A. Svikis, D.S., Cathers, L.A., … Schwartz, R.P. (2017). Validation of the TAPS-1: A four-item screening tool to identify unhealthy substance use in primary care. *Journal of General Internal Health 32*, 990-996. https://doi.org/10.1007/s11606-017-4079-x

Hamwey, M., Allen, L., Hay, M., & Varpio, L. (2019). Bronfenbrenner's bioecological model of human development: Applications for health professions education. *Academic Medicine, 94*, 1621. https://doi.org/10.1097/ACM.0000000000002822

Harling, M., Strehmel, P., Schablon, A., & Nienhaus, A. (2009). Psychosocial stress, demoralization and the consumption of tobacco, alcohol and medical drugs by veterinarians. *Journal of Occupational Medicine and Toxicology, 4*(4), 1-11. https://doi.org/10.1186/1745-6673-4-4

Health Navigator New Zealand. (2022). *General anxiety scale (GAD-7).* https://www.healthnavigator.org.nz/tools/g/general-anxiety-scale-gad-7/#Languages

Hockey, M., Rocks, T., Ruusunen, A., Jacka, F. N., Huang, W., Liao, B., Aune, D., Jing Nie, Y. W., & O'Neil, A. (2021). Psychological distress as a risk factor for all-cause, chronic-disease- and suicide-specific mortality: A prospective analysis using data from the National Health Interview Survey. *Social Psychiatry and Psychiatric Epidemiology, 57*, 541-552. https://doi.org/10.1007/s00127-021-02116-7

Houtsma, C., Bond, A. E., & Anestis, M. D. (2022). Practical capability among veterinarians: Preliminary evidence of the importance of access to lethal medications in the workplace. *Archives of Suicide Research*, 1-12. https://doi.org/https://doi.org/10.1080/13811118.2022.2131492

Hu, L. & Bentler, P. M. (2009). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55. https://doi.org/ 10.1080/10705519909540118

Ikeda, R., Hedegaard, H., Bossarte, R., Crosby, A.E., Hanzlick, R., Roesler, J., Seider, R., Smith, P., & Warner, M. (2014). Improving national data systems for surveillance of suicide-related events. *American Journal of Preventative Medicine, 47*(3). https://doi.org/10.1016/j.amepre.2014.05.026

Johns Hopkins University. (2022). *Hierarchy of evidence guide: Appendix D.* https://bradley.libguides.com/ld.php?content_id=67216778

Johnson, S.U., Ulvenes, P.G., Oktedalen, T., & Hoffart, A. (2019). Psychometric properties of the General Anxiety Disorder 7-item (GAD-7) scale in a heterogeneous psychiatric sample. *Frontiers in Psychology, 10.* https://doi.org/10.3389/fpsyg.2019.01713

Kersebohm, J. C., Lorenz, T., Becher, A., & Doherr, M. G. (2017). Factors related to work and life satisfaction of veterinary practitioners in Germany. *Veterinary Record Open, 4*, 1-10. https://doi.org/10.1136/vetreco-2017-000229

Koutsimani P., Montgomery A., & Georganta K. (2019). The relationship between burnout, depression, and anxiety: A systematic review and meta-analysis. *Frontiers in Psychology*, 10, 284. https://doi.org/10.3389/fpsyg.2019.00284

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606-613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Lederhouse, C. (2024). *Veterinary students voice concerns over duty hours.* https://www.avma.org/news/veterinary-students-voice-concerns-over-duty-hours#:~:text=Veterinary%20schools%20are%20not%20required,when%20they%20are%20on%20call.

Larkin, M. (2022). *Veterinarian employers require innovative solutions to attract, retain staff members.* https://www.avma.org/news/veterinarian-employers-require-innovative-solutions-attract-retain-staff-members

Marsac, M. L. & Ragsdale, L. B. (2020). *Tips for recognizing, managing secondary traumatic stress in yourself.* https://publications.aap.org/aapnews/news/14395/Tips-for-recognizing-managing-secondary-traumatic?autologincheck=redirected

Matarazzo, B.B., Brown, G.K., Stanley, B., Forster, J.E., Billera, M., Currier, G.W., Ghahramanlou-Holloway, M., & Brenner, L.A. (2019). Predictive validity of the Columbia-Suicide Severity Rating Scale among a cohort of at-risk veterans. *Suicide and Life-Threatening Behavior, 49*(5), 1255-1265. https://doi.org/10.1111/sltb.12515

McFarland, D. C. & Hlubocky, F. (2021). Therapeutic strategies to tackle burnout and emotional exhaustion in frontline medical staff: Narrative review. *Psychology Research and Behavior Management, 14*, 1429-1436. https://doi.org/10.2147/PRBM.S256228

McNeely, J., Wu. L., Subramaniam, G., Sharma, G., Cathers, L.A., Svikis, D., Sleiter, L., Russel, L., Nordeck, C., Sharma, A., O'Grady, K.E., Bouk, L.B., Cushing, C., King, J., Wahle, A., & Schwartz, R.P. (2016). Performance of the Tobacco, Alcohol, Prescription medication, and other Substance use (TAPS) tool for substance use screening in primary care patients. *Annals of Internal Medicine, 165*(10), 690-703. https://doi.org/10.7326/M16-0317

Mellman, T.A., Miller, A.L., Weissman, E.M., Crismon, M.L., Essock, S.M., & Marder, S.R. (2001). Evidence-based pharmacologic treatment for people with severe mental illness: A focus on guidelines and algorithms. *Psychiatric Services, 52*(5). https://doi.org/10.1176/appi.ps.52.5.619

Menon, V., Subramanian, K., Selvakumar, N., & Kattimani, S. (2018). Suicide prevention strategies: An overview of current evidence and best practice elements. *International Journal of Advanced Medical and Health Research, 5*, 43-51. https://doi.org/10.4103/IJAMR.IJAME_71_18

Merriam-Webster. (n.d.). *Veterinarian*. https://www.merriam-webster.com/dictionary/veterinarian

Meyer, V.M., Benjamens, S., El Moumni, M., Lange, J.F.M., & Pol, R.A. (2022). Global overview of response rates in patient and health care professional surveys in surgery: A systematic review. *Annals of Surgery, 275*(1). https://doi.org/10.1097/SLA.0000000000004078

Motillon-Toudic, C., Walter, M., Seguin, M., Carrier, J.D., Berrouiguet, S., & Lemey, C. (2022). Social isolation and suicide risk: Literature review and perspectives. *European Psychiatry, 65*(1). https://doi.org/10.1192/j.eurpsy.2022.2320

Multicultural Mental Health Resource Centre. (n.d.). *Screening for common mental disorders.* https://multiculturalmentalhealth.ca/clinical-tools/screening-for-common-mental-disorders/

National Center on Safe Supportive Learning Environments (2024). *Emotional safety.* https://safesupportivelearning.ed.gov/topic-research/ihe/safety/emotional-safety

National Council for Mental Wellbeing. (2024). *Study reveals lack of access as root cause for mental health crisis in America.* https://www.thenationalcouncil.org/news/lack-of-access-root-cause-mental-health-crisis-in-america/

National Institute for Occupational Safety and Health. (2024). *About the Total Worker Health approach.* https://www.cdc.gov/niosh/twh/about/index.html

National Institute on Drug Abuse. (n.d.). *TAPS: Tobacco, alcohol, prescription medication, and other substances tool.* https://nida.nih.gov/taps2/

National Institute of Mental Health. (2024). *Suicide.* https://www.nimh.nih.gov/health/statistics/suicide

National Occupational Research Agenda (NORA). (2019). *National occupational research agenda for healthcare and social assistance (HCSA)*. https://www.cdc.gov/nora/councils/hcsa/pdfs/National_Occpational_Agenda_for_HCSA_February_2019-508.pdf

Nett, R. J., Witte, T. K., Holzbauer, S. M., Elchos, B. L., Campagnolo, E. R., Musgrave, K. J., … & Funk, R. H. (2015). Risk factors for suicide, attitudes toward mental illness, and practice-related stressors among US veterinarians. *Journal of the American Veterinary Medical Association, 247*(8), 945-955. https://doi.org/10.2460/javma.247.8.945

Nie, J., O'Neil, A., Liao, B., Lu, C., Aune, D., & Wang, Y. (2021). Risk factors for completed suicide in the general population: A prospective cohort study of 242,952 people. *Journal of Affective Disorders, 282*(1), 707-711. https://doi.org/10.1016/j.jad.2020.12.132

Nolen, R. S. (2020). *Veterinary labor demand remains strong during COVID.* https://www.avma.org/javma-news/2020-12-15/veterinary-labor-demand-remains-strong-during-covid

Nolen, R.S. (2020). *Women practice owners projected to overtake men within a decade.* https://www.avma.org/javma-news/2020-12-15/women-practice-owners-projected-overtake-men-within-decade

Nolen, R.S. (2021). *Fierce competition over veterinary labor: Practices compete over veterinarians inclined to work fewer hours.* https://www.avma.org/javma-news/2021-12-01/fierce-competition-over-veterinary-labor

Nolen, R.S. (2023). *Report: Animal health industry experiencing highly competitive labor market.* https://www.avma.org/news/report-animal-health-industry-experiencing-highly-competitive-labor-market

Not One More Vet. (n.d.). *Helplines listed by country.* https://www.nomv.org/crisis-numbers/

Not One More Vet. (2024). *Veterinary mental health support.* https://www.nomv.org/vmhs/

O'Connell, M.E., Boat, T., & Warner, K.E. (Eds.). (2009*). National Research Council (US) and Institute of Medicine (US) Committee on the Prevention of Mental Disorders and Substance Abuse Among Children, Youth, and Young Adults: Research Advances and Promising Interventions.* National Academes Press (US).

Office of Disease Prevention and Health Promotion. (2020). *Healthy People 2020: An end of decade snapshot.* U.S. Department of Health and Human Services. https://health.gov/sites/default/files/2020-12/HP2020EndofDecadeSnapshot.pdf

Office of Disease Prevention and Health Promotion. (2020). *Health care access and quality. Healthy People 2030.* U.S. Department of Health and Human Services. https://health.gov/healthypeople/objectives-and-data/browse-objectives/health-care-access-and-quality

Pilgrim, J. L., Dorward, R., & Drummer, O. H. (2016). Drug-caused deaths in Australian medical practitioners and health-care professionals. *Addiction*, *112*, 486-493. https://doi.org/https://doi.org/10.1111/add.13619

Piperac, P., Todorovic, J., Terzic-Supic, Z., Maksimovic, A., Karic, S., Pilipovic, F., & Soldatovic, I. (2021). The validity and reliability of the Copenhagen Burnout Inventory for examination of burnout among preschool teachers in Serbia. *International Journal of Environmental Research, 18*, 1-10. https://doi.org/10.3390/ijerph18136805

Platt, B., Hawton, K., Simkin, S., Dean, R., & Mellanby, R. J. (2012). Suicidality in the veterinary profession: Interview study of veterinarians with a history of suicidal ideation or behavior. *The Journal of Crisis Intervention and Suicide Prevention,* 1-12. https://doi.org/10.1027/0227-5910/a000143

Polit, D. F., & Beck, C. T. (2021). *Nursing research: Generating and assessing evidence for nursing practice.* Wolters Kluwer.

Prevention Institute. (n.d.). *Tracking suicide data in your community.* https://www.preventioninstitute.org/suicide-prevention/tracking-suicide-data-in-your-community

REACHING Improved Mental Health Outcomes for Patients Act of 2022, H.R. 7237, 117th Cong. (2022). https://www.congress.gov/search?q=%7B%22source%22%3A%22legislation%22%2C%22congress%22%3A117%7D

Riera-Serra, P., Navarra-Ventura, G., Castro, A., Gili, M., Salazar-Cedillo, A., Ricci-Cabello, I., Roldan-Espinola, L., Coronado-Simsic, V., Garcia-Toro, M., Gomez-Juanes, R., & Roca, M. (2023). Clinical predictors of suicidal ideation, suicide attempts and suicide death in

depressive disorder: A systematic review and meta-analysis. *European Archives of Psychiatry and Clinical Neuroscience,* 1-21. https://doi.org/10.1007/s00406-023-01716-5

Rhodes, R. L., Noguchi, K., & Agler, L. M. L. (2022). Female veterinarians' experiences with human clients: The link to burnout and depression. *International Journal of Workplace Health Management*, *15*(5), 572-589. https://doi.org/https://doi.org/10.1108/IJWHM-01-2021-0007

Salcedo, B. (2018). *The comorbidity of anxiety and depression*. https://www.nami.org/education/the-comorbidity-of-anxiety-and-depression/#:~:text=In%20mental%20health%2C%20one%20of,with%20depression%20also%20experiencing%20anxiety.

Schwerdtfeger, K. A., Bahramsoltani, M., Spangenberg, L., Hallensleben, N., & Glaesmer, H. (2020). Depression, suicidal ideation and suicide risk in German veterinarians compared with the general German population. *Veterinary Record*, 186(15), 1-9. https://doi.org/10.1136/vr.105430

Shrivastava, A. & Desousa, A. (2016). Resilience: A psychobiological construct for psychiatric disorders. *Indian Journal of Psychiatry, 58*(1), 38-43. https://doi.org/10.4103/0019-5545.174365

Skipper, G. E., & Williams, J. B. (2012). Failure to acknowledge high suicide risk among veterinarians. *Journal of Veterinary Medical Education*, *39*(1), 79-82. https://doi.org/https://doi.org/10.3138/jvme.0311.034R

Spitzer, R.L., Kroenke, K., Williams, J.B., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine.* https://doi.org/10.1001/archinte.166.10.1092

Substance Abuse and Mental Health Services Administration. (2023). *Alcohol, tobacco, and other drugs.* https://www.samhsa.gov/find-help/atod

Suicide Prevention Resource Center. (2018). *Choosing a suicide prevention gatekeeper training program: A comparison table.* /https://sprc.org/wp-content/uploads/2022/12/GatekeeperMatrix6-21-18_0.pdf

Suicide Prevention Resource Center. (2020). *A comprehensive approach to suicide prevention.* https://sprc.org/effective-prevention/comprehensive-approach

Sun, C. F., Correll, C. U., Trestman, R. L., Lin, Y., Xie, H., Hankey, M. S., Uymatiao, R. P., Patel, R. T., Metsutnan, V. L., McDaid, E. C., Saha, A., Kuo, C., Lewis, P., Bhatt, S. H., Lipphard, L. E., & Kablinger, A. S. (2023). Low availability, long wait times, and high geographic disparity of psychiatric outpatient care in the US. *General Hospital Psychiatry*, *84*, 12–17. https://doi.org/10.1016/j.genhosppsych.2023.05.012

Sun, Y., Fu, Z., Bo, Q., Mao, Z., Ma, X., & Wang, C. (2020). The reliability and validity of PHQ-9 in patients with major depressive disorder in psychiatric hospital. *BMC Psychiatry, 20*(474). https://doi.org/10.1186/s12888-020-02885-6

Super, D.E. & Jordaanm J.P. (1973). Career development theory. *British Journal of Guidance and Counselling, 1*(1), 3-16. https://doi.org/10.1080/03069887308259333

Sutton, J. (2020). *Maladaptive coping: 15 examples and how to break the cycle.* https://positivepsychology.com/maladaptive-coping/

Tam, M. T., Wu, J. M., Zhang, C. C., Pawliuk, C., Robillard, J. M. (2024). A systematic review of the impacts of media mental health awareness campaigns on young people. *Health Promotion Practice,* 1-14. https://doi.org/10.1177/15248399241232646

The National Research Center for Work Environment. (n.d.). *Copenhagen Burnout Inventory (CBI).* https://nfa.dk/da/vaerktoejer/sporgeskemaer/sporgeskema-til-maaling-afudbraendthed/copenhagen-burnout-inventory-cbi

The University of Alabama. (2024). *Healthy vs. unhealthy relationships.* https://www.counseling.sa.ua.edu/resources/healthy-vs-unhealthy-relationships/

The White House. (2022). *Reducing the economic burden of unmet mental health needs.* https://www.whitehouse.gov/cea/written-materials/2022/05/31/reducing-the-economic-burden-of-unmet-mental-health-needs/#:~:text=The%20Federal%20Government%20covers%20some,from%20the%20U.S.%20Medicaid%20program.

Tomasi, S. E., Fechter-Leggett, E. D., Edwards, N. T., Reddish, A. D., Crosby, A. E., & Nett, R. J. (2019). Suicide among veterinarians in the United States from 1979 through 2015. *Journal of the American Veterinary Medical Association, 254*(1), 104-112. https://doi.org/10.2460/javma.254.1.104

Tran, L., Crane, M. F., & Phillips, J. K. (2014). The distinct role of performing euthanasia on depression and suicide in veterinarians. *Journal of Occupational Health Psychology*, *19*(2), 123-132. https://doi.org/10.1037/a0035837

Tretina, K. & Basile, C. (2022). *Student loan forgiveness for veterinarians.* https://www.forbes.com/advisor/student-loans/forgiveness-for-veterinarians/

University of North Georgia. (2024). *Physical well-being.* https://ung.edu/campus-recreation-and-wellness/wellness/physical-wellbeing.php

U.S. Bureau of Labor Statistics. (2024). *Occupational outlook handbook: Veterinarians.* https://www.bls.gov/ooh/healthcare/veterinarians.htm#tab-3

U.S. Department of Agriculture. (n.d.). *The veterinary medicine loan repayment program.* Retrieved June 4, 2024, from https://www.nifa.usda.gov/grants/programs/veterinary-medicine-loan-repayment-program

United States Department of Labor. (n.d.). *Bloodborne pathogens and needlestick prevention.* Retrieved June 11, 2024, from https://www.osha.gov/bloodborne-pathogens/standards

United States Department of Labor. (n.d.). *Criteria for personal protective equipment.* Retrieved June 11, 2024, from https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.95

U.S. Department of Labor. (1990). *What works: Workplaces without drugs.* https://files.eric.ed.gov/fulltext/ED332102.pdf

U.S. Office of Personnel Management. (n.d.). *Employee assistance program (EAP).* Retrieved June 4, 2024, from https://www.opm.gov/frequently-asked-questions/work-life-faq/employee-assistance-program-eap/what-is-an-employee-assistance-program-eap/

Vita, A. & Barlati, S. (2019). The implementation of evidence-based psychiatric rehabilitation: Challenges and opportunities for mental health services. *Frontiers in Psychiatry, 10*(147). https://doi.org/10.3389/fpsyt.2019.00147

Volk, J., Schimmack, U., Strand, E.B., Lord, L.K., & Siren, C.W. (2018). Executive summary of the Merck Animal Health veterinary wellbeing study. *Journal of the American Veterinary Medical Association, 252*(10), 1231-1238.

Volk, J., Schimmack, U., Strand, E., Hahn, J., Reinhard, A., Stiefelmeyer, K., & Probyn-Smith, K. (2022). *Merck Animal Health Veterinary Wellbeing Study III.* https://www.merck-animal-health-usa.com/wp-content/uploads/sites/54/2022/02/2021-PSV-Veterinary-Wellbeing-Presentation_V2.pdf

Volk, J., Schimmack, U., Strand, E., Hahn, J., Reinhard, A., Stiefelmeyer, K., & Probyn-Smith, K. (2023). *Merck Animal Health veterinary wellbeing study IV.* https://www.merck-animal-health-usa.com/offload-downloads/2023-vet-wellbeing-presentation

Volk, J., Schimmack, U., Strand, E., Vasconcelos, J., Siren, C., & Lord, L. (2020). *Merck Animal Health Veterinary Wellbeing Study II.* https://www.merck-animal-health-usa.com/offload-downloads/veterinary-wellbeing-study

Wadsworth, M.E. (2015). Development of maladaptive coping: A functional adaptation to chronic, uncontrollable stress. *Child Development Perspective, 9*(2), 96-100. https://doi.org/10.1111/cdep.12112

Wahlbeck, K. & McDaid, D. (2012). Actions to alleviate the mental health impact of the economic crisis. *World Psychiatry, 11*(3), 139-145. https://doi.org/10.1002/j.2051-5545.2012.tb00114.x

Waitz-Kudla, S. N., Kramper, S., Roark, A., Mani, I., & Witte, T. K. ((2023). Securing lethal means for suicide: A focus group study exploring perceptions and barriers among practicing veterinarians. *Journal of the Veterinary Medical Association*, *26*(11), 1683-1693. https://doi.org/https://doi.org/10.2460/javma.23.03.0129

Weissman, J., Pratt, L.A., Miller, E.A., & Parker, J.D. (2015). *Serious psychological distress among adults: United States, 2009-2013.* https://www.cdc.gov/nchs/data/databriefs/db203.pdf

White House. (2022). *Reducing the economic burden of unmet mental health needs.* https://www.whitehouse.gov/cea/written-materials/2022/05/31/reducing-the-economic-burden-of-unmet-mental-health-needs/

Whittemore, R., & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing, 52*(5), 546-553. https://doi.org/10.1111/j.1365-2648.2005.03621.x

World Health Organization. (2019). *ICD 11 for mortality and morbidity statistics: Burnout*. https://icd.who.int/browse/2024-01/mms/en#129180281

World Health Organization. (2019). *Burn-out an "occupational phenomenon": International Classification of Diseases.* https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases

World Health Organization. (2021). *Live life: An implementation guide for suicide prevention in countries.* https://iris.who.int/bitstream/handle/10665/341726/9789240026629-eng.pdf?sequence=1

World Health Organization. (2022). *Mental health.* https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response

World Health Organization. (2023). *Suicide.* https://www.who.int/news-room/fact-sheets/detail/suicide

World Health Organization. (2024). *Countries*. https://www.who.int/countries

World Health Organization. (2024). *Health and well-being.* https://www.who.int/data/gho/data/major-themes/health-and-well-being

Zero Suicide. (2022). *Framework.* https://zerosuicide.edc.org/about/framework

Zimmerman, C., Strohmaier, S., Niederkrotenthaler, T., Thau, K., & Schernhammer, E. (2023). Suicide mortality among physicians, dentists, veterinarians, and pharmacists as well as other high-skilled occupations in Austria from 1986 through 2020. *Psychiatry Research*, *323*, 1-8. https://doi.org/10.1016/j.psychres.2023.1151

Zippia. (2024). *Veterinarian demographics and statistics in the US.* https://www.zippia.com/veterinarian-jobs/demographics/

Appendix A: Institutional Review Board Approval

University of CINCINNATI
Institutional Review Board
FWA #: 00003152

APPROVAL

December 10, 2023

Afton Erbe
CON Office of Research and Scholarship

Dear Afton Erbe,

Type of Submission:	Initial Study
Title:	Mental Health and Suicide Among Veterinarians
Investigator:	Afton Erbe
IRB ID:	2023-0442
Funding:	National Institute for Occupational Safety and Health
Study Risk Level:	No greater than minimal risk
Documents Reviewed:	• Demographic Questions.pdf • IRB - Dissertation V3.pdf • Gillespie CV 2022-05.pdf • CV - Afton Erbe • Copenhagen Burnout Inventory • TAPS Tool • GAD-7 • PHQ-9 • Letter of Information • C-SSRS • Recruitment Letter.pdf • Social Media Recruitment.pdf • Screening Questions.pdf

On **11/5/2023**, the IRB reviewed the above submission using an EXPEDITED review procedure in accordance with 45 CFR 46.110(b)(1) which was given approval pending the response to modifications required. Response to the modifications required provided to the IRB were reviewed and approved on **11/30/2023** under the following category(ies):

• (7)(a) Behavioral research
• (7)(b) Social science methods

§46.110. *Expedited review procedures for certain kinds of research involving no more than minimal risk, and for minor changes in approved research.*

§46.110(b) *An IRB may use the expedited review procedure to review either or both of the following:*

1. *some or all of the research appearing on the list and found by the reviewer(s) to involve no more than minimal risk,*
2. *minor changes in previously approved research during the period (of one year or less) for which approval is authorized.*

Under an expedited review procedure, the review may be carried out by the IRB chairperson or by one or more experienced reviewers designated by the chairperson from among members of the IRB. In reviewing the research, the reviewers may exercise all of the authorities of the IRB except that the reviewers may not disapprove the research. A research activity may be disapproved only after review in accordance with the non-expedited procedure set forth in §46.108(b).

NO CONTINUING REVIEW REQUIREMENT:
Per UC SOP HRP-028 and the revised Common Rule, this study does not require continuing review and does not expire. The PI is still responsible for study closure, which is required upon completion of the study and can be completed by creating and submitting a continuing review. Navigate to the active study and click Create Modification/CR. Changes to the approved study are still required to be submitted and approved through a Modification request.

THE IRB HAS DETERMINED THE FOLLOWING CONSENTING REQUIREMENTS:

- **Per 45 CFR 46.117 (21 CFR 56.109)** the IRB has waived the requirement to obtain DOCUMENTATION of informed consent for all adult participants.

PI NOTIFICATIONS:
This approval is through the IRB only. You may be responsible for reporting to other regulatory officials. Please check with your institution and department to ensure you have met all reporting requirements.

WHERE CAN I FIND MY IRB APPROVED DOCUMENTS?
Approved and/or final versions of documents submitted to the IRB can be found under the **documents tab** of the study's RAP submission. Watermarked ("stamped") versions of the consent form will appear in the right-side column as a pdf document. The approval or acknowledgement letter can be found in the top right section of the submission's main study page under **letter**.

INTERNATIONAL CONFERENCE ON HARMONIZATION AND GOOD CLINICAL PRACTICES STATEMENT:
The Institutional Review Board is duly constituted (fulfilling FDA requirements for diversity), has written procedures for initial and continuing review of clinical trials: prepares written minutes of convened meetings and retains records pertaining to the review and approval process all in compliance with requirements defined in 21 CFR Parts 50, 56 and 312 Code of Federal Regulations. This institution is in compliance with the ICH GCP as adopted by FDA/DHHS.

Thank you for your cooperation during the review process.

Appendix B: Notice of Award

Department of Environmental and Public Health Sciences
Education and Research Center
University of Cincinnati
PO Box 670056
Cincinnati, OH 45267-0056

Kettering Laboratory Complex
160 Panzeca Way
(513) 558-5710

Occupational Health & Safety Program Areas:
Biological Monitoring, Environmental and Occupational Hygiene, Hazardous Substance Academic Training, Occupational Health Nursing, Occupation and Environmental Medicine, Pilot Research Project Program, Continuing Education, Outreach

July 6, 2023
Afton Michelle Erbe
University of Cincinnati
RE: Mental Health and Suicide Among Veterinarians

Dear Afton Michelle Erbe,

We are pleased to inform you that the above-referenced Pilot Research Project (PRP) proposal has received a meritorious priority score by the review panel and subsequently has been recommended for funding in the amount of $6,940.

The acceptance of this award comes with certain responsibilities and expectations.

Availability of Funds
Your approved funds will be available only after all required documents have been received and processed (documents detailed in award notice email). Please note that you must spend (not just encumber) all the approved funds for your project before June 30, 2024, as no funds will be allowed to carry-over.

Annual Symposium
As a PRP awardee, attendance is required at the 24th Annual Pilot Research Project Symposium (PRP), which will take place on October 13, 2023. You are also required to submit an abstract and present your proposed study plan and preliminary research findings to date (if any) as a poster presentation at the symposium.

Final Report
The final report will be due in the University of Cincinnati's ERC office by Friday, August 16, 2024. The PDF and word document should be emailed to erccoor@uc.edu. You are also required to make a podium presentation of your research results at the 25th Annual PRP Symposium that will be held in October 2024 (date TBA).

Acknowledgement Statement

An affirmative action/equal opportunity institution

It is important that support from the NIOSH ERC Pilot Research Project Training Program at the University of Cincinnati be acknowledged in all presentations (platform and poster) and publications. Failure to provide the required acknowledgement could jeopardize future funding. It is important that you share the above information with others involved in your project. The following is the appropriate acknowledgement statement to use:

This research study was supported by the National Institute for Occupational Safety and Health through the Pilot Research Project Training Program of the University of Cincinnati Education and Research Center Grant #T42OH008432

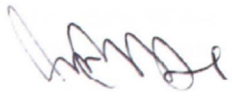
Follow Up

We plan to contact you periodically in the next several years for any additional accomplishments and/or grant success. We appreciate your assistance in this. It is important that we track the outcomes of these investments to ensure continued support of the Pilot Project Research Training Program from NIOSH.

If you have any additional questions and/or concerns, please direct them to Dr. Bhattacharya at (513) 558-0503 (amit.bhattacharya@uc.edu).

Congratulations once again!

Sincerely
PRP Executive Committee,



Amit Bhattacharya, PhD, CPE
Director
Education and Research Center
Pilot Research Project Program

Gordon Gillespie, PhD, DNP, RN
Deputy Director
Pilot Research Project Program

Kermit Davis, PhD
Deputy Director
Education and Research Center