

Article

Work-Related Behavior and Experience Patterns as Correlates of Health: A Comparative Analysis of Health Impairments Among Veterinarians in Germany by Employment Group

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Simple Summary

Veterinarians are exposed to significant work-related stress, which can impact their health. This study examined 974 German veterinarians and found that health problems occurred across various employment groups. Notably, health problems were more strongly associated with how veterinarians experienced and coped with work-related stress than with their employment type. These findings highlight the importance of prevention strategies focusing on working conditions and healthy coping mechanisms for work-related stress.

Abstract

Background: Veterinarians are exposed to substantial occupational stress. This study examined associations between work-related behavior and experience patterns (the way in which people deal with stressful situations) and physical, psychological, and social-communicative health impairments across employment groups of veterinarians in Germany. **Methods:** Data were obtained from a nationwide online cross-sectional survey. Sociodemographic and occupational variables, Work-Related Behavior and Experience Patterns (AVEM), and Physical, Psychological, and Social Symptoms (KOEPS) were analyzed in 974 veterinarians. **Results:** Of the 706 participants with a classifiable AVEM pattern, 65.5% exhibited Risk Pattern A or Risk Pattern B. Risk Patterns A and B were particularly frequent among trainee/assistant veterinarians (19.6%) and employees in private practices/clinics (26%). Above-average KOEPS total-scale scores were most frequent among employees in private practices/clinics (40.5%) and trainee/assistant veterinarians (39.9%). In the adjusted model, employment group was significantly associated only with Psychological Impairment ($p = 0.034$), whereas AVEM pattern showed the largest effect sizes across all KOEPS outcomes. **Conclusions:** Health impairments occurred across employment groups and were more strongly associated with AVEM patterns than with employment status. Prevention should therefore address both working conditions and individual coping resources.



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Keywords: veterinarians; stress; work-related behavior and experience patterns; physical; psychological; and social-communicative symptoms; employment groups

1. Introduction

Veterinary care is essential to the health of companion animals and livestock. According to a representative survey ($n = 5000$ households) conducted by the market research

institute Skopos on behalf of the German Pet Supplies Industry Association (Industrieverband Heimtierbedarf e. V.) and the Central Association of Zoological Retailers in Germany (Zentralverband Zoologischer Fachbetriebe Deutschlands e. V.), 43% of German households had at least one pet in 2025 [1,2]. Of the 34.3 million pets, cats accounted for 15.7 million and dogs for 10.0 million; the remainder included small animals, ornamental birds, and animals kept in aquariums, garden ponds, and terrariums [3]. In addition, the 2025 livestock population in Germany comprised approximately 33.4 million cattle, pigs, and sheep [4]. Veterinary medicine encompasses a broad range of activities aimed at protecting animal and human health, including the prevention and control of animal diseases, veterinary care, protection from zoonotic risks, monitoring of food hygiene and the safety of animal products and by-products, and protection from environmental impacts associated with animals and animal by-products [5]. Additional fields of activity include industry, particularly the pharmaceutical industry, and scientific research [5]. These responsibilities underscore the importance of the veterinary profession; veterinary practices and clinics have been classified as systemically relevant [6].

1.1. The Veterinary Profession in the Federal Republic of Germany

As of 31 December 2025, 46,089 veterinarians were registered in Germany, including 30,784 women [7]. Of the total, 34,476 were practicing veterinary medicine, whereas 11,613 were not practicing, had ceased practicing, or were working without compensation. Nearly one-quarter ($n = 11,216$) were private-practice veterinarians, and more than half of these ($n = 5930$) worked in small-animal practices. A total of 5958 veterinarians were employed in the public sector, 1447 were civil servants, 1172 worked in the private sector/industry, and 46 were veterinary interns. The remainder were distributed across agriculture, the German Armed Forces, and other employment categories.

1.2. The Employment Situation of Veterinarians

Current national and international research indicates that veterinarians are exposed to substantial physical and psychological strain associated with their work [8–12]. This is reflected in an increased prevalence of mental health disorders and a higher risk of suicide compared with the general population [13–16]. Regarding physical workload, veterinarians who treat large animals are particularly exposed to heavy physical labor, awkward body postures, and heavy lifting [11].

1.3. Work-Related Behavior and Experience Patterns as Correlates of Health

Employees' health is determined not only by working conditions but also by individual behaviors and ways of experiencing work-related demands [17]. Differences in work engagement, the ability to detach from work, coping with stress, and subjective well-being influence how work-related stressors are processed and the health consequences that may result. To assess these individual coping patterns, Schaarschmidt and Fischer developed the concept of Work-Related Behavior and Experience Patterns (AVEM) [18]. The AVEM assesses health-related characteristics across 11 dimensions grouped into engagement with work, psychological resilience, and work-related emotions [17,18]. A more detailed description of the 11 dimensions and the AVEM patterns can be found in the Methodology section under Section 2.2.1.

Numerous studies have shown that AVEM Risk Patterns A and B are associated with increased psychological strain, emotional exhaustion, burnout symptoms, depressive symptoms, and reduced work ability [19–26]. Pattern G reflects a health-promoting relationship with work, characterized by high but not excessive engagement, resilience, the ability to maintain emotional distance, and positive emotions such as experience of success at work, satisfaction with life, and experience of social support [20]. Pattern S (taking it easy)

requires a more nuanced interpretation. It may serve as a protective coping strategy in the short term, but over the longer term it may also be associated with reduced occupational motivation and willingness to perform [20].

1.4. Derivation of the Research Question

Although occupational stress and mental health disorders among veterinarians have been increasingly studied, an important research gap remains regarding the role of work-related behavior and experience patterns as correlates of health. The aim of this study was to examine associations between work-related behavior and experience patterns (the way in which people deal with stressful situations) and physical, psychological, and social-communicative health impairments among veterinarians in Germany, with comparisons across employment groups. Based on the problem statement outlined above, the following working hypotheses were formulated:

1. AVEM Risk Patterns A and B occur more frequently than Patterns G and S in the overall sample and within each individual employment group.
2. The occurrence of physical, psychological, and social-communicative health impairments differs significantly across the various employment groups. AVEM Risk Patterns A and B have more complaints than the other AVEM patterns G and S.

In addition, the study examined the associations of age, professional experience in years, gender, and AVEM pattern with health impairments.

2. Materials and Methods

The cross-sectional study “Causes and Consequences of Psychological Stress in the Daily Work and Emergency Services of Veterinarians in the Federal Republic of Germany” was conducted from 1 July 2021, to 30 June 2023. Data were collected through an online survey. Eligible participants were practicing veterinarians in Germany who had worked for at least one year in a veterinary specialty. Participants were recruited primarily through state and federal veterinary chambers. A study announcement was also published in the journal of the Federal Veterinary Medical Association and shared on Facebook and Instagram. A QR code provided direct access to the online survey.

The study was approved by the relevant ethics committee (No. 91/21), and data were collected anonymously.

2.1. Sample

A total of 1053 veterinarians participated in the online survey. Inclusion criteria were voluntary participation, at least one year of professional experience, and current employment as a veterinarian in a specialized field of veterinary medicine. Incomplete questionnaires and records that did not meet the inclusion criteria were excluded. Three employment groups were also excluded because of small sample sizes: other occupations ($n = 15$), non-practicing veterinarians ($n = 1$), and doctoral candidates ($n = 8$). After all inclusion and exclusion criteria and statistical requirements (e.g., completed questionnaires) were applied, 974 participants (mean age, 41.8 ± 10.13 years) were included in the analysis. The six analyzed employment groups were self-employed/practitioners (SE/P; 41.3%; $n = 402$), public-sector employees (PSE; 10.3%; $n = 100$), civil servants (CS; 3.2%; $n = 31$), private sector/industry (P/I; 3.1%; $n = 30$), trainee/assistant (T/A; 26.0%; $n = 253$), and employees in private practices/clinics (E; 16.2%; $n = 158$).

2.2. Measures

2.2.1. Work-Related Behavior and Experience Patterns (AVEM)

The AVEM questionnaire is a personality assessment tool used to measure behavior and experience in relation to work and occupational demands [17]. The self-reported behavior and experience patterns are evaluated from a health-related perspective to identify potentially health-relevant characteristics. The standard AVEM contains 66 items assigned to 11 dimensions (six items per dimension). The AVEM involves the following 11 dimensions:

Subjective importance of work (1); Work-related ambition (2); Willingness to work until exhausted (3); Striving for perfection (4); Distancing ability (5); Tendency to resignation in the face of failure (6); Proactive problem-solving (7); Inner calm and balance (8); Experience of success at work (9); Satisfaction with life (10); Experience of social support (11).

Responses are recorded on a five-point scale from 5 = completely agree to 1 = completely disagree. Raw item scores are converted to standard scores (stanine scores, 1–9) for the 11 dimensions. Scores are categorized as below average (≤ 3), average (4–6), or above average (≥ 7).

The 11 dimensions are grouped into three areas: engagement with work (dimensions 1–5), resilience (dimensions 5–8), and work-related emotions (dimensions 9–11) [17]. Distancing ability contributes to both engagement with work and resilience.

Based on scores across the 11 dimensions and the discriminant functions, respondents are classified by cluster analysis into Pattern G (health), Pattern S (taking it easy), Risk Pattern A (risk of driving oneself too hard), or Risk Pattern B (risk of resignation and depression) [17]. Classification is based on the degree of correspondence between an individual profile and the four reference profiles. The AVEM manual distinguishes five levels of pattern clarity: fully pronounced, accentuated, tendential, combined, and unclassifiable. A fully pronounced pattern requires one pattern $>95\%$; an accentuated pattern requires one pattern $>80\%$ and $\leq 95\%$; and a tendential pattern requires one pattern $>50\%$ and $\leq 80\%$, with no second pattern $>30\%$. Participants with combined or unclassifiable patterns were excluded from subsequent pattern analyses; only fully pronounced, accentuated, and tendential patterns were included. This approach was used to maintain comparability with previous studies.

Pattern G: Individuals with Pattern G (health) exhibit high but not excessive engagement with work and pronounced work-related ambition. Their willingness to work until exhausted is moderate to slightly elevated, and they show a pronounced distancing ability. The profile is also characterized by a low tendency to resignation in the face of failure, proactive problem-solving, inner calm and balance, and favorable scores for experience of success at work, satisfaction with life, and experience of social support [17].

Pattern S: Pattern S (taking it easy) is characterized by low engagement with work together with pronounced distancing ability. Individuals with this pattern generally report relative satisfaction and a positive outlook on life, with these resources often located outside the work context. Despite low engagement with work, their resilience suggests that they do not necessarily have a resigned attitude. Interventions may therefore focus on strengthening work motivation. In some cases, Pattern S may reflect insufficient professional challenge; in others, it may function as a protective mechanism against an emotionally stressful work environment [17,27].

Risk Pattern A: For individuals with Risk Pattern A, the behavior and experience profile may pose a health risk because excessive engagement with work is combined with limited distancing ability. This is reflected in above-average scores on dimensions 1–4 and below-average distancing ability. Resilience is also reduced, as indicated by lower inner calm and balance and a greater tendency to resignation in the face of failure. Individuals with this

pattern may therefore be more susceptible to stress and report lower overall well-being [17]. The designation “A” emphasizes both intense effort and the relationship to the Type A behavior [28]. The original Type A concept was associated with increased susceptibility to coronary heart disease among individuals characterized by persistent time pressure, strong ambition and competitiveness, hostility, and aggressiveness [17].

Risk Pattern B: Risk Pattern B is characterized by low engagement with work, particularly low subjective importance of work and work-related ambition. This apparent contradiction reflects the difference between professional commitment and an inability to distance oneself mentally from work. Having low levels of motivation and ambition does not necessarily mean that one can mentally detach from work [17,29]. Individuals with this pattern also find it difficult to mentally disengage from work after the workday. They show an above-average tendency to resignation in the face of failure, together with reduced resilience and coping resources. Satisfaction with life and experience of social support are also relatively low. The AVEM manual describes this profile as Risk Pattern B (risk of resignation and depression); its constellation of exhaustion and resignation resembles symptoms observed in advanced burnout [17,30]. Pattern-specific interventions are recommended for AVEM Risk Patterns A and B to counteract impending exhaustion, resignation, or burnout.

Internal consistency is high across the AVEM dimensions, with Cronbach’s alpha values ranging from 0.79 to 0.87 [17].

2.2.2. Physical, Psychological, and Social-Communicative Symptoms (KOEPS)

The KOEPS questionnaire developed by Manz uses a 60-item health impairments checklist to assess physical, psychological, and social-communicative health impairments [31–33]. Respondents rate the presence of complaints during the previous four weeks on a four-point scale ranging from 0 (does not apply at all) to 3 (applies very strongly). The individual scales are Physical Impairment (PI), Psychological Impairment (PsyI), and Social-Communicative Impairment (ScI), together with the Total Scale (T). Raw scores are standardized by age and gender and converted to stanine scores [31].

For KOEPS, Cronbach’s alpha values for internal consistency range from 0.89 to 0.95 [32].

2.3. Statistics

Statistical analyses were performed using IBM SPSS Statistics 29.0.0 (IBM, Armonk, NY, USA). Descriptive statistics included means (M), standard deviations (SD), medians, minimum and maximum values, and 95% confidence intervals (95% CIs). The Kolmogorov–Smirnov test was used to assess normality before inferential analyses. Inferential analyses included Pearson’s chi-square test or Fisher exact test, and the Kruskal–Wallis test. Bonferroni-adjusted *p*-values in post-hoc pairwise comparisons were calculated to reduce the risk of false-positive findings. Associations with covariates were examined using a general linear model (GLM). The dependent variables were the age- and gender-standardized KOEPS Stanine scores for the total scale and the subcategories physical, psychological and social-communicative health impairments. KOEPS raw scores were not used for this purpose. Occupational group, AVEM pattern and gender were considered categorical factors, while age and years of work experience were considered continuous covariates.

Even though the KOEPS stanine scores had already been standardised for age and gender against a reference population, these factors were taken into account again when estimating the relationships between occupational group, AVEM pattern and KOEPS scores, in order to capture any remaining associations within the sample under investigation. The

effect sizes were classified according to Cohen [34]: $\eta^2 < 0.06$ as a small effect, η^2 between 0.06 and 0.14 as a moderate effect, and $\eta^2 > 0.14$ as a strong effect.

3. Results

3.1. Sociodemographic and Occupational Data

The veterinarians were, on average, 41.8 ± 10.13 years old (range, 24–79 years). Age and years of professional experience differed significantly among employment groups (Table 1). Employees in private practices/clinics (E) were generally younger than participants in the other groups. Trainee/assistant veterinarians (T/A), participants working in the private sector/industry (P/I), and public-sector employees (PSE) were also significantly younger than self-employed/practitioners (SE/P) and civil servants (CS). The mean duration of professional experience was 14.3 ± 9.91 years (range, 1–50 years), with significant differences among employment groups (Kruskal–Wallis $p < 0.001$; Table 1). Civil servants (22.1 ± 9.08 years) and self-employed/practitioners (19.3 ± 9.61 years) had the longest professional experience. Employees in private practices/clinics had the shortest professional experience (8.5 ± 7.06 years), followed by trainee/assistant veterinarians (9.6 ± 7.58 years).

Table 1. Descriptive Statistics for Age and Years of Professional Experience by Employment Group.

Variable	SE/P (n = 402; 41.3%)	PSE (n = 100; 10.3%)	CS (n = 31; 3.2%)	P/I (n = 30; 3.1%)	T/A (n = 253; 26.0%)	E (n = 158; 16.2%)	Total (n = 974)	p (Kruskal–Wallis)
	Mean $\pm$ SD Median (Min–Max)							
Age [years]	47.1 $\pm$ 9.49 47 (25–79)	40.6 $\pm$ 9.48 39 (26–63)	48.6 $\pm$ 8.28 47 (36–68)	39.4 $\pm$ 8.95 37.5 (25–59)	37.1 $\pm$ 8.12 35 (24–65)	35.9 $\pm$ 7.87 34 (24–60)	41.8 $\pm$ 10.13 40 (24–79)	<0.001
	p(Bonferroni): E–PSE (0.002), E–SE/P (<0.001), E–CS (<0.001), T/A–SE/P (<0.001), T/A–CS (<0.001), P/I–SE/P (0.001), P/I–CS (0.004), PSE–SE/P (<0.001), PSE–CS (0.001)							
Years of professional experience [years]	19.3 $\pm$ 9.61 20 (1–50)	13.6 $\pm$ 9.25 12.5 (1–40)	22.1 $\pm$ 9.08 20 (9–45)	13.1 $\pm$ 9.27 11 (1–35)	9.6 $\pm$ 7.58 5.5 (1–37)	8.5 $\pm$ 7.06 7 (1–34)	14.3 $\pm$ 9.91 12 (1–50)	<0.001
	p(Bonferroni): E–PSE (<0.001), E–SE/P (<0.001), E–CS (<0.001), T/A–PSE (0.005), T/A–SE/P (<0.001), T/A–CS (<0.001), P/I–SE/P (0.016), P/I–CS (0.009), PSE–SE/P (<0.001), PSE–CS (0.001)							

Note. SE/P = self-employed/practitioners; PSE = public-sector employees; CS = civil servants; P/I = private sector/industry; T/A = trainee/assistant; E = employees in private practices/clinics. For p (Bonferroni), only significant group differences are shown.

There were significant differences in gender, marital status and the presence of children in the household across the six employment groups (all $p < 0.001$; see Table 2). Women constituted the majority in all groups, with the highest proportion found among those employed in private practices/clinics. The gender distribution was closest to parity among the self-employed and public-sector employees. Single participants represented the largest marital status category in most employment groups.

Information on children in the household was available for 730 of the 974 participants. The proportion of respondents reporting children was highest among trainee/assistant veterinarians and employees in private practices/clinics, and lowest among self-employed practitioners.

Overall, 55.4% of participants ($n = 540$) worked with small animals, 17.4% ($n = 169$) with large animals (livestock and horses), and 15.1% ($n = 147$) with both small and large animals (Table 3). A total of 31 participants (3.2%) worked in laboratory settings: 21 were public-sector employees, 8 worked in the private sector/industry, 1 was a civil servant, and 1 was an employee in a private practice/clinic. Another 87 participants (8.9%) worked for a

government agency. Small-animal work predominated among self-employed/practitioners, trainee/assistant veterinarians, and employees in private practices/clinics. Among the 540 small-animal veterinarians, self-employed/practitioners represented the largest employment group ($n = 253$). The distribution of fields of work differed significantly across employment groups ($p < 0.001$).

Table 2. Distribution of Gender, Marital Status, and Children in the Household Across the Six Employment Groups, n (%).

	Employment Groups						Total ($n = 974$)	p (Pearson χ^2) or Fisher Exact Test
	SE/P ($n = 402$)	PSE ($n = 100$)	CS ($n = 31$)	P/I ($n = 30$)	T/A ($n = 253$)	E ($n = 158$)		
Gender								
Male	169 (42.0%)	44 (44.0%)	9 (29.0%)	8 (26.7%)	100 (39.5%)	8 (5.1%)	338 (34.7%)	<0.001
Female	233 (58.0%)	56 (56.0%)	22 (71.0%)	22 (73.3%)	153 (60.5%)	150 (94.9%)	636 (65.3%)	<0.001
Marital status								
Single	195 (48.5%)	64 (64.0%)	12 (38.7%)	22 (73.3%)	188 (74.3%)	92 (58.2%)	573 (58.8%)	<0.001
Married	169 (42.0%)	33 (33.0%)	14 (45.2%)	6 (20.0%)	61 (24.1%)	62 (39.2%)	345 (35.4%)	<0.001
Widowed	5 (1.2%)	1 (1.0%)	2 (6.5%)	1 (3.3%)	0 (0%)	2 (1.3%)	11 (1.1%)	<0.001
Divorced	33 (8.2%)	2 (2.0%)	3 (9.7%)	1 (3.3%)	4 (1.6%)	2 (1.3%)	45 (4.6%)	<0.001
Children in the household (respondents to this item)								
No	181 (60.7%)	33 (54.1%)	14 (53.8%)	10 (41.7%)	52 (31.9%)	51 (32.3%)	341 (46.7%)	<0.001
Yes	117 (39.3%)	28 (45.9%)	12 (46.2%)	14 (58.3%)	111 (68.1%)	107 (67.7%)	389 (53.3%)	<0.001

Note. SE/P = self-employed/practitioners; PSE = public-sector employees; CS = civil servants; P/I = private sector/industry; T/A = trainee/assistant; E = employees in private practices/clinics.

Table 3. Distribution of Fields of Work, Work Locations, and Employment Contracts Across the Six Employment Groups, n (%).

	Employment Groups						Total ($n = 974$)	p (Pearson χ^2) or Fisher Exact Test
	SE/P ($n = 402$)	PSE ($n = 100$)	CS ($n = 31$)	P/I ($n = 30$)	T/A ($n = 253$)	E ($n = 158$)		
Field of work by animal species								
Small animals	253 (62.9%)	12 (12.0%)	1 (3.2%)	9 (30.0%)	161 (63.6%)	104 (65.8%)	540 (55.4%)	<0.001
Large animals (livestock & horses)	68 (16.9%)	6 (6.0%)	2 (6.5%)	9 (30.0%)	56 (22.1%)	28 (17.7%)	169 (17.4%)	<0.001
Small and large animals	80 (19.9%)	2 (2.0%)	0 (0%)	4 (13.3%)	36 (14.2%)	25 (15.8%)	147 (15.1%)	<0.001
Laboratory	0 (0%)	21 (21.0%)	1 (3.2%)	8 (26.7%)	0 (0%)	1 (0.6%)	31 (3.2%)	<0.001
Government agency	1 (0.2%)	59 (59.0%)	27 (87.1%)	0 (0%)	0 (0%)	0 (0%)	87 (8.9%)	<0.001
Work locations								
Large city	77 (19.2%)	45 (45.0%)	15 (48.4%)	6 (20.0%)	68 (26.9%)	47 (29.7%)	258 (26.5%)	<0.001
Medium-sized/small town	139 (34.6%)	29 (29.0%)	7 (22.6%)	12 (40.0%)	88 (34.8%)	53 (33.5%)	328 (33.7%)	<0.001
Rural areas	186 (46.3%)	26 (26.0%)	9 (29.0%)	12 (40.0%)	97 (38.3%)	58 (36.7%)	388 (39.8%)	<0.001
Employment contract								
	SE/P ($n = 389$)	PSE ($n = 98$)	CS ($n = 31$)	P/I ($n = 30$)	T/A ($n = 253$)	E ($n = 158$)	Total ($n = 959$)	<0.001
Fixed-term	3 (0.8%)	28 (28.6%)	1 (3.2%)	0 (0%)	26 (10.3%)	24 (15.2%)	82 (8.6%)	<0.001
Permanent	86 (22.1%)	70 (71.4%)	28 (90.3%)	30 (100%)	221 (87.4%)	133 (84.2%)	568 (59.2%)	<0.001
Does not apply	300 (77.1%)	0 (0%)	2 (6.5%)	0 (0%)	6 (2.4%)	1 (0.6%)	309 (32.2%)	

Note. SE/P = self-employed/practitioners; PSE = public-sector employees; CS = civil servants; P/I = private sector/industry; T/A = trainee/assistant; E = employees in private practices/clinics. Large city = >100,000 inhabitants; medium-sized/small town = <100,000 inhabitants.

The distribution of employment groups differed significantly across work locations ($p < 0.001$; see Table 3). The largest employment group in medium-sized/small towns and rural areas was self-employed/practitioners. Information on employment contracts was available for 959 participants. Permanent contracts predominated among those for whom an employment contract applied. Contract status differed significantly across employment groups ($p < 0.001$; see Table 3). Most self-employed practitioners indicated that neither contract category applied, consistent with their non-employee status.

3.2. Results of AVEM

Table 4 presents the 11 AVEM dimensions. In the total sample, the highest mean stanine score was observed for willingness to work until exhausted (6.0 ± 2.20), whereas proactive problem-solving had the lowest mean score (3.9 ± 1.87). Employment groups differed significantly in 8 of the 11 dimensions (Kruskal–Wallis $p \leq 0.05$); no significant group differences were observed for work-related ambition, striving for perfection, or experience of social support. Self-employed/practitioners had higher subjective importance of work than several other groups. Civil servants and trainee/assistant veterinarians had below-average mean scores for subjective importance of work. Willingness to work until exhausted was significantly higher among self-employed/practitioners than among public-sector employees. Trainee/assistant veterinarians showed a higher tendency to resignation in the face of failure and lower proactive problem-solving. Experience of success at work was lowest among employees in private practices/clinics and trainee/assistant veterinarians.

Based on their AVEM dimension profiles, 706 of the 974 participants could be assigned to one of the four AVEM patterns with a fully pronounced, accentuated, or tendential pattern expression. Pattern distribution differed significantly across the six employment groups ($p < 0.001$; Table 5).

Among the 706 participants with a classifiable AVEM pattern, Risk Pattern B was most frequent (40.1%; $n = 283$), followed by Risk Pattern A (25.4%; $n = 179$), Pattern S (21.1%; $n = 149$), and Pattern G (13.5%; $n = 95$). For Risk Pattern B, the largest absolute numbers were observed among self-employed/practitioners and trainee/assistant veterinarians ($n = 95$ each; 31.7% and 52.5% from employment groups), followed by employees in private practices/clinics ($n = 52$; 47.3%). For Risk Pattern A, the largest absolute numbers were among self-employed/practitioners ($n = 88$; 29.3%) and trainee/assistant veterinarians ($n = 43$; 23.8%). Pattern G included 55 self-employed/practitioners (18.3%), whereas Pattern S included 62 self-employed/practitioners (20.7%). Because employment-group sizes differed substantially, absolute counts and within-group percentages should be interpreted separately.

Within employment groups, AVEM Risk Patterns A and B together were most frequent among trainee/assistant veterinarians (76.3%) and employees in private practices/clinics (68.2%), followed by public-sector employees (62.5%) and self-employed/practitioners (61.0%). Among civil servants, Risk Patterns A and B and Patterns G and S were equally frequent (50.0% each); in private sector/industry, Patterns G and S together were slightly more frequent than Risk Patterns A and B (52.6% vs. 47.3%). Risk Pattern B was approximately twice as frequent as Risk Pattern A among public-sector employees, trainee/assistant veterinarians, and employees in private practices/clinics, but not among self-employed/practitioners. Pattern S was more frequent than Pattern G in all employment groups except civil servants.

Table 4. Descriptive Statistics of the AVEM Dimensions (Stanines) by Employment Group.

Employment Groups (n = 974)									
AVEM Dimensions (Stanines)	SE/P (n = 402)	PSE (n = 100)	CS (n = 31)	P/I (n = 30)	T/A (n = 253)	E (n = 158)	Total (n = 974)	<i>p</i> (Kruskal– Wallis)	<i>p</i> (Bonferroni)
Mean ± SD Median (Min–Max) [95% CI]									
SW	4.7 ± 2.03 5 (1–9) [4.50–4.90]	3.9 ± 2.08 4 (1–9) [3.49–4.31]	3.4 ± 1.82 3 (1–6) [2.69–4.02]	4.3 ± 1.78 4.5 (1–7) [3.60–4.93]	3.7 ± 1.87 3 (1–9) [3.50–3.97]	3.9 ± 1.77 4 (1–9) [3.59–4.15]	4.2 ± 1.99 (1–9)	<0.001	CS—SE/P (0.008); T/A—SE/P (<0.001); E—SE/P (<0.001); PSE—SE/P (0.006)
WA	4.8 ± 2.13 5 (1–9) [4.56–4.97]	4.8 ± 2.24 4 (1–9) [4.32–5.24]	4.6 ± 2.26 5 (1–8) [3.72–5.38]	4.5 ± 2.01 4 (1–9) [3.75–5.25]	4.7 ± 2.26 4 (1–9) [4.45–5.01]	4.9 ± 2.07 5 (1–9) [4.61–5.26]	4.8 ± 2.17 (1–9)	0.840	
WE	6.2 ± 2.20 6 (1–9) [5.97–6.40]	5.4 ± 2.28 5 (1–9) [4.95–5.85]	5.6 ± 1.89 5 (2–9) [4.92–6.31]	5.5 ± 2.36 6 (1–9) [4.59–6.35]	5.9 ± 2.22 6 (1–9) [5.62–6.17]	6.0 ± 2.05 6 (1–9) [5.63–6.28]	6.0 ± 2.20 (1–9)	0.016	PSE—SE/P (0.019)
SP	5.1 ± 2.11 5 (1–9) [4.86–5.28]	4.6 ± 2.00 4.5 (1–8) [4.21–5.01]	5.1 ± 1.80 5 (1–9) [4.47–5.79]	4.7 ± 1.75 5 (1–8) [4.01–5.32]	5.0 ± 2.14 5 (1–9) [4.74–5.27]	5.2 ± 2.01 5 (1–9) [4.84–5.47]	5.0 ± 2.07 (1–9)	0.362	
DA	4.4 ± 2.10 4 (1–9) [4.14–4.55]	5.0 ± 2.16 5 (1–9) [4.55–5.41]	4.9 ± 2.09 6 (1–8) [4.10–5.64]	4.9 ± 2.08 5 (1–9) [4.09–5.64]	4.1 ± 2.08 4 (1–9) [3.79–4.30]	4.1 ± 2.05 4 (1–9) [3.75–4.39]	4.3 ± 2.11 (1–9)	0.002	T/A—CS (0.006); E—PSE (0.025)
TR	5.7 ± 2.06 6 (1–9) [5.48–5.89]	5.6 ± 1.74 6 (1–9) [5.28–5.98]	4.9 ± 1.87 5 (2–9) [4.22–5.59]	4.8 ± 1.70 5 (2–7) [4.20–5.47]	6.3 ± 1.94 7 (1–9) [6.08–6.56]	6.1 ± 1.95 6 (1–9) [5.83–6.44]	5.9 ± 2.00 (1–9)	<0.001	P/I—E (0.016); P/I—T/A (0.001); CS—E (0.017); CS—T/A (0.001); PSE—T/A (0.015); SE/P—T/A (0.001)
PP	4.2 ± 1.93 4 (1–9) [4.01–4.39]	3.7 ± 1.64 4 (1–7) [3.37–4.03]	4.2 ± 2.01 4 (1–8) [3.46–4.93]	4.8 ± 1.90 5.5 (1–8) [4.09–5.51]	3.4 ± 1.80 3 (1–9) [3.18–3.63]	3.6 ± 1.71 4 (1–9) [3.36–3.90]	3.9 ± 1.87 (1–9)	<0.001	T/A—SE/P (<0.001); T/A—P/I (0.001); E—SE/P (0.035); E—P/I (0.030)
IB	5.0 ± 1.97 5 (1–9) [4.81–5.19]	4.5 ± 1.87 4 (1–9) [4.16–4.90]	5.5 ± 1.65 6 (1–9) [4.85–6.06]	5.2 ± 1.81 5 (2–9) [4.52–5.88]	4.7 ± 1.80 5 (1–9) [4.43–4.87]	4.8 ± 1.84 5 (1–9) [4.55–5.13]	4.9 ± 1.89 (1–9)	0.026	

Table 4. Cont.

Employment Groups (n = 974)									
AVEM Dimensions (Stanines)	SE/P (n = 402)	PSE (n = 100)	CS (n = 31)	P/I (n = 30)	T/A (n = 253)	E (n = 158)	Total (n = 974)	<i>p</i> (Kruskal– Wallis)	<i>p</i> (Bonferroni)
Mean ± SD Median (Min–Max) [95% CI]									
EW	5.2 ± 2.22 6 (1–9) [4.99–5.42]	4.6 ± 2.37 4.5 (1–9) [4.11–5.05]	5.9 ± 2.00 6 (1–9) [5.14–6.60]	5.3 ± 1.82 5.5 (2–9) [4.62–5.98]	3.9 ± 2.15 4 (1–9) [3.58–4.11]	3.8 ± 2.20 3 (1–9) [3.44–4.13]	4.6 ± 2.30 (1–9)	<0.001	E—SE/P (<0.001); E—P/I (0.010); E—CS (<0.001); T/A—SE/P (<0.001); T/A—P/I (0.013); T/A—CS (<0.001)
SL	4.5 ± 2.31 5 (1–9) [4.27–4.72]	4.3 ± 1.95 4 (1–9) [3.94–4.72]	4.5 ± 2.16 5 (1–9) [3.72–5.31]	5.1 ± 2.05 5.5 (1–9) [4.30–5.83]	4.0 ± 2.24 4 (1–9) [3.71–4.27]	3.8 ± 2.27 4 (1–9) [3.47–4.18]	4.3 ± 2.26 (1–9)	<0.001	E—SE/P (0.011) E—P/I (0.033)
ES	4.5 ± 2.08 5 (1–9) [4.30–4.70]	4.2 ± 1.89 4.5 (1–9) [3.82–4.56]	4.6 ± 1.93 5 (1–9) [3.87–5.29]	4.9 ± 1.88 5 (1–9) [4.20–5.60]	4.5 ± 1.94 5 (1–9) [4.26–4.74]	4.7 ± 1.98 5 (1–9) [4.35–4.98]	4.5 ± 2.00 (1–9)	0.472	

Note: SE/P = self-employed/practitioners; PSE = public-sector employees; CS = civil servants; P/I = private sector/industry; T/A = trainee/assistant; E = employees in private practices/clinics. For *p* (Bonferroni), only significant group differences are shown. AVEM dimensions: SW = Subjective importance of work; WA = Work-related ambition; WE = Willingness to work until exhausted; SP = Striving for perfection; DA = Distancing ability; TR = Tendency to resignation in the face of failure; PP = Proactive problem-solving; IB = Inner calm and balance; EW = Experience of success at work; SL = Satisfaction with life; ES = Experience of social support.

Table 5. Distribution of AVEM Patterns Across the Six Employment Groups, n (%).

AVEM Pattern	Employment Groups						Total (n = 706)	p (Pearson χ^2) or Fisher Exact Test
	SE/P (n = 300)	PSE (n = 72)	CS (n = 24)	P/I (n = 19)	T/A (n = 181)	E (n = 110)		
A	88 (29.3%)	15 (20.8%)	3 (12.5%)	7 (36.8%)	43 (23.8%)	23 (20.9%)	179 (25.4%)	<0.001
B	95 (31.7%)	30 (41.7%)	9 (37.5%)	2 (10.5%)	95 (52.5%)	52 (47.3%)	283 (40.1%)	<0.001
G	55 (18.3%)	9 (12.5%)	7 (29.2%)	2 (10.5%)	10 (5.5%)	12 (10.9%)	95 (13.5%)	<0.001
S	62 (20.7%)	18 (25.0%)	5 (20.8%)	8 (42.1%)	33 (18.2%)	23 (20.9%)	149 (21.1%)	<0.001

Note: SE/P = self-employed/practitioners; PSE = public-sector employees; CS = civil servants; P/I = private sector/industry; T/A = trainee/assistant; E = employees in private practices/clinics.

3.3. Results of KOEPS

In the overall sample, mean KOEPS stanine scores were approximately 6 or higher across the Total, Physical Health Impairment, Psychological Health Impairment, and Social-Communicative Health Impairment scales (Table 6). Psychological Health Impairment had higher mean scores than Physical Health Impairment in the total sample and in all employment groups except private sector/industry.

Table 6. Descriptive Statistics for the KOEPS Scales (Stanines) by Employment Group.

KOEPS Scales (Stanines)	Employment Groups						Total (n = 974)	p (Kruskal–Wallis)	p (Bonferroni)
	SE/P (n = 402)	PSE (n = 100)	CS (n = 31)	P/I (n = 30)	T/A (n = 253)	E (n = 158)			
	Mean $\pm$ SD Median (Min–Max) [95% CI]								
Total scale	5.9 $\pm$ 2.16 6 (1–9) [5.70–6.13]	6.0 $\pm$ 2.20 6 (1–9) [5.59–6.47]	5.4 $\pm$ 1.84 5 (2–9) [4.74–6.09]	5.3 $\pm$ 2.00 6 (2–8) [4.52–6.01]	6.5 $\pm$ 2.19 7 (1–9) [6.23–6.77]	6.7 $\pm$ 2.10 7 (1–9) [6.32–6.98]	6.2 $\pm$ 2.18 (1–9)	<0.001	
	p(Bonferroni): P/I–E (0.025), CS–E (0.029), SE/P–T/A (0.009), SE/P–E (0.005)								
Physical impairment	5.8 $\pm$ 1.92 6 (1–9) [5.64–6.02]	5.8 $\pm$ 1.99 6 (2–9) [5.41–6.19]	5.1 $\pm$ 1.59 5 (3–9) [4.48–5.65]	5.6 $\pm$ 1.71 6 (2–9) [4.96–6.24]	6.3 $\pm$ 1.98 6 (1–9) [6.04–6.53]	6.6 $\pm$ 1.89 7 (1–9) [6.27–6.86]	6.0 $\pm$ 1.95 (1–9)	<0.001	
	p(Bonferroni): CS–T/A (0.008), CS–E (0.001), PSE–E (0.028), SE/P–T/A (0.046), SE/P–E (0.001)								
Psychological impairment	6.1 $\pm$ 2.10 6 (1–9) [5.91–6.33]	6.2 $\pm$ 2.11 6 (2–9) [5.82–6.66]	5.7 $\pm$ 1.81 6 (2–9) [5.05–6.37]	5.2 $\pm$ 2.02 5.5 (2–9) [4.44–5.96]	6.7 $\pm$ 2.06 7 (1–9) [6.43–6.94]	6.7 $\pm$ 2.03 7 (2–9) [6.38–7.02]	6.3 $\pm$ 1.95 (1–9)	<0.001	
	p(Bonferroni): P/I–E (0.008), P/I–T/A (0.005), SE/P–T/A (0.009)								
Social-communicative impairment	5.8 $\pm$ 1.85 6 (3–9) [5.62–5.99]	5.8 $\pm$ 1.78 6 (3–9) [5.46–6.16]	5.6 $\pm$ 1.52 5 (3–9) [5.02–6.14]	5.2 $\pm$ 1.63 6 (3–8) [4.59–5.81]	6.3 $\pm$ 1.95 6 (3–9) [6.03–6.51]	6.5 $\pm$ 1.86 6 (3–9) [6.16–6.75]	6.0 $\pm$ 1.88 (3–9)	<0.001	
	p(Bonferroni): P/I–E (0.024), SE/P–T/A (0.048), SE/P–E (0.003)								

Note: SE/P = self-employed/practitioners; PSE = public-sector employees; CS = civil servants; P/I = private sector/industry; T/A = trainee/assistant; E = employees in private practices/clinics. KOEPS scales: PI = Physical Health Impairment; PsyI = Psychological Health Impairment; Sci = Social-Communicative Health Impairment.

Employment groups differed significantly on all three KOEPS impairment scales and the Total Scale in the unadjusted analyses ($p < 0.001$). The highest mean Total Scale scores were observed among employees in private practices/clinics (6.7 ± 2.10) and trainee/assistant veterinarians (6.5 ± 2.19). The highest Physical Impairment score was also observed among employees in private practices/clinics (6.6 ± 1.89), followed by trainee/assistant veterinarians (6.3 ± 1.98); civil servants had the lowest mean Physical Impairment score (5.1 ± 1.59). Psychological Impairment means were highest among trainee/assistant veterinarians (6.7 ± 2.06) and employees in private practices/clinics

(6.7 ± 2.03). These two groups also had the highest Social-Communicative Impairment means (6.3 ± 1.95 and 6.5 ± 1.86 , respectively).

The distribution of below-average, average, and above-average KOEPS scores differed significantly across employment groups for each scale ($p < 0.001$; Table 7).

Table 7. Distribution of KOEPS Scale Categories Across the Six Employment Groups, n (%).

KOEPS Scores	SE/P (n = 402)	PSE (n = 100)	CS (n = 31)	P/I (n = 30)	T/A (n = 253)	E (n = 158)	Total (n = 974)	p (Pearson χ^2) or Fisher Exact Test
Total Scale								
Below average	25 (6.2%)	5 (5.0%)	1 (3.2%)	5 (16.7%)	12 (4.7%)	2 (1.3%)	50 (5.1%)	<0.001
Average	264 (65.7%)	64 (64.0%)	24 (77.4%)	21 (70.0%)	140 (55.3%)	92 (58.2%)	605 (62.1%)	<0.001
Above average	113 (28.1%)	31 (31.0%)	6 (19.4%)	4 (13.3%)	101 (39.9%)	64 (40.5%)	319 (32.8%)	<0.001
Physical impairment								
Below average	9 (2.2%)	3 (3.0%)	0 (0%)	1 (3.3%)	7 (2.8%)	1 (0.6%)	21 (2.2%)	<0.001
Average	305 (75.9%)	74 (74.0%)	29 (93.5%)	26 (86.7%)	166 (65.6%)	101 (63.9%)	701 (72.0%)	<0.001
Above average	88 (21.9%)	23 (23.0%)	2 (6.5%)	3 (10.0%)	80 (31.6%)	56 (35.4%)	252 (25.9%)	<0.001
Psychological impairment								
Below average	24 (6.0%)	3 (3.0%)	1 (3.2%)	5 (16.7%)	7 (2.8%)	3 (1.9%)	43 (4.4%)	<0.001
Average	267 (66.4%)	65 (65.0%)	24 (77.4%)	22 (73.3%)	140 (55.3%)	91 (57.6%)	609 (62.5%)	<0.001
Above average	111 (27.6%)	32 (32.0%)	6 (19.4%)	3 (10.0%)	106 (41.9%)	64 (40.5%)	322 (33.1%)	<0.001
Social-communicative impairment								
Below average	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	<0.001
Average	322 (80.1%)	80 (80.0%)	28 (90.3%)	28 (93.3%)	177 (70.0%)	110 (69.6%)	745 (76.5%)	<0.001
Above average	80 (19.9%)	20 (20.0%)	3 (9.7%)	2 (6.7%)	76 (30.0%)	48 (30.4%)	229 (23.5%)	<0.001

Note: SE/P = self-employed/practitioners; PSE = public-sector employees; CS = civil servants; P/I = private sector/industry; T/A = trainee/assistant; E = employees in private practices/clinics.

Of the 974 veterinarians, 605 (62.1%) had KOEPS Total Scale scores in the average range and 319 (32.8%) had above-average scores. Among participants with above-average Total Scale scores, the largest absolute number was observed among self-employed/practitioners ($n = 113$); however, the highest within-group proportions were among employees in private practices/clinics (40.5%) and trainee/assistant veterinarians (39.9%), compared with 28.1% among self-employed/practitioners.

Above-average Physical Impairment scores were observed in 252 participants (25.9%). Within employment groups, above-average scores occurred in 21.9% of self-employed/practitioners ($n = 88$), 31.6% of trainee/assistant veterinarians ($n = 80$), and 35.4% of employees in private practices/clinics ($n = 56$). Civil servants (6.5%) and private sector/industry (10.0%) had the lowest within-group proportions of above-average Physical Impairment scores.

Above-average Psychological Impairment scores were observed in 33.1% of the total sample ($n = 322$), including 111 self-employed/practitioners (27.6% from employment groups), 106 trainee/assistant veterinarians (41.9%), and 64 employees in private practices/clinics (40.5%). Within employment groups, the highest proportions were observed among trainee/assistant veterinarians (41.9%) and employees in private practices/clinics (40.5%).

No participant had a below-average Social-Communicative Impairment score. Average scores were observed in 745 participants (76.5%), and 229 (23.5%) had above-average scores. The largest absolute number of above-average scores occurred among self-employed/practitioners ($n = 80$), whereas the highest within-group proportions were among employees in private practices/clinics (30.4%) and trainee/assistant veterinarians (30.0%). Public-sector employees also had a substantial proportion of above-average scores (20.0%).

3.4. Summary of Results with Covariate Adjustment

The results of the general linear model (GLM) are presented in Table 8. Partial eta-squared (η^2) values for the adjusted model ranged from 0.284 to 0.379.

Table 8. GeneralLinear Model (GLM) of the KOEPS Scales.

		Total Scale	Physical Impairment	Psychological Impairment	Social-Communicative Impairment
Adjusted model	F	44.916	30.716	47.158	31.350
	<i>p</i>	<0.001	<0.001	<0.001	<0.001
	η^2	0.367	0.284	0.379	0.288
Age	<i>p</i>	0.328	0.111	0.422	0.684
	η^2	0.001	0.004	0.001	<0.001
Years of work experience	<i>p</i>	0.220	0.288	0.224	0.183
	η^2	0.002	0.002	0.002	0.003
AVEM pattern	<i>p</i>	<0.001	<0.001	<0.001	<0.001
	η^2	0.315	0.213	0.328	0.236
Gender	<i>p</i>	0.289	0.029	0.029	0.027
	η^2	0.002	0.007	0.007	0.007
Employment Group	<i>p</i>	0.258	0.412	0.034	0.658
	η^2	0.009	0.007	0.017	0.005

The largest adjusted-model effect size was observed for Psychological Impairment ($\eta^2 = 0.379$), and the smallest for Physical Impairment ($\eta^2 = 0.284$). Age and years of professional experience were not significantly associated with any KOEPS scale. AVEM pattern showed the largest predictor-specific effect sizes, with $p < 0.001$ for all four KOEPS outcomes and η^2 values ranging from 0.213 to 0.328. The largest AVEM effect was observed for Psychological Impairment ($\eta^2 = 0.328$), and the smallest for Physical Impairment ($\eta^2 = 0.213$). Gender was significantly associated with Physical, Psychological, and Social-Communicative Impairment (all $p < 0.05$), but the corresponding effect sizes were very small ($\eta^2 = 0.007$). Employment group was significantly associated only with Psychological Impairment ($p = 0.034$; $\eta^2 = 0.017$), representing a small effect.

Overall, AVEM pattern membership showed the largest associations with KOEPS outcomes, with partial η^2 values of 0.315 for the Total Scale, 0.213 for Physical Impairment, 0.328 for Psychological Impairment, and 0.236 for Social-Communicative Impairment. Age and years of professional experience showed no significant associations. Gender showed statistically significant but very small associations with three impairment scales, and employment group was significantly associated only with Psychological Impairment ($\eta^2 = 0.017$). These findings indicate that work-related behavior and experience patterns were more strongly associated with health impairments than the demographic and employment variables included in the model.

4. Discussion

This study examined associations between work-related behavior and experience patterns and physical, psychological, and social-communicative health impairments among veterinarians in different employment groups in Germany. A key finding was the high prevalence of AVEM Risk Patterns among participants with a classifiable pattern: 65.5% were assigned to Risk Pattern A or Risk Pattern B. Thus, the Risk Patterns predominated overall, although their distribution differed among employment groups.

Numerous studies have documented substantial stress and strain in veterinary work [9,35,36]. For many years, the associated health consequences—including depressive symptoms, suicidal ideation, and burnout—received limited research attention, particularly in Germany. In recent years, however, the evidence base has expanded [8,37,38], enabling

more detailed conclusions regarding the influence of work-related and personal factors on veterinarians' subjective stress and its consequences. Of particular relevance are the identification of problem areas [39], the use of personal resources [40], and the development and implementation of organizational measures that may contribute to prevention and health improvement.

To assess comparability, the study sample was compared with national veterinary statistics for 2022 published by the Bundestierärztekammer e.V. (Bundestierärztekammer, BTK) in 2023 [41]. Public-sector employees represented 10.3% of the study sample ($n = 100$), compared with 12.5% ($n = 5595$) in the national statistics. Civil servants and veterinarians working in the private sector/industry each accounted for approximately 3–4% in both datasets. The trainee/assistant group represented 26.0% of the study sample ($n = 253$), compared with 24.2% ($n = 10,811$) when the corresponding trainee and assistant categories were combined in the national statistics. The largest discrepancy concerned self-employed/practitioners, who were overrepresented in the study sample (41.3%; $n = 402$) compared with the national statistics (26.3%; $n = 11,743$). Employees in private practices/clinics could not be compared directly because this category was not reported separately in the national data.

The proportion of women was similar in the national statistics (64.8%; $n = 28,901$) and the study sample (65.3%; $n = 636$) [41]. Among self-employed/practitioners, women represented 58.0% of the study group ($n = 233$), compared with 56.9% ($n = 6685$) in the national data. The proportion of women in the study sample was lower than in the national statistics among public-sector employees and the trainee/assistant group, but higher among civil servants and those working in the private sector/industry. Women constituted a majority in every employment group in the study sample (at least 56%) and accounted for 94.9% of employees in private practices/clinics, a category for which no direct national comparison was available. The increasing proportion of women in veterinary medicine, both in Germany and internationally, is frequently described as the “feminization” of the profession [42–44]. National statistics indicate that most veterinarians in Germany were between 30 and 59 years of age [7].

Representation across state veterinary chambers was uneven [7]. Because regional differences in working conditions were not evaluated in this analysis, the implications of this uneven representation cannot be determined and should be considered when interpreting generalizability. Although the study sample differed from national veterinary statistics in some respects, several key characteristics—particularly the overall gender distribution and the distribution of several employment groups—were broadly similar. Although the sample reflects some demographic patterns observed in the national veterinary workforce, these similarities do not establish representativeness.

Among the 706 participants with a classifiable AVEM pattern, Risk Patterns A and B together accounted for 65.5%, whereas Patterns G and S together accounted for 34.6%. This distribution varied by employment group. Risk Patterns predominated among self-employed/practitioners, public-sector employees, trainee/assistant veterinarians, and employees in private practices/clinics. Among civil servants, Risk Patterns A and B and Patterns G and S were equally frequent (50.0% each). In private sector/industry, Patterns G and S together were slightly more frequent than Risk Patterns A and B (52.6% vs. 47.3%); however, this finding should be interpreted cautiously because only 19 participants in this group had a classifiable AVEM pattern. Hypothesis 1 was therefore only partially supported.

Risk Pattern B shares features with burnout syndrome, a topic receiving increasing international research attention [45–50]. Previous analyses of this study population reported similar levels of burnout risk across broad employment categories. Some burnout symp-

toms were reported by nearly half of participants, with employed veterinarians particularly affected (54%). A high risk of burnout was reported in 16.7% of public-sector veterinarians, 15.9% of employed veterinarians, and 15.5% of self-employed veterinarians [37]. Burnout risk among veterinarians has also been reported to exceed the 4.2% prevalence reported in the general population [37]. A systematic review further concluded that burnout among veterinarians is elevated compared with human medical professionals [10].

The proportion of veterinarians assigned to AVEM Risk Patterns was similar to findings reported in Ukrainian oncologists [51] and medical students [52], in whom approximately two-thirds of participants also exhibited Risk Patterns. By contrast, AVEM Risk Patterns were identified in only about one-third of emergency medical service personnel [53]. The high burnout burden reported in veterinarians relative to the general population and other medical groups is consistent with the frequent occurrence of Risk Pattern B in the present study. Although AVEM Risk Pattern B exhibits characteristics similar to burnout, such as exhaustion and resignation, it is a work-related behaviour and experience profile rather than a clinical diagnosis. Therefore, its frequency should not be interpreted as an indication of the prevalence of burnout.

The severity of KOEPS health impairments did not differ uniformly across employment groups, contrary to Hypothesis 2. Psychological Impairment had the highest proportion of above-average stanine scores in the total sample (33.1%), exceeding the proportions for Physical and Social-Communicative Impairment. In the unadjusted analyses, employment groups differed significantly on all KOEPS scales (Tables 6 and 7). However, after covariate adjustment in the GLM, employment group was significantly associated only with Psychological Impairment, indicating a small effect. Within-group descriptive results nevertheless showed higher KOEPS scores among trainee/assistant veterinarians and employees in private practices/clinics on several scales, whereas participants in private sector/industry generally had lower mean Psychological Impairment scores. These findings distinguish descriptive group differences from the adjusted employment-group effect.

Absolute counts and within-group percentages should be interpreted separately. Because self-employed/practitioners constituted the largest employment group, they contributed the largest absolute number of participants with above-average scores on several KOEPS scales. In contrast, the highest within-group proportions of above-average scores were often observed among trainee/assistant veterinarians and employees in private practices/clinics.

Direct comparisons with other employment groups are limited because few studies have examined KOEPS scale scores across veterinary employment categories. Related evidence is available for other health measures. For example, well-being assessed with the WHO-5 was low in 59.4% of veterinarians in one study, and multivariate analysis showed no significant association between employment type and subjective well-being [54].

In an Austrian survey conducted in 2022 and published in 2024, Neubauer et al. (2024) assessed 440 practicing veterinarians using validated screening instruments, including the PHQ-9 and GAD-7, to evaluate depression, anxiety, sleep disturbances, perceived stress, and alcohol use [55]. The study found no association between professional field (e.g., clinical practice, university/research, slaughterhouse work, or animal and meat inspection) and the mental health indicators examined.

The adjusted analyses indicate that AVEM pattern membership had the largest effect sizes across the KOEPS outcomes, whereas age, professional experience, gender, and employment group showed smaller or nonsignificant associations. Thus, work-related behavior and experience patterns were more strongly associated with physical, psychological, and social-communicative health impairments than the formal employment variables examined.

These findings suggest that health impairments among veterinarians cannot be explained solely by formal employment status. How occupational demands are experienced and managed also appears to be important. Prevention should therefore address both organizational working conditions and individual work-related behaviors, experiences, and coping resources rather than focusing exclusively on specific employment groups. These associations suggest that AVEM profiles could inform the development of preventive measures alongside organizational working conditions. However, the cross-sectional design and the conceptual overlap between AVEM and self-reported health impairments mean that it is not possible to conclude whether modifying these profiles would improve health outcomes. The effectiveness of pattern-specific interventions requires separate evaluation.

At the individual level, interventions should aim to reduce health-threatening work attitudes and strengthen health-promoting coping strategies. At the organizational level, these patterns should be considered in the context of working and living conditions [17]. For Pattern G, no pattern-specific intervention is generally indicated. For Pattern S, interventions may focus on work motivation while recognizing that lower engagement can also function as a protective response to occupational stress. For Risk Pattern A, characterized by excessive engagement with work together with reduced distancing ability and resilience, interventions may emphasize stress management, boundary setting, and opportunities for recovery. For Risk Pattern B, which is characterized by low engagement with work, a high tendency to resignation in the face of failure, and exhaustion, interventions may prioritize self-efficacy, motivation, psychological support, and coaching.

Limitations

Several limitations should be considered. The cross-sectional design does not allow causal conclusions. Recruiting via veterinary associations, specialist publications and social media probably resulted in a self-selecting sample. Participation was exclusively online, creating a potential risk of selection bias. The number of vets who received or saw the invitation could not be determined, as the readership of newsletters and publications, and the reach of social media posts, were unknown. Furthermore, the recruitment channels may have overlapped. Consequently, no response rate could be calculated. Vets with a particular interest in occupational stress and health, or those suffering from health impairments, may have been more likely to participate in the study. However, the direction and extent of any selection bias remain unknown. Therefore, similarities between the characteristics of the selected sample and national veterinary statistics do not constitute evidence of representativeness, and caution should be exercised when generalising to the veterinary profession in Germany. The AVEM and KOEPS results are based on self-report and therefore reflect participants' subjective perceptions rather than objective measures of impairment; social-desirability bias cannot be excluded. Several employment groups were excluded because of small sample sizes, limiting conclusions for these groups and potentially omitting relevant perspectives. The occupational groups varied greatly in size, with some comprising only a few participants, particularly after the analysis was restricted to classifiable AVEM patterns. To ensure comparability with other studies, combined AVEM patterns were excluded from the pattern analyses. This further reduced the sample size, which limits the precision of group-specific estimates and the statistical power to detect differences involving smaller groups. The results should therefore be interpreted with caution. The results of the adjusted model must also be interpreted in the light of the choice of covariates. Taking age and work experience into one model simultaneously may complicate the estimation of their respective associations with the KOEPS scores, given their potentially close effect. Although the KOEPS scores were already standardized for age and gender, age and gender were additionally taken into account to capture any remaining

associations within the sample under investigation. These associations were taken into account when estimating the relationships between occupational group and AVEM pattern and the KOEPS scores. However, standardization against a reference population does not, in principle, rule out such associations within the sample under investigation. The relatively long data collection period, from July 2021 to June 2023, may have encompassed changes in working conditions that influenced the work-related experiences of participants and their reported health impairments. These temporal influences were not examined, but they may have contributed to the heterogeneity of the findings.

5. Conclusions

This study identified associations between work-related behavior and experience patterns and self-reported health impairments among veterinarians across different employment groups.

Future research should also examine individual and workplace stressors, coping strategies, and available or insufficient resources. Such evidence can support the development and implementation of targeted health-promotion measures.

Future studies should also identify specific occupational stressors so that prevention and health promotion can be tailored appropriately. Job-specific risk assessment may provide one starting point. Programs and interventions should also be evaluated, monitored, and adapted over time to determine and maintain their effectiveness.

Reducing health impairments and strengthening relevant resources may contribute to sustained improvements in veterinarians' working conditions and health. Continued research is therefore important for developing and evaluating effective preventive approaches.

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Abbreviations

The following abbreviations are used in this manuscript:

AVEM	Work-Related Behavior and Experience Patterns
KOEPS	Physical, Psychological, and Social Symptoms

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