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Suicidal behavior in a nationwide cross-sectional study of veterinarians in Norway (The NORVET study): individual and work-related factors

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ABSTRACT

Objectives: To investigate the self-reported level, contributing factors and independent factors associated with suicidal behavior among veterinarians in Norway.

Design: Cross-sectional, nationwide survey.

Participants: Of the eligible sample of 3464 veterinarians, 2596 responses were received (response rate: 75 %).

Main outcome measure: Paykel's five-item questionnaire about suicidal behavior.

Results: In total, 27 % of veterinarians in Norway felt that life was not worth living during the last year, 5 % had serious suicidal thoughts, and 0.2 % had attempted suicide. Female veterinarians reported significantly higher levels of suicidal feelings and thoughts than their male colleagues. For example, women had nearly twice the level of serious suicidal thoughts as their male colleagues (6.1 % vs. 3.6 %, chi-square 6.5, p<0.001). Independent factors associated with serious suicidal thoughts were being single (OR = 1.76, 95 %CI 1.14-2.71, p<0.05), negative life events (OR = 1.43, 95 %CI 1.22-1.67, p<0.001), and the presence of mental distress (OR = 2.75, 95 %CI 2.11-3.44, p<0.001). The veterinarians related their serious suicidal thoughts to work and personal problems, and a lesser degree to family, social, and other problems. Nearly twice as many women (53 %) as men (28 %) reported work problems as the most important contributing factor to their serious suicidal thoughts (chi-square: 4.99, p = 0.03). A total of 4 % reported work problems as the only factor of importance.

Conclusions: Veterinarians in Norway have relatively high levels of suicidal feelings and thoughts, including serious suicidal thoughts. In the multivariate analyses, the individual factors were more important than the work-related ones, while work problems were the most reported contributing factor to serious suicidal thoughts by the veterinarians themselves. The role of gender and specific work-related factors should be further investigated to better understand the complexity of suicidal behavior among veterinarians.

Keywords: Veterinarians – suicidal behavior – mental distress – personality traits –

ARTICLE SUMMARY – STRENGTHS AND LIMITATIONS OF THIS STUDY

Strengths:

- Nationwide study of suicidal behavior in veterinarians, in all main fields of work.
- High response rate (75 %).
- Extensive questionnaire.

Limitations:

- Cross-sectional design.
- Possible limited generalizability, due to differences in organization of work life in other countries.

INTRODUCTION

Several studies have shown increased suicide rates among veterinarians. A review from 2010 found elevated suicide rates in all but one of the 15 studies published at the time.[1] Recent studies have also indicated increased raised suicide rates in the profession.[2-4] Furthermore, three recent studies found a higher prevalence of suicidal ideation among veterinarians than the general population.[5-7]

There is little knowledge about the contribution of individual and work-related factors to suicidal behavior in veterinarians. In a systematic review from 2012, which included 52 papers, the authors highlighted the paucity of research that investigated the factors that contribute to suicide among veterinarians, and that many of the studies were of poor quality.[8] In an interview study with veterinarians with a history of suicidal behavior, Platt et al. found that being a veterinarian contributed to their suicidal behaviour; they emphasized patient issues, responsibility, and poor work/life balance.[9] It has been suggested that suicidal ideation among veterinarians is linked to the demanding nature of their work.[10] Dealing with bereaved clients (i.e. animal owners) has been shown to impact the mental health of veterinarians,[11] and an interview study found that attachment loss and trauma contributed to both depression and suicidality.[12] A recent qualitative study investigating occupational stress among veterinarians found that preoccupation, self-doubt, conflicting responsibilities (care of animals/human clients/financial demands), and insufficient support were important factors of job stress.[13] When searching for independent work-related factors that may be associated with suicidal behavior, it is important to control for known individual factors linked to such behavior. These include having no partner,[14 15] negative life events,[16] anxiety symptoms, depressive symptoms,[15 17] personality problems,[18 19] and the problematic use of alcohol.[17]

The gender balance among veterinarians has changed significantly over the past decades, from 66 % male veterinary students in Norway in 1980 to only 16 % in 2020 (personal communication, Ann Kristin Egeli, and Norwegian University of Life Sciences, June 22nd, 2021). As of June 2021, 69 % of veterinarians holding authorization in Norway were women (personal communication, Bente N. Reve, and The Norwegian Food Safety Authority, July 12th 2021). The gender shift in the profession corresponds to that in several other countries.[20-22] Studies have shown that being female and of younger age increases the risk of serious psychological distress as a veterinarian.[7 8 11] The prevalence of psychological distress, such as anxiety symptoms and depressive symptoms, is also higher among female veterinarians.[5 11 23]

Furthermore, there is substantial evidence that certain personality traits may increase the risk of suicide.[19 24] Reality weakness, a deviant trait including chronic illusions, paranoid traits, identity-insecurity, and relational problems,[25] has demonstrated predictive validity in Norwegian medical

doctors regarding the aggravation of suicidal ideation.[18] Reality weakness is a significant predictor of serious suicidal ideation in other occupational groups as well.[26 27]

Over the last decades, the veterinary profession has turned from agriculture and food-producing animal medicine to an increasing proportion working with companion animals. Two US studies have found a higher suicide rate among companion animal practitioners compared to other specializations,[3 28] and it has been shown that veterinarians in this field more often reported suicidal thoughts than other veterinarians.[29] Thus, attention is required in the different fields of veterinary medicine.

Few studies have investigated the direct association and contribution of individual and work-related factors to suicidal behavior. Therefore, we investigated the following questions:

(1) What is the level of suicidal behavior among veterinarians in Norway, and are there any gender differences?
(2) What do veterinarians in Norway regard as contributing factors to their serious suicidal thoughts?
(3) What are the independent individual and work-related predictors for serious suicidal thoughts?

METHODS

Sample

The sample included all veterinarians in Norway, holding valid authorization as of May 2020 (n = 4256), according to information retrieved from the Norwegian Food Safety Authority. We excluded veterinarians for the following reasons: no residential address in Norway (n = 527), current address unknown (n = 196), those working abroad (n = 62) and those who were deceased (n = 7). This resulted in an eligible sample of 3464 veterinarians.

Questionnaire

A questionnaire of 12 pages, an information sheet and a reply-paid envelope were distributed by surface mail in November 2020. The information sheet included contact information to a psychiatrist in the research group and the colleague-support of the Norwegian Veterinary Association. Two reminders were sent in January and February 2021, respectively. Five gift cards from a sports shop were placed in a draw for respondents as incentives to increase the response rate. An external company managed both the data collection and prize awards. Respondents returned their

questionnaires in a sealed envelope, and the identities of the respondents were unknown to the researchers throughout.

The Regional Committee for Medical and Health Research Ethics South-East C (132704), and the Norwegian Centre for Research Data (674793) approved this study.

Instruments – dependent variable

Paykel's questionnaire about suicidal thoughts and attempts was the dependent variable in this study.[30] It is a five-item instrument developed to study suicidal feelings in the general population. The items represent increasing severity, from unspecific suicidal feelings to actual suicide attempt. Previous studies on several professions in Norway have validated this instrument.[14 15 26 27 31] The five items have the following wording: 1. 'Have you ever felt that life was not worth living?' 2. 'Have you ever wished you were dead – for instance, that you could go to sleep and not wake up?' 3. 'Have you ever thought of taking your life, even if you would not really do it?' 4. 'Have you ever reached the point where you seriously considered taking your life, or perhaps made plans how you would go about doing it?' 5. 'Have you ever made an attempt to take your life?' Question four was slightly altered in the Norwegian translation, to: "… and even made plans…", reinforcing the seriousness in this statement.[15] The responses to each question were never, hardly ever, sometimes or often. The preceding year's suicidal thoughts and attempts were investigated in the present study. For questions 4. and 5., an additional question was asked: 'To what extent do you think the following factors influenced you to consider taking your life', with five response categories.

Independent variables – individual factors

The personality trait *reality weakness* was measured using the nine-item reality weakness dimension of Torgersen's Basic Character Inventory (BCI).[32] Each item had a dichotomous ('agree'/'do not agree') response, with a total sum score from 0 to 9. BCI-Reality weakness is an original, deviant trait related to perceptions and ideations on the borderline between reality and fantasy; this dimension also measures chronic illusions, paranoid traits, and traits related to severe personality disorders.[25 33] Examples of items are 'I feel lonely most of the time' and 'Sometimes I feel I am not myself'. This measure has previously been validated to predict emotional disturbance, such as serious suicidal thoughts, severe depression, and lack of help-seeking among physicians.[33]

The Norwegian Centre for Research Data claimed the use of age intervals to keep the data as unidentifiable as possible. Therefore, *age* was reported in the following intervals: 20-25, 26-30 (…) up to 66-70 and >70 years. In this study, *marital status* was dichotomized into married/cohabitant and single/divorced/separated/widow(er) (coded 0 and 1, respectively).

Life events during the last 12 months were measured by 17 items, previously used by among others, Tyssen et al.,[15 34] and adapted to veterinarians. The adaptations were mainly linguistic and included the removal of items specific to physicians. All items were coded as 0 or 1, and the variable comprised the sum score of all items. To test the effects on serious suicidal thoughts, we used the weighted total score of all items significantly associated with such thoughts.

Mental distress (anxiety symptoms and depressive symptoms) in the last 14 days was measured using SCL-5, a five-item version of the Symptom Check List-25.[35] This five-item version is based on a factor analysis by Tambs and Moum,[36] and contains questions about how much one is bothered by the following: 1. 'Feeling fearful', 2. 'Nervousness or shakiness inside', 3. 'Feeling hopeless about the future', 4. 'Feeling blue', 5. 'Worrying too much about things'. Each item was measured on a scale from 1 to 5 from 'not at all' to 'very much'. The sum score is used to indicate the level of mental distress. This version has been validated in medical students and physicians in Norway.[37 38]

Alcohol to cope was measured by a single item originally used in national surveys in the USA.[39] The item is: 'When you feel worried, tense, or nervous, do you ever drink alcoholic beverages to help you handle things?' The alternatives were 'never', 'seldom', 'now and then' and 'often'. In the analyses, responses were dichotomized into 0 'Never' and 1 'Any frequency', as validated in previous Norwegian studies.[40-42] The reason for dichotomizing the response was for cultural purposes and we wanted a clear distinction between drinking to cope with tension or not, as accounted for in detail elsewhere.[40]

Independent variables – work-related factors

The main fields of work were reported as 'companion animal practice', 'production animal practice', 'mixed clinical practice', 'equine practice', 'aquaculture', 'public administration', 'academia/researcher', 'pensioners' and 'others'. Those who classified themselves as pensioners were excluded from the logistic regression analyses, because work-related factors were included in the model.

Job stress was measured by a modified version of Cooper's Job Stress Questionnaire,[43 44] with minor adaptations to veterinarians' work conditions. These adaptations were mainly linguistic, but some items specific to the veterinary profession were added (as 'cross pressure between economy/animal welfare/ethics'). A factor analysis (principal component with varimax rotation, including scree plot evaluation) identified three job stress factors: *emotional demands, work/life balance,* and *fear of complaints/criticism*. The first factor, *emotional demands* (Cronbach's alpha=0.87), contained six items: 1. 'Daily contact with dying and critically ill animals', 2. 'Taking care of terminally ill animals and their owners', 3. 'Taking care of suffering animals', 4. 'Requests about animals from friends and family', 5. 'Requests about animals from relatives', and 6. 'Emotional involvement with patients'. The second factor, *work/life balance* (Cronbach's alpha=0.86), consisted of five items: 1. 'Work affects family life', 2. 'Managing a balance between work and personal life', 3. 'Work affects social life', 4. 'Time pressure', and 5. 'Interruptions and nagging at work'. The third factor, *fear of complaints/criticism* (Cronbach's alpha=0.88), consisted of three items: 1. 'Worries about complaints from animal owners/customers', 2. 'Animal owners/customers do not appreciate your work', and 3. 'Dealing with challenging animal owners/customers'.

Patient and Public Involvement

The Norwegian Veterinary Association appointed a reference group for this project consisting of seven veterinarians from each of the professional subgroups: Small Animal-, Equine-, Production Animal and Aquaculture Veterinary Association, and the Association of Veterinarians in Public Health Medicine, the Veterinary Students' association and the Pensioners' Association. These veterinarians contributed with valuable input both to the design of the questionnaire, hypotheses, and aims of the present study.

Statistics

SPSS version 27 and StataSE 16 were used for the statistical analyses. The χ^2 test was used to test for group differences. Simultaneous effects were analyzed through hierarchical logistic regression with blockwise analyses to separate the effects of individual and work-related factors. The level of significance was set at 0.05. To investigate gender-specific effects, we entered two-way interaction terms between gender and the other independent variables in separate analyses with the main effect included in the equations. Missing values were coded as 'system missing'.

RESULTS

Demographics

Of the 3464 eligible participants, we received 2596 responses, resulting in a response rate of 75 %.

The most frequently reported age category was 41 – 45 years of age. The age varied between genders, with a higher proportion of younger women, and the majority of men were older than 50 years (Figure 1). In total, 69 % were female and 31 % male (Table 1), which is an accurate reflection of the actual gender distribution of veterinarians in Norway.

Insert Figure 1 (age distribution) about here.

Table 1 – Description of sample

Variable	Range of values	Frequency (%)	Mean (SD)
Gender			
Female		1776 (69.6 %)	
Male		776 (30.4 %)	
Age			
20-30		274 (10.8 %)	
31-40		697 (27.4 %)	
41-50		667 (26.2 %)	
51-60		432 (16.9 %)	
61-70		318 (12.5 %)	
>70		159 (6.2 %)	
Marital status			
Married/cohabiting		1962 (78 %)	
Single/divorced/widow(er)		552 (22 %)	
Life events	0-9		0.54 (0.89)
SCL-5	1-5		2.00 (0.98)

Reality weakness	0-9		1.38 (1.85)
Alcohol to cope			
Never		1769 (71 %)	
Any frequency		722 (29 %)	
Main field of work			
Companion animal practice		802 (31.8 %)	
Public administration		402 (15.9 %)	
Mixed clinical practice		268 (10.6 %)	
Academia/research		202 (8.0 %)	
Production animal practice		177 (7.0 %)	
Aquaculture		121 (4.8 %)	
Equine practice		102 (4.0 %)	
Other		250 (9.9 %)	
Pensioner		198 (7.9 %)	
Job stress			
Emotional demands	6-30		11.9 (4.7)
Work/life-balance	5-25		13.3 (4.9)
Fear of complaints	3-15		9.2 (3.5)
Connection to work-life			
Employed		1561 (63.0 %)	
Self-employed		573 (23.1 %)	
Other		217 (8.8 %)	
Two or more connections to work life		127 (5.1 %)	
Position type			
Permanent position		2023 (88.1 %)	
Temporary position		70 (3 %)	

Temporary educational position		50 (2.2 %)	
Other		153 (6.7 %)	
Working full-time		1922 (81.1 %)	
Frequency of working overtime (weekly or bi-weekly)		1550 (67.9 %)	

Level of suicidal behavior during the last year

27 % of the veterinarians reported that they felt that life was not worth living, 20 % had thought of suicide, even though they knew that they would not do it, 5 % reported that they had serious suicidal thoughts, and six persons (0.2 %) had attempted suicide (Table 2). Female veterinarians reported significantly higher levels of suicidal feelings and thoughts than male colleagues. This gender difference remained throughout all items; for serious suicidal thoughts; women had nearly twice as high levels as their male colleagues (6.2 % vs. 3.6 %, chi-square: 6.5, p=0.011).

Table 2 – Prevalence of suicidal feelings and thoughts among veterinarians in Norway according to gender

Item	All	Men	Women	Total n for each item	χ^2 and p-value
1. Felt life was not worth living	682 (26.6 %)	148 (19.3%)	522 (29.7%)	2567	29.4, p<0.001
2. Wished you were dead	498 (19.4 %)	96 (12.5%)	394 (22.5%)	2565	33.6, p<0.001
3. Thoughts of taking life	503 (19.6 %)	102 (13.3%)	391 (22.3%)	2565	26.9, p<0.001

4. Seriously considered taking your life	139 (5.4 %)	28 (3.6%)	108 (6.2%)	2562	6.5, p=0.011
5. Made a suicide attempt	6 (0.2 %)	1 (0.1%)	5 (0.3%)	2537	NA

Not all veterinarians reported gender (n=2554). This leads to a difference in total sum for men + women compared to "all."

Self-reported factors contributing to serious suicidal thoughts

Among the veterinarians reporting serious suicidal thoughts (n=139), work problems were the most frequently reported contributing factor (48 %), followed by personal problems (37 %) (Table 3). The only significant gender difference was regarding work problems, with nearly twice as many women (53 %) as men (28 %) reporting work problems as the most important contributing factor to their serious suicidal thoughts (chi-square: 4.99, p = 0.03, Fisher's exact), and 4.3 % reported work problems as the only factor of importance.

Table 3 - Contributing factors to serious suicidal thoughts among veterinarians in Norway

	Not at all + A little + Somewhat			Quite a bit + Very much			
	N (%)			N (%)			
	Total	Men	Women	Total	Men	Women	Total n
Personal problems	84 (63.2%)	17 (65.4%)	67 (63.8%)	49 (36.8%)	9 (34.6%)	38 (36.2%)	133
Family problems	91 (68.4%)	19 (79.2%)	72 (67.9%)	42 (31.6%)	5 (20.8%)	34 (32.1%)	133
Social problems	108 (81.2%)	21 (84.0%)	86 (81.1%)	25 (18.8%)	4 (16.0%)	20 (18.9%)	133
Work problems	70 (51.9%)	18 (72.0%)	51 (47.2%)	65 (48.1%)	7 (28.0%)	57 (52.8%)	135

Other problems	90 (72.6%)	20 (83.3%)	70 (71.4%)	34 (27.4%)	4 (16.7%)	28 (28.6%)	124

Item four of Paykel's questionnaire was answered by n= 2562 veterinarians (men=766, women=1754). The question was answered positively by n=139 (see Table 1).

Multiple logistic regression of predictors of serious suicidal thoughts

Being single, negative life events, anxiety symptoms and depressive symptoms, reality weakness, use of alcohol to cope, and the three job stress factors were significant unadjusted (crude) predictors (see Table 4). In the adjusted model, the significant predictors were being single, negative life events, and mental distress. There was no gender effect. No significant effect was found within the different fields of work or any of the three job stress factors in the adjusted model (Table 4).

An additional multivariate analysis was conducted, similar to the multivariate analysis in the previous sub-section, but without the variables *reality weakness* and *mental distress*. When processing the individual and work-related factors without the two variables of reality weakness and mental distress, the significant predictors were being single, negative life events, use of alcohol to cope with tension, and all three job stress factors: *emotional demands, work/life balance,* and *fear of complaints/criticism* (OR = 2.17, 95 % CI 1.44-3.27 for single status, OR = 1.61, 95 %CI 1.39-1.86 for negative life events, OR = 1.52, 95 % CI 1.02-2.27 for alcohol to cope, OR = 1.05, 95 %CI 1.00-1.10 for emotional demands, OR = 1.08, 95 % CI 1.03-1.13 for work/life balance, and OR = 1.08, 95 %CI 1.00-1.16 for fear of complaints). This means that all the job stress factors were probably confounded by mental distress and reality weakness, and they may explain both job stress and serious suicidal thoughts. (Table 4).

Table 4 – Predictors of serious suicidal thoughts among veterinarians in Norway

	Crude		Adjusted	
	OR	95 % CI	OR	95 % CI
Female	1.55	0.999 to 2.401	0.88	0.49 to 1.57
Age	0.93	0.86 to 1.00	1.11	0.996 to 1.235
Single	2.38***	1.65 to 3.43	1.76*	1.13 to 2.72
Negative life events[1]	1.78***	1.55 to 2.04	1.43***	1.22 to 1.68
SCL-5	3.08***	2.61 to 3.64	2.75***	2.14 to 3.52
Reality weakness	1.47***	1.37 to 1.59	1.10	0.99 to 1.22
Alcohol to cope	2.14***	1.51 to 3.04	1.09	0.72 to 1.67
Main field of work (ref. category=				

mixed clinical practice)				
Companion animals	1.38	0.74 to 2.57	1.01	0.50 to 2.06
Production animals	1.28	0.56 to 2.94	1.97	0.77 to 5.05
Equine practice	1.21	0.45 to 3.28	1.02	0.32 to 3.26
Aquaculture	1.01	0.37 to 2.73	1.07	0.32 to 3.61
Public administration	1.08	0.53 to 2.20	1.15	0.49 to 2.71
Academia/research	1.12	0.49 to 2.56	1.07	0.39 to 2.99
Other	0.82	0.35 to 1.91	0.70	0.24 to 2.02
Job stress				
Emotional demands	1.12***	1.08-1.16	1.02	0.97 to 1.07
Work/life-balance	1.13***	1.09-1.17	1.00	0.95 to 1.05
Fear of complaints	1.18***	1.11-1.25	1.01	0.93 to 1.09

[1]The variable life events was entered into the model as a weighted variable ('Negative life events'), comprising the sum score of life events that was significant in a univariate model with the dependent variable.

*P<0.05

**P<0.01

***P<0.001

We found significant interactions between gender and negative life events (p = 0.015), with clearly steeper gradients for females. There was also an interaction between gender and work/life balance (p = 0.026), and the increase in suicidal thoughts with higher work/life imbalance was stronger among males than among females.

DISCUSSION

The main finding of this study was that more than one-fourth of the veterinarians in Norway felt that life was not worth living during the last year, 5 % had serious suicidal thoughts, and 0.2 % had attempted suicide. Female veterinarians reported significantly more suicidal feelings and thoughts than their male colleagues. Independent factors associated with serious suicidal thoughts were being single, negative life events, and mental distress. The veterinarians considered their serious suicidal thoughts mainly as work and personal problems, and to a lesser degree, family, social, and other problems.

Furthermore, veterinarians reported both suicidal feelings and serious suicidal thoughts more frequently (26.6 % and 5.4 %, respectively) than physicians (16.6 % and 2.6 %, respectively),[14] and police (8.9 % and 1.7 %, respectively)[26] in Norway. Furthermore, veterinarians regarded work problems as the most important contributing factor, which suggests that work factors play a more important role in suicidal thoughts in veterinarians than in physicians. A previous study found that physicians most frequently regarded personal and family problems as the most important factors.[14]

Regarding suicide attempts, veterinarians had levels (0.2%) comparable to those of physicians and police (0.3% and 0.1%, respectively).[14 26]

The relatively high levels of suicidal feelings and thoughts concur with findings among veterinarians in other countries. Two studies used "National Survey of Psychiatric Morbidity",[5 45] an item originally sourced from Paykel's instrument.[30] These items use the same wording for items one and three, which makes comparison possible. Suicidal feelings among veterinarians in Norway were slightly higher (26.6%) than among those in the UK (23.0%)[45] and Canada (17.9%),[5] whereas suicidal thoughts were at the same level (19.6%, 21.3%, and 19.4%, respectively). However, veterinarians in Canada reported higher levels (17.0%) of serious suicidal thoughts than in Norway (5.4%), which is probably due to the reporting period in the Canadian survey being 'since the start of veterinary education', while in the present study, the reporting period was the preceding year.

Moreover, like female physicians,[14] female veterinarians had higher levels of suicidal feelings and thoughts than their male colleagues. Gender differences were present in the contributing factors, as female veterinarians reported work problems more frequently than men. Veterinarians consider work problems more important than physicians. It may be speculated that this, in part, may be explained by the fact that veterinarians in Norway have less undergraduate training in communication, psychology and coping skills, and experience more professional isolation. Additionally, animal health care poses a cost issue (in Norway, human health care costs are funded by tax revenues), resulting in cross pressure for veterinarians at the intersection of animal welfare, costs, and ethics. Conflicting responsibilities in the veterinary profession may be an overarching theme contributing to significant stress among veterinarians.[13]

Today, approximately 70 % of veterinarians in Norway are female, and this proportion is expected to increase. There was no significant effect of gender in the adjusted model. This may be because age was highly correlated with the female gender. Females reported significantly higher levels of suicidal behavior than males. Furthermore, females regarded work problems as the factor that contributes the most to their serious suicidal thoughts. Being single and experiencing negative life events predicted serious suicidal thoughts in the present study (76 % and 43 % higher odds, respectively). These findings are consistent with studies on physicians and others.[14 15 18] In contrast to physicians, where family and relationship issues were the most significant negative life events,[14] economic problems (OR = 10.88, 95 % CI 5.20-22.78, p<0.001) were the most significant negative life event for veterinarians. This also supports the hypothesis that there are other factors associated with suicidal thoughts among veterinarians than with physicians and that economic concerns are more important with veterinarians. In fact, in a recent qualitative study from Australia, veterinarians were asked what

they would do if they could change something in the profession, and the most common response was to remove money from the decision-making process.[13] Contrary to the findings in a recent review,[16] experiencing negative life events had a greater impact on serious suicidal thoughts among women than among men. Furthermore, work/life balance had a greater impact on serious suicidal thoughts among men than among women. These findings warrant further research.

Research on veterinarians and alcohol use is scarce,[8 46] and the finding that the use of alcohol to cope with tension was significant in the univariate model warrants further research. In a study examining drug-caused deaths in Australia, veterinarians were the group with the highest prevalence of alcohol detected in post-mortem examinations.[47] Another recent study found that veterinarians who turned to alcohol to cope with their work-related stress were more likely to have suicidal thoughts.[10]

There was no significant effect on serious suicidal thoughts regarding the main field of work, neither in the univariate nor in the adjusted model. Subsequently, all job stress factors were significantly associated with serious suicidal thoughts in the univariate model, but not in the adjusted model. However, in the additional analyses, the use of alcohol to cope with tension and all three job stress factors remained significant before entering reality weakness and mental distress in the model. Although previous studies have suggested that work-related stress influences suicide risk in veterinarians,[48] longitudinal research design may further elaborate on the role of mediating and confounding effects. The findings of *emotional demands, work/life balance,* and *fear of complaints/criticism* as important job stress factors concur with previous research. It has been suggested that work conditions that are emotionally exhausting for veterinarians may foster suicidal thoughts,[10] and that poor work/life balance contributes to suicidal behavior.[8] Moreover, the fear of complaints or litigation has been reported as one of the greatest contributors to stress for veterinarians in a previous study.[49]

Contrary to previous research,[18 26 27] the personality trait, reality weakness, was not significant in the adjusted model. This may be explained by the high correlation between mental distress and reality weakness. The significance of mental distress on suicidal thoughts was high, with nearly three times increased odds for each step on the item scale. The importance of mental distress, anxiety symptoms, and depressive symptoms with respect to suicidal ideation is consistent with other research, both among medical doctors and others.[15 17]

Strengths and limitations

To our knowledge, this is the only nationwide study of suicidal behavior in veterinarians, incorporating all authorized veterinarians, in all main fields of work. A major strength was the high response rate (75 %), making multivariate analyses feasible, and reducing the effect of selection and response biases. Additionally, the questionnaire was quite extensive, allowing the use of a comprehensive predictor model and controlling for several variables. An important limitation is the cross-sectional design, which restricts conclusions about causality. The generalizability of the results may also be limited due to differences in the organization of work life, including workload, in other countries. Nevertheless, we believe the findings are representative of veterinarians in Northern Europe. The study was conducted during the coronavirus-pandemic of 2019 (Covid-19), which may have affected the results. The survey was planned before the pandemic, and any potential effects of Covid-19 (e.g., redundancy, and economic effects in the practices) were not accounted for.

CONCLUSION

In summary, the level of suicidal behavior among veterinarians in Norway is relatively high, and both individual and work-related factors contribute to serious suicidal thoughts. In the multivariate analyses, the individual factors, and particularly mental distress, played a more important role than the work-related factors, while veterinarians themselves regarded work problems as the most contributing factor to their suicidal thoughts. The roles of gender and specific work-related factors should be further investigated to better understand the complexity of suicidal behavior among veterinarians.

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AUTHOR'S CONTRIBUTION TO THE MANUSCRIPT

HSD, RT, and EH designed the study and analyzed the data. HSD wrote the first draft of the manuscript. All authors revised the manuscript and approved the final version of the manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. HSD and EH acts as a guarantor.

DATA AVAILABILITY STATEMENT

Data are available upon reasonable request.

COMPETING INTERESTS STATEMENT

None declared.

FIGURE LEGENDS

Figure 1: Age distribution according to gender.

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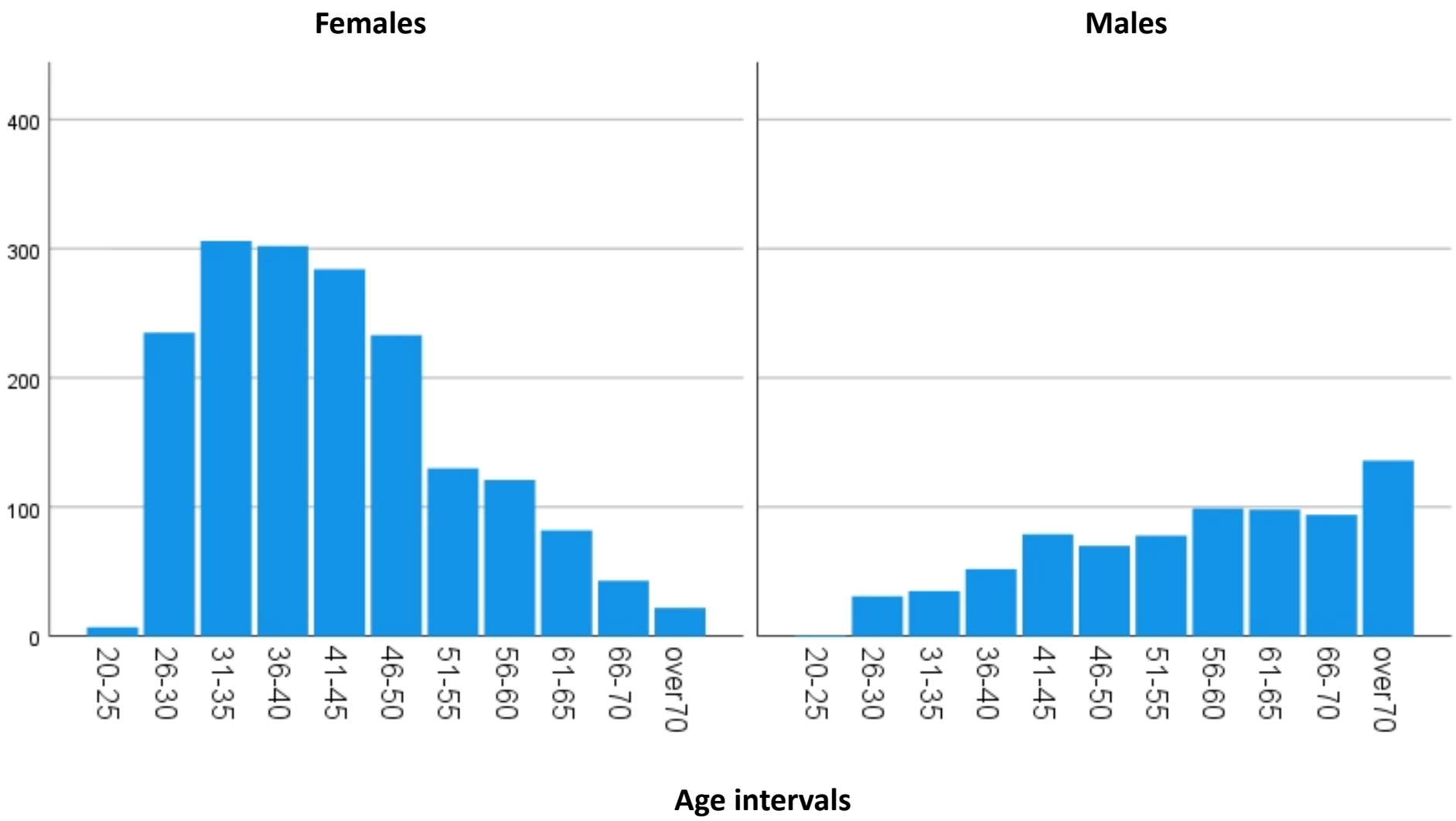
Females
Males
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36-40
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46-50
51-55
56-60
61-65
66-70
over70
Age intervals

Gjerdrum, July 23rd 2021

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To Editor-in-Chief Adrian Aldcroft

We hereby submit the article entitled "Suicidal behaviour in a nationwide cross-sectional study of veterinarians in Norway (The NORVET study): individual and work-related factors" to be considered for publication as original research in BMJ Open.

Several studies have shown increased suicide rates in veterinarians, but less is known about factors contributing to suicidal behaviour in this profession. The present manuscript is the first based on a nationwide survey among veterinarians. An extensive questionnaire was distributed to all authorized veterinarians in Norway, and the response rate was exceptionally high (75%).

The manuscript has not been considered for publication nor is it currently under consideration for publication by any other journal.

The authors received no funding for preparing the manuscript. The authors declare that they have no competing interests. All authors have contributed to the manuscript and approved the final version submitted.

We hope that this manuscript is of interest for BMJ Open, and we are looking forward to your response.

Sincerely yours,

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-9
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	9
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	9
		(*c*) Explain how missing data were addressed	9
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	NA
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9-10
		(b) Indicate number of participants with missing data for each variable of interest	9-13
Outcome data	15*	Report numbers of outcome events or summary measures	9-13
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	12
Discussion			
Key results	18	Summarise key results with reference to study objectives	14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-16
Generalisability	21	Discuss the generalisability (external validity) of the study results	16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	4

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Prevalence and individual and work-related factors associated with suicidal thoughts and behaviors among veterinarians in Norway: a cross-sectional, nationwide survey-based study (the NORVET study)

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Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Mental health, Occupational and environmental medicine
Keywords:	EPIDEMIOLOGY, MENTAL HEALTH, OCCUPATIONAL & INDUSTRIAL MEDICINE, Suicide & self-harm < PSYCHIATRY

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TITLE PAGE:

TITLE

Prevalence and individual and work-related factors associated with suicidal thoughts and behaviors among veterinarians in Norway: a cross-sectional, nationwide survey-based study (the NORVET study)

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ABSTRACT

Objectives: Several studies have shown increased suicide rates among veterinarians. We investigated the self-reported prevalence of suicidal thoughts and behaviors and contributing and independent factors associated with suicidal thoughts and behaviors among veterinarians in Norway.

Design: Cross-sectional, nationwide survey.

Participants: 2596 veterinarians in Norway (response rate: 75 %).

Main outcome measure: Paykel's five-item questionnaire.

Results: In total, 27 % (n=682/2657) of veterinarians in Norway felt that life was not worth living during the last year, 5 % (n=139/2562) had serious suicidal thoughts, and 0.2 % (n=6/2537) had attempted suicide. Female veterinarians reported significantly higher prevalence of suicidal feelings and thoughts than males. For serious suicidal thoughts, women had nearly twice the prevalence as their male colleagues (6.2 % (n=108/1754) vs. 3.6 % (n=28/766), chi-square 6.5, p=0.011). Independent factors associated with serious suicidal thoughts were being single (OR = 1.76, 95 %CI 1.13-2.72, p<0.05), negative life events (OR = 1.43, 95 %CI 1.22-1.68, p<0.001), and the presence of mental distress (OR = 2.75, 95 %CI 2.14-3.52, p<0.001). The veterinarians related their serious suicidal thoughts to work and personal problems, and a lesser degree to family, social, and other problems. Nearly twice as many women (53 %, n=57/108) as men (28 %, n=7/25) reported work problems as the most important contributing factor to their serious suicidal thoughts (chi-square: 4.99, p=0.03). 4 % (n=6/139) reported work problems as the only factor of importance.

Conclusions: Veterinarians in Norway have relatively high prevalence of suicidal feelings and thoughts, including serious suicidal thoughts. In multivariable analyses, the individual factors were more important than work-related ones, while work problems were the most reported contributing factor to serious suicidal thoughts by the veterinarians themselves. The role of gender and specific work-related factors should be further investigated to better understand the complexity of suicidal behavior among veterinarians.

Keywords: Veterinarians – suicidal behavior – mental distress – personality traits –

Strengths and limitations of this study

- Strengths of our study is the high response rate (75 %), in a nationwide study of suicidal behavior in veterinarians, in all main fields of work.
- An extensive questionnaire was used, making multivariable analysis feasible.
- This is a cross-sectional study, which limits any conclusions regarding causality.
- The study possibly has limited generalizability, due to differences in organization of work life in other countries.

INTRODUCTION

Several studies have shown increased suicide rates among veterinarians. A review from 2010 found elevated suicide rates in all but one of the 15 studies published at the time.[1] Recent studies have also indicated increased suicide rates in the profession.[2-4] Furthermore, three recent studies found a higher prevalence of suicidal ideation among veterinarians than the general population.[5-7]

There is little knowledge about the contribution of individual and work-related factors to suicidal behavior in veterinarians. In a systematic review from 2012, which included 52 papers, the authors highlighted the paucity of research that investigated the factors that contribute to suicide among veterinarians, and that many of the studies were of poor quality.[8] An interview study found that patient issues, responsibility, and poor work/life balance contributed to suicidal behavior among veterinarians.[9] It has been suggested that suicidal ideation among veterinarians is linked to the demanding nature of their work.[10] Dealing with bereaved clients (i.e. animal owners) has been shown to impact the mental health of veterinarians,[11] and attachment loss and trauma can contribute to both depression and suicidality.[12] Preoccupation, self-doubt, conflicting responsibilities (care of animals/human clients/financial demands), and insufficient support were important factors of job stress among veterinarians in a qualitative study.[13] When searching for independent work-related factors associated with suicidal behavior, it is important to control for known individual factors. These include having no partner,[14 15] negative life events,[16] anxiety symptoms, depressive symptoms,[15 17] personality problems,[18 19] and the problematic use of alcohol.[17]

The gender balance among veterinarians has changed significantly over the past decades, from 66 % male veterinary students in Norway in 1980 to only 16 % in 2020 (personal communication, Ann Kristin Egeli, and Norwegian University of Life Sciences, June 22nd, 2021). As of June 2021, 69 % of veterinarians holding authorization in Norway were women (personal communication, Bente N. Reve, and The Norwegian Food Safety Authority, July 12th, 2021). The gender shift in the profession corresponds to that in several other countries.[20-22] Studies have shown that being female and of younger age increases the risk of serious psychological distress as a veterinarian.[7 8 11] The prevalence of psychological distress, such as anxiety symptoms and depressive symptoms, is also higher among female veterinarians compared to that among male veterinarians.[5 11 23]

Furthermore, there is substantial evidence that certain personality traits may increase the risk of suicide.[19 24] Reality weakness is a deviant personality trait including chronic illusions, paranoid traits, identity-insecurity, and relational problems.[25] This trait has demonstrated predictive validity in Norwegian medical doctors regarding the aggravation of suicidal ideation.[18] It is a significant predictor of serious suicidal ideation in other occupational groups as well.[26 27]

Over the last decades, the veterinary profession has turned from agriculture and food-producing animal medicine to an increasing proportion working with companion animals. Two US studies have found a higher suicide rate among companion animal practitioners compared to other specializations,[3 28] and it has been shown that veterinarians in this field more often reported suicidal thoughts than other veterinarians.[29] Thus, attention is required in the different fields of veterinary medicine.

Few studies have investigated the direct association and contribution of individual and work-related factors to suicidal thoughts and behavior. Therefore, we investigated the following questions:

(1) What is the prevalence of suicidal thoughts and behavior among veterinarians in Norway, and are there any gender differences?
(2) What do veterinarians in Norway regard as contributing factors to their serious suicidal thoughts?
(3) What are the independent individual and work-related predictors for serious suicidal thoughts?

METHODS

Sample

The sample included all veterinarians in Norway, holding valid authorization as of May 2020 (n = 4256), according to information retrieved from the Norwegian Food Safety Authority. We excluded veterinarians for the following reasons: no residential address in Norway (n = 527), current address unknown (n = 196), those working abroad (n = 62) and those who were deceased (n = 7). This resulted in an eligible sample of 3464 veterinarians.

Questionnaire

A questionnaire of 12 pages, an information sheet and a reply-paid envelope were distributed by surface mail in November 2020. The information sheet included contact information to a psychiatrist in the research group and the colleague-support of the Norwegian Veterinary Association. Two reminders were sent in January and February 2021, respectively. Five gift cards from a sports shop were placed in a drawing for respondents as incentives to increase the response rate. An external company managed both the data collection and prize awards. Respondents returned their questionnaires in a sealed envelope, and the identities of the respondents were unknown to the researchers throughout. The complete questionnaire in Norwegian can be found as a supplementary file ("Supplementary file 1 – Full questionnaire NORVET.pdf").

The Regional Committee for Medical and Health Research Ethics South-East C (132704), and the Norwegian Centre for Research Data (674793) approved this study.

Instruments – dependent variable

Paykel's questionnaire about suicidal thoughts and attempts was the dependent variable in this study.[30] It is a five-item instrument developed to study suicidal feelings in the general population. The items represent increasing severity, from unspecific suicidal feelings to actual suicide attempt. Previous studies on several professions in Norway have validated this instrument.[14 15 26 27 31] The five items have the following wording: 1. 'Have you ever felt that life was not worth living?' 2. 'Have you ever wished you were dead – for instance, that you could go to sleep and not wake up?' 3. 'Have you ever thought of taking your life, even if you would not really do it?' 4. 'Have you ever reached the point where you seriously considered taking your life, or perhaps made plans how you would go about doing it?' 5. 'Have you ever made an attempt to take your life?' Question four was slightly altered in the Norwegian translation, to: "… and even made plans…", reinforcing the seriousness in this statement.[15] The responses to each question were never, hardly ever, sometimes or often. Responses were dichotomized into never (0) and any frequency (1) according to Paykel's original work. The preceding year's suicidal thoughts and attempts were investigated in the present study. For questions 4. and 5., an additional question was asked: 'To what extent do you think the following factors contributed to your consideration of taking your life', with the following factors: 1. Personal problems, 2. Family problems, 3. Social problems, 4. Work problems, 5. Other problems. Each of the factors had five response categories from 'not at all' (1) to 'very much' (5).

Independent variables – individual factors

The personality trait *reality weakness* was measured using the nine-item reality weakness dimension of Torgersen's Basic Character Inventory (BCI).[32] Each item had a dichotomous ('agree'/'do not agree') response, with a total sum score from 0 to 9. BCI-Reality weakness is an original, deviant trait related to perceptions and ideations on the borderline between reality and fantasy; this dimension also measures chronic illusions, paranoid traits, and traits related to severe personality disorders.[25 33] Examples of items are 'I feel lonely most of the time' and 'Sometimes I feel I am not myself'. This measure has previously been validated to predict emotional disturbance, such as serious suicidal thoughts, severe depression, and lack of help-seeking among physicians.[33]

The Norwegian Centre for Research Data claimed the use of age intervals to keep the data as unidentifiable as possible. Therefore, *age* was reported in the following intervals: 20-25, 26-30 (…) up to 66-70 and >70 years. In this study, *marital status* was dichotomized into married/cohabitant and single/divorced/separated/widow(er) (coded 0 and 1, respectively).

Life events during the last 12 months were measured by 17 items, previously used by among others, Tyssen et al.,[15 34] and adapted to veterinarians. The adaptations were mainly linguistic and included the removal of items specific to physicians. Examples of life events were 'serious disease or accident', 'death of a relative/close friend' and 'serious economical problems'. All items were coded as 0 or 1, and the variable comprised the sum score of all items. To test the effects on serious suicidal thoughts, we used the weighted total score of all items significantly associated with such thoughts.

Mental distress (anxiety symptoms and depressive symptoms) in the last 14 days was measured using SCL-5, a five-item version of the Symptom Check List-25.[35] This five-item version is based on a factor analysis by Tambs and Moum,[36] and contains questions about how much one is bothered by the following: 1. 'Feeling fearful', 2. 'Nervousness or shakiness inside', 3. 'Feeling hopeless about the future', 4. 'Feeling blue', 5. 'Worrying too much about things'. Each item was measured on a scale from 1 to 5 from 'not at all' to 'very much'. The sum score is used to indicate the level of mental distress. This version has been validated in medical students and physicians in Norway.[37 38]

Alcohol to cope was measured by a single item originally used in national surveys in the USA.[39] The item is: 'When you feel worried, tense, or nervous, do you ever drink alcoholic beverages to help you handle things?' The alternatives were 'never', 'seldom', 'now and then' and 'often'. In the analyses, responses were dichotomized into 0 'Never' and 1 'Any frequency', as validated in previous Norwegian studies.[40-42] The reason for dichotomizing the response was for cultural purposes and we wanted a clear distinction between drinking to cope with tension or not, as accounted for in detail elsewhere.[40]

Independent variables – work-related factors

The main fields of work were reported as 'companion animal practice', 'production animal practice', 'mixed clinical practice', 'equine practice', 'aquaculture', 'public administration', 'academia/researcher', 'pensioners' and 'others'. Those who classified themselves as pensioners were excluded from the logistic regression analyses, because work-related factors were included in the model.

Job stress was measured by a modified version of Cooper's Job Stress Questionnaire,[43 44] with minor adaptations to veterinarians' work conditions. These adaptations were mainly linguistic, but some items specific to the veterinary profession were added (as 'cross pressure between economy/animal welfare/ethics'). The veterinarians were asked how much different situations/factors made them stressed, with the response alternatives being reported by a five-point Likert type rating scale ranging from no stress at all (1) to a source of extreme stress (5). A factor analysis (principal component with varimax rotation, including scree plot evaluation) identified three job stress factors: *emotional demands, work/life balance,* and *fear of complaints/criticism*. The first factor, *emotional demands* (Cronbach's alpha=0.87), contained six items: 1. 'Daily contact with dying and critically ill animals', 2. 'Taking care of terminally ill animals and their owners', 3. 'Taking care of suffering animals', 4. 'Requests about animals from friends and family', 5. 'Requests about animals from relatives', and 6. 'Emotional involvement with patients'. The second factor, *work/life balance* (Cronbach's alpha=0.86), consisted of five items: 1. 'Work affects family life', 2. 'Managing a balance between work and personal life', 3. 'Work affects social life', 4. 'Time pressure', and 5. 'Interruptions and nagging at work'. The third factor, *fear of complaints/criticism* (Cronbach's alpha=0.88), consisted of three items: 1. 'Worries about complaints from animal owners/customers', 2. 'Animal owners/customers do not appreciate your work', and 3. 'Dealing with challenging animal owners/customers'.

Statistical analysis

SPSS version 27 and StataSE 16 were used for the statistical analyses. Table analyses and the χ^2 test were used to test for differences in categorical variables. Controlled effects were reported as odds ratios, analyzed through hierarchical logistic regression. The following variables were used as predictors of serious suicidal thoughts: gender, age, civil status, negative life events, mental distress, reality weakness, use of alcohol to cope, main field of work, and job stress. Initially all independent variables were analyzed bivariately with the dependent variable (crude ORs). In the adjusted model, all independent variables were entered simultaneously in a logistic regression (adjusted ORs). In order to study possible mediating or confounding effects of mental distress and reality weakness, we performed an additional multiple regression with leaving out the variables mental distress and reality weakness. The level of significance was set at 5 % ($p<0.05$). To investigate gender-specific effects, we entered two-way interaction terms between gender and the other independent variables in separate analyses with the main effect included in the equations. Missing values were coded as 'system missing'.

Patient and Public Involvement

The Norwegian Veterinary Association appointed a reference group for this project consisting of seven veterinarians from each of the professional subgroups: Small Animal-, Equine-, Production Animal and Aquaculture Veterinary Association, and the Association of Veterinarians in Public Health Medicine, the Veterinary Students' association and the Pensioners' Association. These veterinarians contributed with valuable input both to the design of the questionnaire, hypotheses, and aims of the present study.

RESULTS

Demographics

Of the 3464 eligible participants, we received 2596 responses, resulting in a response rate of 75 %.

The most frequently reported age category was 41 – 45 years of age. The age varied between genders, with a higher proportion of younger women, and the majority of men were older than 50 years. In total, 69 % were female and 31 % male (Table 1), which is an accurate reflection of the actual gender distribution of veterinarians in Norway. Descriptive statistics for the veterinarians with serious suicidal thoughts is included as a supplementary file (Supplementary File 2 – Descriptives for veterinarians with serious suicidal thoughts).

Table 1 – Description of sample

Variable	Range of values	Frequency (%)	Mean (SD)
Gender			
Female		1776 (69.6 %)	
Male		776 (30.4 %)	
Age			
20-30		274 (10.8 %)	
31-40		697 (27.4 %)	
41-50		667 (26.2 %)	

51-60		432 (16.9 %)	
61-70		318 (12.5 %)	
>70		159 (6.2 %)	
Marital status			
Married/cohabiting		1962 (78 %)	
Single/divorced/widow(er)		552 (22 %)	
Life events	0-9		0.54 (0.89)
SCL-5	1-5		2.00 (0.98)
Reality weakness	0-9		1.38 (1.85)
Alcohol to cope			
Never		1769 (71 %)	
Any frequency		722 (29 %)	
Main field of work			
Companion animal practice		802 (31.8 %)	
Public administration		402 (15.9 %)	
Mixed clinical practice		268 (10.6 %)	
Academia/research		202 (8.0 %)	
Production animal practice		177 (7.0 %)	
Aquaculture		121 (4.8 %)	
Equine practice		102 (4.0 %)	
Other		250 (9.9 %)	
Pensioner		198 (7.9 %)	
Job stress			
Emotional demands	1-5		1.98 (0.79)
Work/life-balance	1-5		2.67 (0.97)
Fear of complaints	1-5		3.06 (1.17)

Connection to work-life			
Employed		1561 (63.0 %)	
Self-employed		573 (23.1 %)	
Other		217 (8.8 %)	
Two or more connections to work life		127 (5.1 %)	
Position type			
Permanent position		2023 (88.1 %)	
Temporary position		70 (3 %)	
Temporary educational position		50 (2.2 %)	
Other		153 (6.7 %)	
Working full-time		1922 (81.1 %)	
Frequency of working overtime (weekly or bi-weekly)		1550 (67.9 %)	

Prevalence of suicidal thoughts and behavior during the last year

27 % of the veterinarians reported that they felt that life was not worth living, 20 % had thought of suicide, even though they knew that they would not do it, 5 % reported that they had serious suicidal thoughts, and six persons (0.2 %) had attempted suicide (Table 2). Female veterinarians reported significantly higher prevalence of suicidal feelings and thoughts than male colleagues. This gender difference remained throughout all items; for serious suicidal thoughts; women had nearly twice the prevalence as their male colleagues (6.2 % vs. 3.6 %, chi-square: 6.5, p=0.011).

Table 2 – Prevalence of suicidal feelings and thoughts among veterinarians in Norway according to gender

Item	All	Men	Women	Total n for each item	χ^2 and p-value
1. Felt life was not worth living	682 (26.6 %)	148 (19.3%)	522 (29.7%)	2567	29.4, p<0.001
2. Wished you were dead	498 (19.4 %)	96 (12.5%)	394 (22.5%)	2565	33.6, p<0.001
3. Thoughts of taking life	503 (19.6 %)	102 (13.3%)	391 (22.3%)	2565	26.9, p<0.001
4. Seriously considered taking your life	139 (5.4 %)	28 (3.6%)	108 (6.2%)	2562	6.5, p=0.011
5. Made a suicide attempt	6 (0.2 %)	1 (0.1%)	5 (0.3%)	2537	NA

Not all veterinarians reported gender (n=2554). This leads to a difference in total sum for men + women compared to "all."

Self-reported factors contributing to serious suicidal thoughts

Among the veterinarians reporting serious suicidal thoughts (n=139), work problems were the most frequently reported contributing factor (48 %), followed by personal problems (37 %) (Table 3). The only significant gender difference was regarding work problems, with nearly twice as many women (53 %) as men (28 %) reporting work problems as the most important contributing factor to their serious suicidal thoughts (chi-square: 4.99, p=0.03, Fisher's exact), and 4.3 % reported work problems as the only factor of importance.

Table 3 - Contributing factors to serious suicidal thoughts among veterinarians in Norway

	Not at all + A little + Somewhat			Quite a bit + Very much			
	N (%)			N (%)			
	Total	Men	Women	Total	Men	Women	Total n
Personal problems	84 (63.2%)	17 (65.4%)	67 (63.8%)	49 (36.8%)	9 (34.6%)	38 (36.2%)	133
Family problems	91 (68.4%)	19 (79.2%)	72 (67.9%)	42 (31.6%)	5 (20.8%)	34 (32.1%)	133
Social problems	108 (81.2%)	21 (84.0%)	86 (81.1%)	25 (18.8%)	4 (16.0%)	20 (18.9%)	133
Work problems	70 (51.9%)	18 (72.0%)	51 (47.2%)	65 (48.1%)	7 (28.0%)	57 (52.8%)	135
Other problems	90 (72.6%)	20 (83.3%)	70 (71.4%)	34 (27.4%)	4 (16.7%)	28 (28.6%)	124

Item four of Paykel's questionnaire was answered by n= 2562 veterinarians (men=766, women=1754). The question was answered positively by n=139 (see Table 1).

Multiple logistic regression of predictors of serious suicidal thoughts

Being single, negative life events, mental distress, reality weakness, use of alcohol to cope, and the three job stress factors were significant unadjusted (crude) predictors (Table 4). In the adjusted model, the significant predictors were being single, negative life events, and mental distress. There was no gender effect. No significant effect was found within the different fields of work or any of the three job stress factors in the adjusted model (Table 4).

Post hoc, and in order to investigate any confounding or mediating effect of mental distress and reality weakness on the job stress-variables, we conducted an additional multivariable analysis. This was similar to the multivariable analysis in the previous sub-section, but without the variables *reality weakness* and *mental distress*. When processing the individual and work-related factors without the two variables of reality weakness and mental distress, the significant predictors were being single,

negative life events, use of alcohol to cope with tension, and all three job stress factors. The results from the additional analysis can be found in the supplementary material (Supplementary File 3 – Additional analysis predictor model).

Table 4 – Predictors of serious suicidal thoughts among veterinarians in Norway

	Crude		Adjusted[2]	
	OR	95 % CI	OR	95 % CI
Female	1.55	0.999 to 2.401	0.88	0.49 to 1.57
Age	0.93	0.86 to 1.00	1.11	0.996 to 1.235
Single	2.38***	1.65 to 3.43	1.76*	1.13 to 2.72
Negative life events[1]	1.78***	1.55 to 2.04	1.43***	1.22 to 1.68
SCL-5	3.08***	2.61 to 3.64	2.75***	2.14 to 3.52
Reality weakness[3]	1.47***	1.37 to 1.59	1.10	0.99 to 1.22
Alcohol to cope	2.14***	1.51 to 3.04	1.09	0.72 to 1.67
Main field of work (ref. category= mixed clinical practice)				
Companion animals	1.38	0.74 to 2.57	1.01	0.50 to 2.06
Production animals	1.28	0.56 to 2.94	1.97	0.77 to 5.05
Equine practice	1.21	0.45 to 3.28	1.02	0.32 to 3.26
Aquaculture	1.01	0.37 to 2.73	1.07	0.32 to 3.61
Public administration	1.08	0.53 to 2.20	1.15	0.49 to 2.71
Academia/research	1.12	0.49 to 2.56	1.07	0.39 to 2.99
Other	0.82	0.35 to 1.91	0.70	0.24 to 2.02
Job stress				
Emotional demands	1.12***	1.08-1.16	1.02	0.97 to 1.07
Work/life-balance	1.13***	1.09-1.17	1.00	0.95 to 1.05
Fear of complaints	1.18***	1.11-1.25	1.01	0.93 to 1.09

[1]The variable life events was entered into the model as a weighted variable ('Negative life events'), comprising the sum score of life events that was significant in a univariate model with the dependent variable.
*P<0.05
**P<0.01
***P<0.001

[2] In the adjusted model, all listed variables were adjusted for, i.e., gender, age, civil status, negative life events, SCL-5, reality weakness, use of alcohol to cope, main field of work and the three job stress factors.

[3]There was a high correlation between SCL-5 and reality weakness (Pearson's R=0.6).

We found significant interactions between gender and negative life events (OR=0.65, 95 % CI 0.46 – 0.92, p=0.015), with clearly steeper gradients for females. There was also an interaction between gender and work/life balance (OR=1.11, 95 %CI 1.01 – 1.22, p=0.026), and the increase in suicidal thoughts with higher work/life imbalance was stronger among males than among females. A figure illustrating the interaction analysis can be found as a Supplementary file (Supplementary file 4-1 and Supplementary File 4-2).

DISCUSSION

The main finding of this study was that more than one-fourth of the veterinarians in Norway felt that life was not worth living during the last year, 5 % had serious suicidal thoughts, and 0.2 % had attempted suicide. Female veterinarians reported significantly more suicidal feelings and thoughts than their male colleagues. The veterinarians considered their serious suicidal thoughts mainly as work and personal problems, and to a lesser degree, family, social, and other problems. Independent factors associated with serious suicidal thoughts were being single, negative life events, and mental distress.

Furthermore, veterinarians reported both suicidal feelings and serious suicidal thoughts more frequently (26.6 % and 5.4 %, respectively) than physicians (16.6 % and 2.6 %, respectively),[14] and police (8.9 % and 1.7 %, respectively)[26] in Norway. Furthermore, veterinarians, especially females, regarded work problems as the most important contributing factor to their suicidal thoughts. A previous study found that physicians most frequently regarded personal and family problems as the most important factors for serious suicidal thoughts,[14] which may suggest that self-reported work factors play a more important role in suicidal thoughts in veterinarians than in physicians. Regarding suicide attempts, veterinarians had a prevalence (0.2%) comparable to those of physicians and police (0.3% and 0.1%, respectively).[14 26]

The relatively high prevalence of suicidal feelings and thoughts concurs with findings among veterinarians in other countries. Two studies used “National Survey of Psychiatric Morbidity”,[5 45] an item originally sourced from Paykel’s instrument.[30] These items use the same wording for items one and three, which makes comparison possible. The prevalence of suicidal feelings in the past year among veterinarians in Norway was slightly higher (26.6%) than among those in the UK (23.0%)[45] and Canada (17.9%),[5] whereas suicidal thoughts the past year were at the same level (19.6%, 21.3%, and 19.4%, respectively). However, veterinarians in Canada reported higher prevalence (17.0%) of serious suicidal thoughts than in Norway (5.4%), which is probably due to the reporting period for serious suicidal thoughts in the Canadian survey being ‘since the start of veterinary education’, while in the present study, the reporting period was the preceding year.

Moreover, like female physicians,[14] female veterinarians had higher levels of suicidal feelings and thoughts than their male colleagues. Gender differences were also present in the self-reported contributing factors, as female veterinarians reported work problems more frequently than men. According to our own results and those of others’,[14] work problems are more often considered a contributing factor to suicidal thoughts by veterinarians than by physicians. The perceived impact of work-factors on serious suicidal thoughts may be partly influenced by the fact that veterinarians in

Norway have less undergraduate training in communication, psychology and coping skills, and experience more professional isolation. Additionally, animal health care poses a cost issue (in Norway, human health care costs are funded by tax revenues), resulting in cross pressure for veterinarians at the intersection of animal welfare, costs, and ethics. Conflicting responsibilities in the veterinary profession may be an overarching theme contributing to significant stress among veterinarians.[13]

Today, approximately 70 % of veterinarians in Norway are female, and this proportion is expected to increase. There was no significant effect of gender in the adjusted model. This may be because age was highly correlated with the female gender. Being single and experiencing negative life events predicted serious suicidal thoughts in the present study (76 % and 43 % higher odds, respectively). These findings are consistent with studies on physicians and others.[14 15 18] In contrast to physicians, where family and relationship issues were the most significant negative life events,[14] economic problems (OR = 10.88, 95 % CI 5.20-22.78, p<0.001) were the most significant negative life event for veterinarians. This also supports the hypothesis that there are other factors associated with suicidal thoughts among veterinarians than with physicians and that economic concerns are more important with veterinarians. In an Australian qualitative study, veterinarians were asked what they would do if they could change something in the profession, and the most common response was to remove money from the decision-making process.[13] Contrary to the findings in a recent review,[16] experiencing negative life events had a greater impact on serious suicidal thoughts among women than among men. Furthermore, work/life balance had a greater impact on serious suicidal thoughts among men than among women. These findings warrant further research.

Bivariately, drinking to cope was a significant predictor for serious suicidal thoughts, but not in the multivariate model. Previous research indicates that alcohol use is a risk factor for suicidal behavior.[17] Research on veterinarians and alcohol use is scarce.[8 46] In a study examining drug-caused deaths in Australia, veterinarians were the group with the highest prevalence of alcohol detected in post-mortem examinations.[47] Another study found that veterinarians who turned to alcohol to cope with their work-related stress were more likely to have suicidal thoughts.[10] In a recent study examining different occupational groups in the US Army, there was no significant difference in problem drinking in veterinarians, physicians and dentists. [48] The impact of alcohol regarding to mental health among veterinarians warrants further research.

There was no significant effect on serious suicidal thoughts regarding the main field of work, neither in the bivariate nor in the adjusted model. Subsequently, all job stress factors were significantly associated with serious suicidal thoughts bivariately, but not in the adjusted model. However, in the

additional analyses, the use of alcohol to cope with tension and all three job stress factors remained significant without reality weakness and mental distress included in the model. The findings of *emotional demands, work/life balance,* and *fear of complaints/criticism* as important job stress factors concur with previous research.[10 8 49] Although previous studies have suggested that work-related stress influences suicide risk in veterinarians,[50] longitudinal research design may further elaborate on the role of mediating and confounding effects.

Contrary to previous research,[18 26 27] the personality trait reality weakness, was not significant in the adjusted model. This may be explained by the high correlation between mental distress and reality weakness. The impact of mental distress on suicidal thoughts was high, with a nearly three times increase in odds for each step on the 1-5 scale. The direction of causality obtaining between job stress and mental health in this study cannot be unequivocally assessed. On the assumption that job stress actually is an effect of mental distress and reality weakness, our results would indicate that the effect of job stress factors probably was confounded by mental distress and reality weakness. However, if job stress is defined as the underlying causal factor, as posited above, our results would indicate that mental distress and reality weakness mediate the effect of job stress. Previous studies have found that psychosocial factors in the workplace may play a role for mental health,[51] and that individual factors such as stress are related to the way people perceive their jobs.[52] The importance of mental distress with respect to suicidal ideation is consistent with other research, both among medical doctors and others.[15 17]

To our knowledge, this is the only nationwide study of suicidal behavior in veterinarians, incorporating all authorized veterinarians, in all main fields of work. A major strength was the high response rate (75 %), making multivariable analyses feasible, and reducing the effect of selection and response biases. Additionally, the questionnaire was quite extensive, allowing the use of a comprehensive predictor model and controlling for several variables. An important limitation is the cross-sectional design, which restricts conclusions about causality. The generalizability of the results may also be limited due to differences in the organization of work life, including workload, in other countries. Nevertheless, we believe the findings are representative of veterinarians in Northern Europe. The study was conducted during the coronavirus-pandemic of 2019 (Covid-19), which may have affected the results. The survey was planned before the pandemic, and any potential effects of Covid-19 (e.g., redundancy, and economic effects in the practices) were not accounted for.

CONCLUSION

In summary, the level of suicidal behavior among veterinarians in Norway is relatively high, and both individual and work-related factors contribute to serious suicidal thoughts. In the multivariable analyses, the individual factors, and particularly mental distress, played a more important role than the work-related factors, while veterinarians themselves regarded work problems as the most contributing factor to their suicidal thoughts. The roles of gender and specific work-related factors should be further investigated to better understand the complexity of suicidal behavior among veterinarians.

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AUTHOR'S CONTRIBUTION TO THE MANUSCRIPT

HSD, RT, and EH designed the study and analyzed the data. HSD wrote the first draft of the manuscript. All authors revised the manuscript and approved the final version of the manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. HSD and EH acts as a guarantor.

DATA AVAILABILITY STATEMENT

Data are available upon reasonable request.

COMPETING INTERESTS STATEMENT

None declared.

FIGURE LEGENDS

Supplementary File 4-1 (Interaction between life events and gender): Illustration of the two-way interaction between gender and life events (weighted). The life events scale has been divided into four categories to improve readability of the graph. The gradient is significantly steeper for females than males.

Supplementary File 4-2 (Interactions between work/life-balance and gender): Illustration of the two-way interaction between gender and work/life-balance. The increase in suicidal thoughts with higher work/life imbalance was significantly stronger among males than among females.

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NORVET-undersøkelsen

Arbeid, trivsel og mental helse hos veterinærer i Norge

På de fleste spørsmålene skal du angi svar ved å sette et kryss i en rute slik ☒
Vennligst benytt en penn og sett krysset tydelig i ruten.

Noen steder skal du sette tall eller bokstaver i en eller flere ruter, slik [1] eller slik [A]

Skjemaene vil bli lest maskinelt, derfor er det viktig at du skriver tydelig i rutene.

Det er svært viktig at du velger å merke av bare ett svaralternativ, der ikke annet fremgår av teksten. Hvis to alternativer synes like dekkende, bes du velge det ene. Dette vil jevne seg ut på gruppenivå.

Selv om det kanskje er noen spørsmål du synes er mindre viktige, ber vi deg svare likevel.
Det vil bidra til å styrke undersøkelsen.

Det vil være en del spørsmål som blir gjentatt flere ganger i skjemaet. Dette skyldes at de utgjør en integrert del av standardiserte måleinstrumenter. Noen ganger spørres det også om opplysninger for ulike tidsperioder. Dette gjøres for å kunne foreta pålitelige sammenligninger med flere andre grupper, nasjonalt og internasjonalt.

LYKKE TIL, OG PÅ FORHÅND TUSEN TAKK FOR INNSATSEN!

A. BAKGRUNNSOPPLYSNINGER

A1 Kjønn:
☐ Kvinne
☐ Mann
☐ Annen kjønnsidentitet

A3 Nåværende sivilstatus
☐ Ugift ☐ Separert
☐ Samboende ☐ Skilt
☐ Gift ☐ Enke/enkemann

A2 Alder:
☐ 20-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60 ☐ 61-65 ☐ 66-70 ☐ >70

Partner

A4 Har du fast partner (kjæreste/samboer/ektefelle)?
☐ Nei
☐ Ja

A5 Hvis JA, er din partner i arbeid?
☐ Nei
☐ Ja

A6 Hvis JA, er din partner veterinær?
☐ Nei
☐ Ja

Barn og familie

A7 Hvor mange barn har du?
☐ Ingen ☐ 1 barn ☐ 2 barn ☐ 3 eller flere barn

HAR DU I LØPET AV DE SISTE 12 MND. OPPLEVD NOE AV DET FØLGENDE?

A8 En alvorlig sykdom eller ulykke ☐
A9 Skilsmisse/separasjon med samboer eller kjæreste ☐
A10 Giftet deg/flyttet sammen med samboer ☐
A11 Fått barn ☐
A12 Dødsfall familie/nære venner ☐
A13 Andre vansker hos nær familie ☐
A14 Alvorlige økonomiske problemer ☐
A15 Ektefelle har vært arbeidsløs/permittert ☐
A16 Alvorlige bomessige problemer ☐
A17 Du selv, eller noen i nær familie, har vært utsatt for, eller innblandet i, alvorlig lovbrudd ☐
A18 Samlivsproblemer ☐
A19 Flyttet fra foreldre ☐
A20 Permisjon ☐
A21 Sykefravær 21 dager eller mer ☐
A22 Du selv har vært involvert i tilsynssak fra tilsynsmyndigheter ☐
A23 Alvorlig sykdom hos et nærtstående familiemedlem (partner/barn/foreldre) ☐
A24 Andre alvorlige hendelser Spesifiser: ☐

B. ARBEIDSFORHOLD OG ARBEIDSBELASTNING

Hovedstilling

B1 Hvilken tilknytningsform har du til arbeidslivet?

☐ Ansatt ☐ Selvstendig næringsdrivende ☐ Annet, spesifiser:_____

B2 Har du en lederrolle?

☐ Ja ☐ Nei

B3 Hva slags hovedstilling har du nå?

☐ Smådyrpraksis
☐ Produksjonsdyrpraksis
☐ Kombinertpraksis
☐ Hestepraksis
☐ Akvakultur
☐ Offentlig forvaltning
☐ Akademia/forskning
☐ Pensjonist
☐ Annet, eventuelt spesifiser: _____

B3a Hva slags stilling er dette?

☐ Fast stilling
☐ Tidsbegrenset utdanningsstilling
☐ Vikariat Hvis vikariat, fyll inn antall mnd (samlet lengde) ☐☐☐
☐ Annet

B3b Jobber du i

☐ Bedrift som er del av kjede ☐ Frittstående bedrift

B4 Hvor mange måneder har du vært i din nåværende stilling? I ca. ☐☐☐ måneder

Arbeidstidsforhold

B5 Hvor mange prosent er din hovedstilling? Angi prosent: ☐☐☐ %

B6 Hvor lang er din fastlagte arbeidstid i timer per uke i din hovedstilling?

☐☐ timer og ☐☐ minutter pr uke

B7 Hvor mange timer jobber du faktisk i gjennomsnitt pr. uke (inkludert alle stillinger)?

☐☐ timer

B8 I en gjennomsnittlig arbeidsuke, inkludert ev. bistilling(er), omtrent hvor mange timer pr. uke bruker du på:

1.1 Klinisk arbeid	☐☐ timer	1.2 Møtevirksomhet	☐☐ timer
1.3 Papirarbeid	☐☐ timer	1.4 Telefoner/e-post	☐☐ timer
1.5 Reisetid	☐☐ timer	1.6 Totalt	☐☐ timer

B9 Hvor mange timer overtid har du i gjennomsnitt i din hovedstilling i en vanlig arbeidsuke? (Ikke forlenget arbeidstid eller utrykning på vakt, kun tilfeldig overtid.)

Betalt: ☐☐ timer pr. uke

Ubetalt: ☐☐ timer pr. uke

B10 Hvor ofte har du overtidsarbeid/forlenget arbeidstid (betalt eller ubetalt)?

☐ Aldri
☐ Sjeldnere enn en gang i måneden
☐ Minst en gang i måneden
☐ Omtrent annenhver uke
☐ Hver uke

Bistilling

B11 Har du noen fast bistilling eller ekstrajobb i tillegg til din hovedstilling?

☐ Nei
☐ Ja

B12 Hvis du har en bistilling, hvor mange arbeidstimer utgjør denne stillingen gjennomsnittlig pr. uke?

☐☐ timer pr. uke

Vakter som veterinær

B13 Hvis du har faste vakter ut over normal arbeidstid i din hovedstilling, hva slags vaktdelingsordning har du nå?

☐ Tar ikke faste vakter * ☐ 9-delt **Gå til spørsmål B18*
☐ 2-3-delt ☐ 10-delt
☐ 4-5-delt ☐ 11-delt
☐ 6-7-delt ☐ >12-delt
☐ 8-delt

B14 Hvilken type vaktordning deltar du i?

☐ Offentlig vakt ☐ Privat vakt

B15 Hvis du tar faste vakter ut over normal arbeidstid i din hovedstilling, hvor lange er vaktene?

☐ Ca 1/2 døgn
☐ Ca. 1 døgn
☐ Mer enn 1 døgn
☐ Annet; hva _____

B16 Ca. hvor mange timer av dine faste vakter tilbringer du

Aktiv: ☐☐ timer

Hvilende: ☐☐ timer

Sovende: ☐☐ timer

Har du

☐ tilstedevakt eller ☐ hjemmevakt

B17 Hvis du har faste vakter, cirka hvor lenge arbeider du dagen etter vakt?

☐ Arbeider ikke rett etter vakt

☐ 1-3 timer

☐ 4-6 timer

☐ 7 timer eller mer

B18 Hvis du har vakter som en del av en bistilling, cirka hvor mange timer av disse vaktene tilbringer du

Hvis du ikke har vakt som del av bistilling, gå til B19

Aktiv: ☐☐ timer

Hvilende: ☐☐ timer

Sovende: ☐☐ timer

Har du

☐ tilstedevakt eller ☐ hjemmevakt

B19 Cirka hvor mange avspaseringsuker pr. halvår benytter du til ikke-faglig aktivitet?

☐ Ingen uke

☐ 1 uke

☐ 2 uker

☐ 3 uker

☐ 4 uker

☐ 5 uker

☐ 6 uker eller flere

B20 Dersom du jobber i klinisk praksis, hvor mange avlivinger utfører du omtrent på en vanlig uke?

☐ 0-4

☐ 5-9

☐ 10-14

☐ 15 eller fler

Belastningsfaktorer

I hvilken grad gjør de følgende situasjoner/faktorer deg belastet (stresset)?
Sett ett kryss i den ruten som passer best for deg.

		Ikke noen belastning	Litt belastning	Endel belastning	Mye belastning	Svært mye belastning
B21	Kritikk av veterinærer i media	☐	☐	☐	☐	☐
B22	Kundene/dyreeierne setter ikke pris på det du gjør	☐	☐	☐	☐	☐
B23	Bekymring over klager fra kunder/dyreeiere	☐	☐	☐	☐	☐
B24	Å ha ansvar for dyrenes liv 24 timer i døgnet	☐	☐	☐	☐	☐
B25	Telefoner, sykebesøk og utrykning om natten	☐	☐	☐	☐	☐
B26	Å ta seg av vanskelige veterinærmedisinske problemstillinger	☐	☐	☐	☐	☐
B27	Å ta seg av vanskelige kunder/dyreeiere	☐	☐	☐	☐	☐
B28	Krysspress mellom økonomi og dyrevelferd/etikk	☐	☐	☐	☐	☐
B29	Bekymringer knyttet til egen økonomi	☐	☐	☐	☐	☐
B30	Bekymringer knyttet til bedriftens økonomi	☐	☐	☐	☐	☐
B31	Sykejournaler og annet papirarbeid	☐	☐	☐	☐	☐
B32	Kirurgiske inngrep	☐	☐	☐	☐	☐
B33	Arbeidsmiljøet	☐	☐	☐	☐	☐
B34	Tidspress	☐	☐	☐	☐	☐
B35	Jobben går ut over familieliv	☐	☐	☐	☐	☐
B36	Jobben går ut over sosialt liv	☐	☐	☐	☐	☐
B37	Daglig kontakt med døende og kritisk syke dyr	☐	☐	☐	☐	☐
B38	Å ta seg av dødssyke dyr og deres eiere	☐	☐	☐	☐	☐
B39	Forespørsler om dyr fra venner og bekjente	☐	☐	☐	☐	☐
B40	Forespørsler om dyr fra slektninger	☐	☐	☐	☐	☐
B41	Være i generell beredskap	☐	☐	☐	☐	☐

	Ikke noen belastning	Litt belastning	Endel belastning	Mye belastning	Svært mye belastning
B42 Følelsesmessig engasjement i dyrene	☐	☐	☐	☐	☐
B43 Forventninger om at veterinæren også skal hjelpe med ikke-medisinske problemer	☐	☐	☐	☐	☐
B44 Avbrytelser og mas i arbeidssituasjonen	☐	☐	☐	☐	☐
B45 Å ta seg av lidende dyr	☐	☐	☐	☐	☐
B46 Konflikt med kolleger/medarbeidere	☐	☐	☐	☐	☐
B47 Å få til en balanse mellom arbeid og privatliv	☐	☐	☐	☐	☐

Forhold til kolleger

	Ingen grad						I svært høy grad
B48 I hvilken grad trives du i det store og det hele blant dine kolleger?	☐	☐	☐	☐	☐	☐	☐
B49 I hvor stor grad har du følt deg ivaretatt av dine veterinærkolleger?	☐	☐	☐	☐	☐	☐	☐

	Stemmer helt	Stemmer ganske bra	Stemmer ikke særlig bra	Stemmer ikke
B50 Det er rolig og behagelig stemning på min arbeidsplass	☐	☐	☐	☐
B51 Det er godt samhold	☐	☐	☐	☐
B52 Mine arbeidskolleger stiller opp for meg	☐	☐	☐	☐
B53 Det er forståelse for at jeg kan ha en dårlig dag	☐	☐	☐	☐
B54 Jeg kommer godt overens med mine overordnede*	☐	☐	☐	☐
B55 Jeg trives bra med mine arbeidskolleger	☐	☐	☐	☐

**Besvares bare dersom du har en overordnet.*

B56 Når du føler deg bekymret, engstelig eller nervøs - drikker du noen gang alkohol for å klare situasjonen bedre?

☐ Aldri ☐ Sjelden ☐ Av og til ☐ Ofte

Vedrørende ditt arbeid		Meget sjelden eller aldri	Nokså sjelden	Av og til	Nokså ofte	Meget ofte eller alltid
B57	Er det fastsatt klare mål for din jobb?	☐	☐	☐	☐	☐
B58	Vet du hva som er ditt ansvarsområde?	☐	☐	☐	☐	☐
B59	Vet du nøyaktig hva som forventes av deg i jobben?	☐	☐	☐	☐	☐
B60	Må du gjøre ting du mener burde vært gjort annerledes?	☐	☐	☐	☐	☐
B61	Får du oppgaver uten tilstrekkelig hjelpemidler og ressurser til å fullføre dem?	☐	☐	☐	☐	☐
B62	Mottar du motstridende forespørsler fra to eller flere personer?	☐	☐	☐	☐	☐
B63	Fordeler din nærmeste sjef arbeidsoppgaver rettferdig og upartisk?*	☐	☐	☐	☐	☐
B64	Behandler din nærmeste sjef de ansatte rettferdig og upartisk?*	☐	☐	☐	☐	☐
B65	Er forholdet mellom deg og din nærmeste sjef en kilde til stress for deg?*	☐	☐	☐	☐	☐

**Besvares bare dersom du har en overordnet.*

		Ja, ofte	Ja, noen ganger	Nei, sjelden	Nei, så godt som aldri
B66	Krever arbeidet ditt at du arbeider meget raskt?	☐	☐	☐	☐
B67	Krever arbeidet ditt at du arbeider meget hardt?	☐	☐	☐	☐
B68	Krever arbeidet ditt for stor arbeidsinnsats?	☐	☐	☐	☐
B69	Har du tilstrekkelig tid til å utføre arbeidsoppgavene dine?	☐	☐	☐	☐
B70	Forekommer det ofte motstridende krav i arbeidet ditt?	☐	☐	☐	☐
B71	Får du lære nye ting i ditt arbeid?	☐	☐	☐	☐
B72	Krever ditt arbeid dyktighet?	☐	☐	☐	☐
B73	Krever ditt arbeid oppfinnsomhet/kreativitet?	☐	☐	☐	☐
B74	Innebærer ditt arbeid at du gjør samme ting om og om igjen?	☐	☐	☐	☐
B75	Har du frihet til å bestemme hvordan ditt arbeid skal utføres?	☐	☐	☐	☐
B76	Har du frihet til å bestemme hva som skal utføres i ditt arbeid?	☐	☐	☐	☐

C HELSE

Nedenfor finner du en oppstilling av plager som man av og til har.
Les nøye gjennom dem, en for en, og angi deretter hvor mye hvert enkelt problem har plaget deg eller vært til besvær i løpet av de siste 14 dagene

		Ikke i det hele tatt	Litt	Måtelig	Ganske mye	Veldig mye
C1	Nervøsitet, indre uro	☐	☐	☐	☐	☐
C2	Stadig redd eller engstelig	☐	☐	☐	☐	☐
C3	Følelse av håpløshet med tanke på fremtiden	☐	☐	☐	☐	☐
C4	Mye bekymret eller urolig	☐	☐	☐	☐	☐
C5	Nedtrykt, tungsindig	☐	☐	☐	☐	☐

C6 Hvis du har hatt psykiske problemer i løpet av det siste året, har du da søkt/fått hjelp for dette?

☐ Ikke hatt psykiske problemer av betydning* **Gå til spørsmål C13*
☐ Har ikke søkt hjelp selv om jeg nok kunne ha hatt behov for det
☐ Ja, har konsultert allmennlege eller fastlege
☐ Ja, har konsultert psykolog/psykiater
☐ Ja, har vært innlagt i psykiatrisk avdeling

C7 Hvis du har vært i kontakt med psykolog/psykiater, hva slags behandling har du fått?
Det er mulig å sette flere klyss

☐ 1-5 samtaler
☐ Flere enn 5 samtaler
☐ Psykoterapi/psykoanalyse
☐ Gruppeterapi
☐ Medikamentell behandling

Hvis du har hatt psykiske problemer i løpet av det siste året, i hvilken grad mener du at følgende forhold var medvirkende til at det ble vanskelig for deg?

		Betydde ingenting	Betydde litt	Betydde endel	Betydde ganske mye	Betydde svært mye
C8	Personlige forhold	☐	☐	☐	☐	☐
C9	Forhold til familie/ektefelle/partner	☐	☐	☐	☐	☐
C10	Sosiale forhold	☐	☐	☐	☐	☐
C11	Problemer i forbindelse med veterinæryrket	☐	☐	☐	☐	☐
C12	Andre forhold	☐	☐	☐	☐	☐

Livslyst

De følgende spørsmål dreier seg om du i løpet av det siste året har mistet livslysten, og i så fall i hvilken grad?

C13 **Har du noen gang i løpet av det siste året følt at livet ikke er verdt å leve?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

C14 **Har du i løpet av det siste året ønsket at du var død - f.eks. at du skulle sovne inn og aldri våkne igjen?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

C15 **Har du noen gang i løpet av det siste året tenkt på å ta livet ditt, selv om du vet at du ikke vil gjøre det?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

C16 **Har du noen gang i løpet av det siste året vært i den situasjonen at du alvorlig har overveiet å ta livet ditt og til og med planlagt hvordan du i såfall skulle gjøre det?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

Hvis det har hendt, i hvilken grad mener du de følgende forhold var medvirkende til at det ble så vanskelig for deg?

	Betydde ingenting	Betydde litt	Betydde endel	Betydde ganske mye	Betydde svært mye
C17 Personlige forhold	☐	☐	☐	☐	☐
C18 Forhold til familie/ektefelle/partner	☐	☐	☐	☐	☐
C19 Sosiale forhold	☐	☐	☐	☐	☐
C20 Problemer i forbindelse med veterinæryrket	☐	☐	☐	☐	☐
C21 Andre forhold	☐	☐	☐	☐	☐

C22 **Har du i løpet av det siste året forsøkt å ta ditt eget liv?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

Hvis det har hendt, i hvilken grad mener du de følgende forhold var medvirkende til at det ble så vanskelig for deg?

	Betydde ingenting	Betydde litt	Betydde endel	Betydde ganske mye	Betydde svært mye
C23 Personlige forhold	☐	☐	☐	☐	☐
C24 Forhold til familie/ektefelle/partner	☐	☐	☐	☐	☐
C25 Sosiale forhold	☐	☐	☐	☐	☐
C26 Problemer i forbindelse med veterinæryrket	☐	☐	☐	☐	☐
C27 Andre forhold	☐	☐	☐	☐	☐

Holdninger til aktiv dødshjelp

Aktiv dødshjelp er en samlebetegnelse på eutanasi og legeassistert selvmord. I noen europeiske land er aktiv dødshjelp tillatt, men i Norge er det ulovlig.

Eutanasi er en leges tilsiktede drap på en person ved å sette en sprøyte med dødbringende medikamenter etter at personen frivillig har bedt om det.

Legeassistert selvmord er en leges hjelp til selvmord, ved å skaffe til veie medikamenter som personen kan innta selv.

	Ta stilling til følgende påstander	Svært enig	Litt enig	Verken enig eller uenig	Litt uenig	Svært uenig
C28	Legeassistert selvmord bør tillates for personer som har en dødelig sykdom med kort forventet levetid.	☐	☐	☐	☐	☐
C29	Eutanasi bør tillates for personer som har en dødelig sykdom med kort forventet levetid.	☐	☐	☐	☐	☐
C30	Aktiv dødshjelp bør tillates også for personer som har en uhelbredelig kronisk sykdom, men ikke er døende.	☐	☐	☐	☐	☐
C31	Det finnes tilfeller der det kan være riktig/moralsk forsvarlig av legen å utføre aktiv dødshjelp, selv om det er ulovlig.	☐	☐	☐	☐	☐

Holdninger til psykiske lidelser

	Ta stilling til følgende påstander	Svært enig	Noe enig	Ikke sikker/ ubestemt	Noe uenig	Svært uenig
C32	Behandling kan hjelpe mennesker med psykiske lidelser til å føre et normalt liv.	☐	☐	☐	☐	☐
C33	Folk er generelt sett omsorgsfulle og positivt innstilte overfor personer med psykiske lidelser.	☐	☐	☐	☐	☐

D Personlige egenskaper

Ta stilling til følgende påstander

		Stemmer ikke	Stemmer
D1	Det er vanskelig for meg å stole på folk ettersom de så ofte vender seg mot meg eller lar meg i stikken	☐	☐
D2	På en eller annen måte føler jeg at jeg ikke vet hvordan jeg skal oppføre meg sammen med andre mennesker	☐	☐
D3	Jeg opplever meg selv som helt ulik til ulike tidspunkter	☐	☐
D4	Jeg føler meg ensom mesteparten av tiden	☐	☐
D5	Folk som virker bra til å begynne med, ender ofte opp med å skuffe meg	☐	☐
D6	Jeg føler det av og til som om jeg lever i en tåke	☐	☐
D7	Noen ganger føler jeg at jeg ikke er meg selv	☐	☐
D8	Folk kan oppfatte meg som uhøflig eller hensynsløs uten at jeg skjønner hvorfor	☐	☐
D9	Av og til får jeg rare tanker i hodet som jeg ikke er i stand til å få vekk	☐	☐

D10 Eventuelle kommentarer til spørreskjemaet?

Supplementary File 2 – Description of sample for veterinarians with serious suicidal thoughts

Variable	Range of values	Frequency (%)	Mean (SD)
Gender			
Female		108 (79.4%)	
Male		28 (20.6 %)	
Age			
20-30		16 (11.7 %)	
31-40		47 (34.3 %)	
41-50		41 (29.9 %)	
51-60		21 (15.3 %)	
61-70		10 (7.3 %)	
>70		2 (1.5 %)	
Marital status			
Married/cohabiting		82 (61.2 %)	
Single/divorced/widow(er)		52 (38.8 %)	
Life events	0-9		1.3 (1.4)
SCL-5	1-5		3.3 (1.0)
Reality weakness	0-8		3.2 (2.1)
Alcohol to cope			
Never		73 (53.3 %)	
Any frequency		64 (46.7 %)	
Main field of work			
Companion animal practice		53 (39.6 %)	
Public administration		21 (15.7 %)	
Mixed clinical practice		13 (9.7 %)	
Academia/research		11 (8.2 %)	
Production animal practice		11 (8.2 %)	
Aquaculture		6 (4.5 %)	
Equine practice		6 (4.5 %)	
Other		10 (7.5 %)	
Pensioner		3 (2.2 %)	
Job stress			
Emotional demands	1 - 5		2.44 (0.84)
Work/life-balance	1 - 5		3.22 (0.98)
Fear of complaints	1 - 5		3.63 (1.11)
Connection to work-life			
Employed		80 (58.4 %)	
Self-employed		37 (27.0 %)	
Other		11 (8.0 %)	
Two or more connections to work life		9 (6.6 %)	
Position type			
Permanent position		115 (87.8 %)	
Temporary position		6 (4.6 %)	
Temporary educational position		2 (1.5 %)	
Other		8 (6.1 %)	
Working full-time		101 (75.4 %)	

Frequency of working overtime (weekly or bi-weekly)		92 (71.9 %)	

Supplementary File 3 – Additional analysis predictor model – Predictors of serious suicidal thoughts among veterinarians in Norway, without mental distress and reality weakness

	Crude		Adjusted[2]	
	OR	95 % CI	OR	95 % CI
Female	1.55	0.999 to 2.401	0.88	0.50 to 1.53
Age	0.93	0.86 to 1.00	1.02	0.92 to 1.13
Single	2.38***	1.65 to 3.43	2.17***	1.44 to 3.27
Negative life events[1]	1.78***	1.55 to 2.04	1.61***	1.39 to 1.86
Alcohol to cope	2.14***	1.51 to 3.04	1.52*	1.02 to 2.27
Main field of work (ref. category= mixed clinical practice)				
Companion animals	1.38	0.74 to 2.57	1.17	0.59 to 2.30
Production animals	1.28	0.56 to 2.94	1.72	0.71 to 4.19
Equine practice	1.21	0.45 to 3.28	1.02	0.34 to 3.04
Aquaculture	1.01	0.37 to 2.73	1.23	0.39 to 3.89
Public administration	1.08	0.53 to 2.20	1.47	0.65 to 3.31
Academia/research	1.12	0.49 to 2.56	1.53	0.59 to 4.01
Other	0.82	0.35 to 1.91	0.80	0.29 to 2.17
Job stress				
Emotional demands	1.12***	1.08-1.16	1.05*	1.003 to 1.104
Work/life-balance	1.13***	1.09-1.17	1.08**	1.03 to 1.13
Fear of complaints	1.18***	1.11-1.25	1.08*	1.001 to 1.164

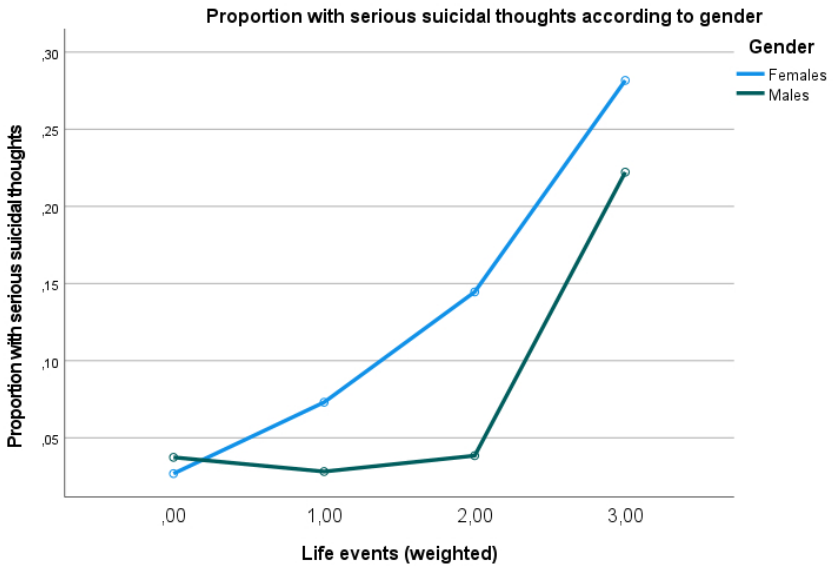
[1]The variable life events was entered into the model as a weighted variable ('Negative life events'), comprising the sum score of life events that was significant in a univariate model with the dependent variable.

*P<0.05

**P<0.01

***P<0.001

[2] In the adjusted model, all listed variables were adjusted for, i.e. gender, age, civil status, negative life events, use of alcohol to cope, main field of work and the three job stress factors.



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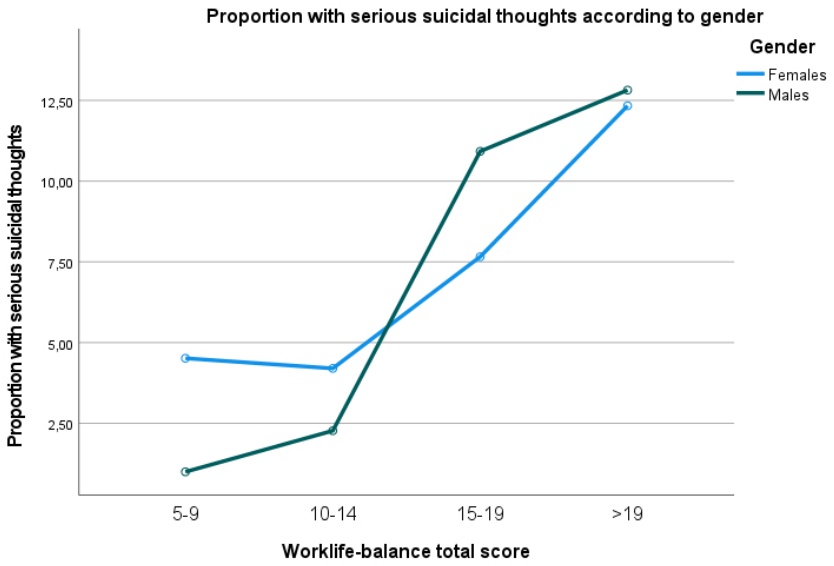

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-8
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	NA
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9-11
		(b) Indicate number of participants with missing data for each variable of interest	9-14
Outcome data	15*	Report numbers of outcome events or summary measures	9-14
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13-14
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	13-14
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Prevalence and individual and work-related factors associated with suicidal thoughts and behaviors among veterinarians in Norway: a cross-sectional, nationwide survey-based study (the NORVET study)

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Prevalence and individual and work-related factors associated with suicidal thoughts and behaviors among veterinarians in Norway: a cross-sectional, nationwide survey-based study (the NORVET study)

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ABSTRACT

Objectives: Several studies have shown increased suicide rates among veterinarians. We investigated the self-reported prevalence of suicidal thoughts and behaviors and contributing and independent factors associated with suicidal thoughts and behaviors among veterinarians in Norway.

Design: Cross-sectional, nationwide survey.

Participants: 2596 veterinarians in Norway (response rate: 75 %).

Main outcome measure: Paykel's five-item questionnaire.

Results: In total, 27 % (n=682/2657) of veterinarians in Norway felt that life was not worth living during the last year, 5 % (n=139/2562) had serious suicidal thoughts, and 0.2 % (n=6/2537) had attempted suicide. Female veterinarians reported significantly higher prevalence of suicidal feelings and thoughts than males. For serious suicidal thoughts, women had nearly twice the prevalence as their male colleagues (6.2 % (n=108/1754) vs. 3.6 % (n=28/766), chi-square 6.5, p=0.011). Independent factors associated with serious suicidal thoughts were being single (OR = 1.76, 95 %CI 1.13-2.72, p<0.05), negative life events (OR = 1.43, 95 %CI 1.22-1.68, p<0.001), and the presence of mental distress (OR = 2.75, 95 %CI 2.14-3.52, p<0.001). The veterinarians related their serious suicidal thoughts to work and personal problems, and a lesser degree to family, social, and other problems. Nearly twice as many women (53 %, n=57/108) as men (28 %, n=7/25) reported work problems as the most important contributing factor to their serious suicidal thoughts (chi-square: 4.99, p=0.03). 4 % (n=6/139) reported work problems as the only factor of importance.

Conclusions: Veterinarians in Norway have relatively high prevalence of suicidal feelings and thoughts, including serious suicidal thoughts. In multivariable analyses, the individual factors were more important than work-related ones, while work problems were the most reported contributing factor to serious suicidal thoughts by the veterinarians themselves. The role of gender and specific work-related factors should be further investigated to better understand the complexity of suicidal behavior among veterinarians.

Keywords: Veterinarians, suicidal behavior, mental distress, personality traits.

Strengths and limitations of this study

- A major strength of our study is the high response rate (75 %), incorporating all authorized veterinarians nationwide, in all main fields of work.
- An extensive questionnaire was used, making multivariable analysis feasible.
- This is a cross-sectional study, which limits any conclusions regarding causality.
- The study possibly has limited generalizability, due to differences in organization of work life in other countries.

INTRODUCTION

Several studies have shown increased suicide rates among veterinarians. A review from 2010 found elevated suicide rates in all but one of the 15 studies published at the time. The suicide rate among veterinarians in the UK was three times that of the general population.[1] Recent studies have also indicated increased suicide rates in the profession.[2-4] Furthermore, three recent studies found a higher prevalence of suicidal ideation among veterinarians than the general population.[5-7]

There is little knowledge about the contribution of individual and work-related factors to suicidal behavior in veterinarians. In a systematic review from 2012, which included 52 papers, the authors highlighted the paucity of research that investigated the factors that contribute to suicide among veterinarians, and that many of the studies were of poor quality.[8] An interview study found that patient issues, responsibility, and poor work/life balance contributed to suicidal ideation among veterinarians.[9] It has been suggested that suicidal ideation among veterinarians is linked to the demanding nature of their work.[10] Dealing with bereaved clients (i.e. animal owners) has been shown to impact the mental health of veterinarians,[11] and attachment loss and trauma can contribute to both depression and suicidality.[12] Preoccupation, self-doubt, conflicting responsibilities (care of animals/human clients/financial demands), and insufficient support were important factors of job stress among veterinarians in a qualitative study.[13] When searching for independent work-related factors associated with suicidal thoughts and behavior, it is important to control for known individual factors. These include having no partner,[14 15] negative life events,[16] anxiety symptoms, depressive symptoms,[15 17] personality problems,[18 19] and the problematic use of alcohol.[17]

The gender balance among veterinarians has changed significantly over the past decades, from 66 % male veterinary students in Norway in 1980 to only 16 % in 2020 (personal communication, Ann Kristin Egeli, Norwegian University of Life Sciences, June 22nd, 2021). As of June 2021, 69 % of veterinarians holding authorization in Norway were women (personal communication, Bente N. Reve, The Norwegian Food Safety Authority, July 12th, 2021). The gender shift in the profession corresponds to that in several other countries.[20-22] Studies have shown that being female and of younger age increases the risk of serious psychological distress as a veterinarian.[7 8 11] The prevalence of psychological distress, such as anxiety symptoms and depressive symptoms, is also higher among female veterinarians compared to that among male veterinarians.[5 11 23]

Furthermore, there is substantial evidence that certain personality traits may increase the risk of suicide.[19 24] Reality weakness is a deviant personality trait including chronic illusions, paranoid traits, identity-insecurity, and relational problems.[25] This trait has demonstrated predictive validity in

Norwegian medical doctors regarding the aggravation of suicidal ideation.[18] It is a significant predictor of serious suicidal ideation in other occupational groups as well.[26 27]

Over the last decades, the veterinary profession has turned from agriculture and food-producing animal medicine to an increasing proportion working with companion animals. Two US studies have found a higher suicide rate among companion animal practitioners compared to other specializations,[3 28] and it has been shown that veterinarians in this field more often reported suicidal thoughts than other veterinarians.[29] Thus, attention is required in the different fields of veterinary medicine.

Few studies have investigated the direct association and contribution of individual and work-related factors to suicidal thoughts and behavior. Therefore, we investigated the following questions:

(1) What is the prevalence of suicidal thoughts and behavior among veterinarians in Norway, and are there any gender differences?
(2) What do veterinarians in Norway regard as contributing factors to their serious suicidal thoughts?
(3) What are the independent individual and work-related predictors for serious suicidal thoughts?

METHODS

Sample

The sample included all veterinarians in Norway, holding valid authorization as of May 2020 (n = 4256), according to information retrieved from the Norwegian Food Safety Authority. We excluded veterinarians for the following reasons: no residential address in Norway (n = 527), current address unknown (n = 196), those working abroad (n = 62) and those who were deceased (n = 7). This resulted in an eligible sample of 3464 veterinarians.

Questionnaire

A 12-page questionnaire, an information sheet and a prepaid postage envelope were distributed by mail in November 2020. The information sheet included contact information of a psychiatrist in the research group and the colleague-support network of the Norwegian Veterinary Association. Two reminders were sent in January and February 2021, respectively. Five gift cards from a sports shop were placed in a drawing for respondents as incentives to increase the response rate. An external company managed both the data collection and prize awards. Respondents returned their

questionnaires in a sealed envelope, and the identities of the respondents were unknown to the researchers throughout. The complete questionnaire in Norwegian can be found as a supplementary file ("Supplementary file 1 – Full questionnaire NORVET.pdf").

The Regional Committee for Medical and Health Research Ethics South-East C (132704), and the Norwegian Centre for Research Data (674793) approved this study.

Instruments – dependent variable

Paykel's questionnaire about suicidal thoughts and attempts was the dependent variable in this study.[30] It is a five-item instrument developed to study suicidal feelings in the general population. The items represent increasing severity, from unspecific suicidal feelings to actual suicide attempt. Previous studies on several professions in Norway have validated this instrument.[14 15 26 27 31] The five items have the following wording: 1. 'Have you ever felt that life was not worth living?' 2. 'Have you ever wished you were dead – for instance, that you could go to sleep and not wake up?' 3. 'Have you ever thought of taking your life, even if you would not really do it?' 4. 'Have you ever reached the point where you seriously considered taking your life, or perhaps made plans how you would go about doing it?' 5. 'Have you ever made an attempt to take your life?' Question four was slightly altered in the Norwegian translation, to: "… and even made plans…", reinforcing the seriousness in this statement.[15] The responses to each question were never, hardly ever, sometimes or often. Responses were dichotomized into never (0) and any frequency (1) according to Paykel's original work. The preceding year's suicidal thoughts and attempts were investigated in the present study. For questions 4. and 5., an additional question was asked: 'To what extent do you think the following factors contributed to your consideration of taking your life', with the following factors: 1. Personal problems, 2. Family problems, 3. Social problems, 4. Work problems, 5. Other problems. Each of the factors had five response categories from 'not at all' (1) to 'very much' (5). For the regression analyses, Paykel item number four was used (serious suicidal thoughts) as the outcome variable, dichotomized as specified above.

Independent variables – individual factors

The personality trait *reality weakness* was measured using the nine-item reality weakness dimension of Torgersen's Basic Character Inventory (BCI).[32] Each item had a dichotomous ('agree'/'do not agree') response, with a total sum score from 0 to 9. BCI-Reality weakness is an original, deviant trait related to perceptions and ideations on the borderline between reality and fantasy; this dimension

also measures chronic illusions, paranoid traits, and traits related to severe personality disorders.[25 33] Examples of items are: 'I feel lonely most of the time' and 'Sometimes I feel I am not myself'. This measure has previously been validated to predict emotional disturbance, such as serious suicidal thoughts, severe depression, and lack of help-seeking among physicians.[33]

The Norwegian Centre for Research Data claimed the use of age intervals to keep the data as unidentifiable as possible. Therefore, *age* was reported in the following intervals: 20-25, 26-30 (…) up to 66-70 and >70 years. In this study, *marital status* was dichotomized into married/cohabitant and single/divorced/separated/widow(er) (coded 0 and 1, respectively).

Life events during the last 12 months was measured by 17 items, previously used by among others, Tyssen et al.,[15 34] and adapted to veterinarians. The adaptations were mainly linguistic and included the removal of items specific to physicians. Examples of life events were 'serious disease or accident', 'death of a relative/close friend' and 'serious economic problems'. All items were coded as 0 or 1, and the variable comprised the sum score of all items. To test the effects on serious suicidal thoughts, we used the weighted total score of all items significantly associated with such thoughts.

Mental distress (anxiety symptoms and depressive symptoms) in the last 14 days was measured using SCL-5, a five-item version of the Symptom Check List-25.[35] This five-item version is based on a factor analysis by Tambs and Moum,[36] and contains questions about how much one is bothered by the following: 1. 'Feeling fearful', 2. 'Nervousness or shakiness inside', 3. 'Feeling hopeless about the future', 4. 'Feeling blue', 5. 'Worrying too much about things'. Each item was measured on a scale from 1 to 5 from 'not at all' to 'very much'. The sum score is used to indicate the level of mental distress. This version has been validated in medical students and physicians in Norway.[37 38]

Alcohol to cope was measured by a single item originally used in national surveys in the USA.[39] The item is: 'When you feel worried, tense, or nervous, do you ever drink alcoholic beverages to help you handle things?' The alternatives were 'never', 'seldom', 'now and then' and 'often'. In the analyses, responses were dichotomized into 0 'Never' and 1 'Any frequency', as validated in previous Norwegian studies.[40-42] The reason for dichotomizing the response was for cultural purposes and we wanted a clear distinction between drinking to cope with tension or not, as accounted for in detail elsewhere.[40]

Independent variables – work-related factors

The main fields of work were reported as 'companion animal practice', 'production animal practice', 'mixed clinical practice', 'equine practice', 'aquaculture', 'public administration', 'academia/researcher', 'pensioners' and 'others'. Those who classified themselves as pensioners were excluded from the logistic regression analyses, because work-related factors were included in the model.

Job stress was measured by a modified version of Cooper's Job Stress Questionnaire,[43 44] with minor adaptations to veterinarians' work conditions. These adaptations were mainly linguistic, but some items specific to the veterinary profession were added (as 'cross pressure between economy/animal welfare/ethics'). The veterinarians were asked how much different situations/factors made them stressed, with the response alternatives being reported by a five-point Likert type rating scale ranging from no stress at all (1) to a source of extreme stress (5). A factor analysis (principal component with varimax rotation, including scree plot evaluation) identified three job stress factors: *emotional demands, work/life balance,* and *fear of complaints/criticism*. The first factor, *emotional demands* (Cronbach's alpha=0.87), contained six items: 1. 'Daily contact with dying and critically ill animals', 2. 'Taking care of terminally ill animals and their owners', 3. 'Taking care of suffering animals', 4. 'Requests about animals from friends and family', 5. 'Requests about animals from relatives', and 6. 'Emotional involvement with patients'. The second factor, *work/life balance* (Cronbach's alpha=0.86), consisted of five items: 1. 'Work affects family life', 2. 'Managing a balance between work and personal life', 3. 'Work affects social life', 4. 'Time pressure', and 5. 'Interruptions and nagging at work'. The third factor, *fear of complaints/criticism* (Cronbach's alpha=0.88), consisted of three items: 1. 'Worries about complaints from animal owners/customers', 2. 'Animal owners/customers do not appreciate your work', and 3. 'Dealing with challenging animal owners/customers'.

Statistical analysis

SPSS version 27 and StataSE 16 were used for the statistical analyses. Table analyses and the χ^2 test were used to test for gender differences. Controlled effects were reported as odds ratios, analyzed through hierarchical logistic regression. The following variables were examined as possible predictors of serious suicidal thoughts: gender, age, civil status, negative life events, mental distress, reality weakness, use of alcohol to cope, main field of work, and job stress. Initially all independent variables were analyzed bivariately with the dependent variable (crude ORs). In the adjusted model, all independent variables were entered simultaneously in a logistic regression (adjusted ORs). In order

to study possible mediating or confounding effects of mental distress and reality weakness, we performed an additional multivariable regression leaving out the variables mental distress and reality weakness. $p<0.05$ was considered statistically significant for all analyses. To investigate gender-specific effects, we entered two-way interaction terms between gender and the other independent variables in separate analyses with the main effect included in the equations. Missing values were coded as 'system missing'.

Patient and Public Involvement

The Norwegian Veterinary Association appointed a reference group for this project consisting of seven veterinarians from each of the professional subgroups: Small Animal-, Equine-, Production Animal and Aquaculture Veterinary Association, the Association of Veterinarians in Public Health Medicine, the Veterinary Students' Association and the Pensioners' Association. These veterinarians contributed with valuable input both to the design of the questionnaire, hypotheses, and aims of the present study.

RESULTS

Demographics

Of the 3464 eligible participants, we received 2596 responses, resulting in a response rate of 75 %.

The most frequently reported age category was 41 – 45 years of age. The age varied between genders, with a higher proportion of younger women, and the majority of men were older than 50 years. In total, 69 % were female and 31 % male (Table 1), which is an accurate reflection of the actual gender distribution of veterinarians in Norway.

1 **Table 1 – Description of study population**

	Range of values	Frequency (%)	Mean (SD)
Gender			
Female	..	1776 (69.6 %)	..
Male	..	776 (30.4 %)	..
Age			
20-30	..	274 (10.8 %)	..
31-40	..	697 (27.4 %)	..
41-50	..	667 (26.2 %)	..
51-60	..	432 (16.9 %)	..
61-70	..	318 (12.5 %)	..
>70	..	159 (6.2 %)	..
Marital status			
Married/cohabiting	..	1962 (78 %)	..
Single/divorced/widow(er)	..	552 (22 %)	..
Life events	0-9	..	0.54 (0.89)
SCL-5	1-5	..	2.00 (0.98)
Reality weakness	0-9	..	1.38 (1.85)
Alcohol to cope			
Never	..	1769 (71 %)	..
Any frequency	..	722 (29 %)	..
Main field of work			
Companion animal practice	..	802 (31.8 %)	..
Public administration	..	402 (15.9 %)	..
Mixed clinical practice	..	268 (10.6 %)	..

Academia/research	..	202 (8.0 %)	..
Production animal practice	..	177 (7.0 %)	..
Aquaculture	..	121 (4.8 %)	..
Equine practice	..	102 (4.0 %)	..
Other	..	250 (9.9 %)	..
Pensioner	..	198 (7.9 %)	..
Job stress			
Emotional demands	1-5	..	1.98 (0.79)
Work/life balance	1-5	..	2.67 (0.97)
Fear of complaints	1-5	..	3.06 (1.17)
Connection to work-life			
Employed	..	1561 (63.0 %)	..
Self-employed	..	573 (23.1 %)	..
Other	..	217 (8.8 %)	..
Two or more connections to work life	..	127 (5.1 %)	..
Position type			..
Permanent position	..	2023 (88.1 %)	..
Temporary position	..	70 (3 %)	..
Temporary educational position	..	50 (2.2 %)	..
Other	..	153 (6.7 %)	..
Working full-time	..	1922 (81.1 %)	..
Frequency of working overtime (weekly or bi-weekly)	..	1550 (67.9 %)	..

1

2

Prevalence of suicidal thoughts and behavior during the last year

27 % of the veterinarians reported that they felt that life was not worth living, and 20 % had thought of suicide, even though they knew that they would not do it. 5 % reported that they had serious suicidal thoughts, and six persons (0.2 %) had attempted suicide (Table 2). Female veterinarians reported significantly higher prevalence of suicidal feelings and thoughts than male colleagues did. This gender difference remained throughout all items; for serious suicidal thoughts; women had nearly twice the prevalence as their male colleagues (6.2 % vs. 3.6 %, chi-square: 6.5, p=0.011). Economic problems (OR = 10.88, 95 % CI 5.20-22.78, p<0.001) were the most significant negative life event for veterinarians. Descriptive statistics for the veterinarians with serious suicidal thoughts is included as a supplementary file (Supplementary File 2 – Descriptives for veterinarians with serious suicidal thoughts).

Table 2 – Prevalence of suicidal feelings and thoughts among veterinarians in Norway according to gender

	All	Men	Women	Total n for each item	χ^2 and p-value
1. Felt life was not worth living	682 (26.6 %)	148 (19.3%)	522 (29.7%)	2567	29.4, p<0.001
2. Wished you were dead	498 (19.4 %)	96 (12.5%)	394 (22.5%)	2565	33.6, p<0.001
3. Thoughts of taking life	503 (19.6 %)	102 (13.3%)	391 (22.3%)	2565	26.9, p<0.001
4. Seriously considered taking your life	139 (5.4 %)	28 (3.6%)	108 (6.2%)	2562	6.5, p=0.011
5. Made a suicide attempt	6 (0.2 %)	1 (0.1%)	5 (0.3%)	2537	NA

Not all veterinarians reported gender (n=2554). This leads to a difference in total sum for men + women compared to "all."

Self-reported factors contributing to serious suicidal thoughts

Among the veterinarians reporting serious suicidal thoughts (n=139), work problems were the most frequently reported contributing factor (48 %), followed by personal problems (37 %) (Table 3). The only significant gender difference was regarding work problems, with nearly twice as many women (53 %) as men (28 %) reporting work problems as the most important contributing factor to their serious suicidal thoughts (chi-square: 4.99, p=0.03, Fisher's exact), and 4.3 % reported work problems as the only factor of importance.

Table 3 – Self-reported contributing factors to serious suicidal thoughts among veterinarians in Norway

	Not at all + A little + Somewhat			Quite a bit + Very much			
	N (%)			N (%)			
	Total	Men	Women	Total	Men	Women	Total n
Personal problems	84 (63.2%)	17 (65.4%)	67 (63.8%)	49 (36.8%)	9 (34.6%)	38 (36.2%)	133
Family problems	91 (68.4%)	19 (79.2%)	72 (67.9%)	42 (31.6%)	5 (20.8%)	34 (32.1%)	133
Social problems	108 (81.2%)	21 (84.0%)	86 (81.1%)	25 (18.8%)	4 (16.0%)	20 (18.9%)	133
Work problems	70 (51.9%)	18 (72.0%)	51 (47.2%)	65 (48.1%)	7 (28.0%)	57 (52.8%)	135
Other problems	90 (72.6%)	20 (83.3%)	70 (71.4%)	34 (27.4%)	4 (16.7%)	28 (28.6%)	124

Item four of Paykel's questionnaire was answered by n= 2562 veterinarians (men=766, women=1754). The question was answered positively by n=139 (see Table 1).

Predictors of serious suicidal thoughts

Being single, negative life events, mental distress, reality weakness, use of alcohol to cope, and the three job stress factors were significant unadjusted (crude) predictors (Table 4). In the adjusted model, the significant predictors were being single, negative life events, and mental distress. There was no gender effect. No significant effect was found within the different fields of work or any of the three job stress factors in the adjusted model (Table 4).

Post hoc, and in order to investigate any confounding or mediating effect of mental distress and reality weakness on the job stress-variables, we conducted an additional multivariable analysis. When processing the individual and work-related factors without the two variables of reality weakness and mental distress, the significant predictors were: being single, negative life events, use of alcohol to cope with tension, and all three job stress factors. The results from the additional analysis can be found in the supplementary material (Supplementary File 3 – Additional analysis predictor model).

Table 4 – Predictors of serious suicidal thoughts among veterinarians in Norway

	Crude		Adjusted[2]	
	OR	95 % CI	OR	95 % CI
Female	1.55	0.999 to 2.401	0.88	0.49 to 1.57
Age	0.93	0.86 to 1.00	1.11	0.996 to 1.235
Single	2.38***	1.65 to 3.43	1.76*	1.13 to 2.72
Negative life events[1]	1.78***	1.55 to 2.04	1.43***	1.22 to 1.68
SCL-5	3.08***	2.61 to 3.64	2.75***	2.14 to 3.52
Reality weakness[3]	1.47***	1.37 to 1.59	1.10	0.99 to 1.22
Alcohol to cope	2.14***	1.51 to 3.04	1.09	0.72 to 1.67
Main field of work (ref. category= mixed clinical practice)				
Companion animals	1.38	0.74 to 2.57	1.01	0.50 to 2.06
Production animals	1.28	0.56 to 2.94	1.97	0.77 to 5.05
Equine practice	1.21	0.45 to 3.28	1.02	0.32 to 3.26
Aquaculture	1.01	0.37 to 2.73	1.07	0.32 to 3.61
Public administration	1.08	0.53 to 2.20	1.15	0.49 to 2.71
Academia/research	1.12	0.49 to 2.56	1.07	0.39 to 2.99
Other	0.82	0.35 to 1.91	0.70	0.24 to 2.02
Job stress				
Emotional demands	1.12***	1.08-1.16	1.02	0.97 to 1.07
Work/life balance	1.13***	1.09-1.17	1.00	0.95 to 1.05
Fear of complaints	1.18***	1.11-1.25	1.01	0.93 to 1.09

[1]The variable life events was entered into the model as a weighted variable ('Negative life events'), comprising the sum score of life events that was significant in a univariate model with the dependent variable.

*P<0.05

**P<0.01

***P<0.001

[2] In the adjusted model, all listed variables were simultaneously entered in the model, i.e., gender, age, civil status, negative life events, SCL-5, reality weakness, use of alcohol to cope, main field of work and the three job stress factors.

[3] There was a high correlation between SCL-5 and reality weakness (Pearson's R=0.6).

We found significant interactions between gender and negative life events (OR=0.65, 95 % CI 0.46 – 0.92, p=0.015), with clearly steeper gradients for females. There was also an interaction between gender and work/life balance (OR=1.11, 95 %CI 1.01 – 1.22, p=0.026), and the increase in suicidal thoughts with higher work/life imbalance was stronger among males than among females. A figure illustrating the interaction analysis can be found as a Supplementary file (Supplementary file 4-1 and Supplementary File 4-2).

DISCUSSION

A main finding of this study was that 27 % of the veterinarians in Norway felt that life was not worth living during the last year, 5 % had serious suicidal thoughts, and 0.2 % had attempted suicide. Female veterinarians reported significantly more suicidal feelings and thoughts than their male colleagues. The veterinarians considered their serious suicidal thoughts mainly as related to work and personal problems, and to a lesser degree, family, social, and other problems. Independent factors associated with serious suicidal thoughts were: being single, negative life events, and mental distress.

Furthermore, veterinarians reported both suicidal feelings and serious suicidal thoughts more frequently (26.6 % and 5.4 %, respectively) than physicians (16.6 % and 2.6 %, respectively),[14] and police (8.9 % and 1.7 %, respectively)[26] in Norway. Furthermore, veterinarians, especially females, regarded work problems as the most important contributing factor to their suicidal thoughts. A previous study found that physicians most frequently regarded personal and family problems as the most important factors for serious suicidal thoughts,[14] which may suggest that self-reported work factors play a more important role in suicidal thoughts in veterinarians than in physicians. Regarding suicide attempts, veterinarians had a prevalence (0.2%) comparable to those of physicians and police (0.3% and 0.1%, respectively).[14 26]

The relatively high prevalence of suicidal feelings and thoughts concurs with findings among veterinarians in other countries. Two studies used "National Survey of Psychiatric Morbidity",[5 45] an item originally sourced from Paykel's instrument.[30] These items use the same wording for items one

and three, which makes comparison possible. The prevalence of suicidal feelings in the past year among veterinarians in Norway was slightly higher (26.6%) than among those in the UK (23.0%)[45] and Canada (17.9%),[5] whereas suicidal thoughts in the past year were at the same level (19.6%, 21.3%, and 19.4%, respectively). However, veterinarians in Canada reported higher prevalence (17.0%) of serious suicidal thoughts than in Norway (5.4%), which is probably due to the reporting period for serious suicidal thoughts in the Canadian survey being 'since the start of veterinary education', while in the present study, the reporting period was the preceding year.

Moreover, like female physicians,[14] female veterinarians had higher levels of suicidal feelings and thoughts than their male colleagues. Gender differences were also present in the self-reported contributing factors, as female veterinarians reported work problems more frequently than men. According to our own results and those of others',[14] work problems are more often considered a contributing factor to suicidal thoughts by veterinarians than by physicians. The perceived impact of work-factors on serious suicidal thoughts may be partly influenced by the fact that veterinarians in Norway have less undergraduate training in communication, psychology and coping skills, and experience more professional isolation. Additionally, animal health care poses a cost issue (in Norway, human health care costs are funded by tax revenues), resulting in cross pressure for veterinarians at the intersection of animal welfare, costs, and ethics. Conflicting responsibilities in the veterinary profession may be an overarching theme contributing to significant stress among veterinarians.[13]

Today, approximately 70 % of veterinarians in Norway are female, and this proportion is expected to increase. There was no significant effect of gender in the adjusted model. This may be because age was highly correlated with the female gender. Being single and experiencing negative life events predicted serious suicidal thoughts in the present study (76 % and 43 % higher odds, respectively). These findings are consistent with studies on physicians and others.[14 15 18] In contrast to physicians, where family and relationship issues were the most significant negative life events,[14] economic problems were the most significant negative life event for veterinarians. This also supports the hypothesis that there are other factors associated with suicidal thoughts among veterinarians than with physicians and that economic concerns are more important with veterinarians. In an Australian qualitative study, veterinarians were asked what they would do if they could change something in the profession, and the most common response was to remove money from the decision-making process.[13] Contrary to the findings in a recent review,[16] experiencing negative life events had a greater impact on serious suicidal thoughts among women than among men. Furthermore, work/life balance had a greater impact on serious suicidal thoughts among men than among women. These findings warrant further research.

Bivariately, drinking to cope was a significant predictor for serious suicidal thoughts, but not in the multivariable model. Previous research indicates that alcohol use is a risk factor for suicidal behavior.[17] Research on veterinarians and alcohol use is scarce.[8 46] In a study examining drug-caused deaths in Australia, veterinarians were the group with the highest prevalence of alcohol detected in post-mortem examinations.[47] Another study found that veterinarians who turned to alcohol to cope with their work-related stress were more likely to have suicidal thoughts.[10] In a recent study examining different occupational groups in the US Army, there was no significant difference in problem drinking in veterinarians, physicians and dentists. [48] The impact of alcohol regarding to mental health among veterinarians warrants further research.

There was no significant effect on serious suicidal thoughts regarding the main field of work, neither in the bivariate nor in the adjusted model. Subsequently, all job stress factors were significantly associated with serious suicidal thoughts bivariately, but not in the adjusted model. However, in the additional analyses, the use of alcohol to cope with tension and all three job stress factors remained significant without reality weakness and mental distress included in the model. The findings of *emotional demands, work/life balance,* and *fear of complaints/criticism* as important job stress factors concur with previous research.[10 8 49] Although previous studies have suggested that work-related stress influences suicide risk in veterinarians,[50] longitudinal research design may further elaborate on the role of mediating and confounding effects.

Contrary to previous research,[18 26 27] the personality trait reality weakness, was not significant in the adjusted model. This may be explained by the high correlation between mental distress and reality weakness. The impact of mental distress on suicidal thoughts was high, with a nearly three times increase in odds for each step on the 1-5 scale. The direction of causality obtaining between job stress and mental health in this study cannot be unequivocally assessed. On the assumption that job stress actually is an effect of mental distress and reality weakness, our results would indicate that the effect of job stress factors probably was confounded by mental distress and reality weakness. However, if job stress is defined as the underlying causal factor, as posited above, our results would indicate that mental distress and reality weakness mediate the effect of job stress. Previous studies have found that psychosocial factors in the workplace may play a role for mental health,[51] and that individual factors such as stress are related to the way people perceive their jobs.[52] The importance of mental distress with respect to suicidal ideation is consistent with other research, both among medical doctors and others.[15 17] A previous study among junior physicians during internship found that the effect of work stress on suicidal thoughts and behavior was absorbed by mental distress, in keeping with our finding.[15] First, our study emphasizes the importance of using multivariable models when studying single factors and self-report measures, in order to identify independent and more

objective effects. Second, it is in keeping with previous research, that emphasizes the complexity in predicting suicidal thoughts and behaviour, there may be both direct and indirect effects of several individual and contextual predictors.[53 54] Third, there may be specific work-related factors of importance for veterinarians with serious suicidal thoughts that we have not captured by our variables in the regression model. Altogether, this explains the apparent discrepancy in our study with regard to the role of work-related factors in serious suicidal thoughts.

To our knowledge, this is the only nationwide study of suicidal behavior in veterinarians, incorporating all authorized veterinarians, in all main fields of work. A major strength was the high response rate (75 %), making multivariable analyses feasible, and reducing the effect of selection and response biases. Additionally, the questionnaire was quite extensive, allowing the use of a comprehensive predictor model and controlling for several variables. An important limitation is the cross-sectional design, which restricts conclusions about causality. Another limitation is the disparity in referred time span measured by serious suicidal ideation (last 12 months) and mental distress (past 2 weeks), this can lead to more recall bias with respect to suicidal ideation, and a relative overestimation of mental distress. The generalizability of the results may also be limited due to differences in the organization of work life, including workload, in other countries. Nevertheless, we believe the findings are representative of veterinarians in Northern Europe. The study was conducted during the coronavirus-pandemic of 2019 (Covid-19), which may have affected the results. The survey was planned before the pandemic, and any potential effects of Covid-19 (e.g., redundancy, and economic effects in the practices) were not accounted for.

CONCLUSION

In summary, the level of suicidal behavior among veterinarians in Norway is relatively high, and both individual and work-related factors contribute to serious suicidal thoughts. In the multivariable analyses, the individual factors, and particularly mental distress, played a more important role than the work-related factors, while veterinarians themselves regarded work problems as the most contributing factor to their suicidal thoughts. The roles of gender and specific work-related factors should be further investigated to better understand the complexity of suicidal behavior among veterinarians.

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AUTHOR'S CONTRIBUTION TO THE MANUSCRIPT

HSD, RT, and EH designed the study and analyzed the data. HSD wrote the first draft of the manuscript. All authors revised the manuscript and approved the final version of the manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. HSD and EH acts as a guarantor.

DATA AVAILABILITY STATEMENT

Data is available upon reasonable request.

COMPETING INTERESTS STATEMENT

None declared.

FIGURE LEGENDS

Supplementary File 4-1 (Interaction between life events and gender): Illustration of the two-way interaction between gender and life events (weighted). The life events scale has been divided into four categories to improve readability of the graph. The gradient is significantly steeper for females than males.

Supplementary File 4-2 (Interactions between work/life balance and gender): Illustration of the two-way interaction between gender and work/life-balance. The increase in suicidal thoughts with higher work/life imbalance was significantly stronger among males than among females.

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NORVET-undersøkelsen

Arbeid, trivsel og mental helse hos veterinærer i Norge

På de fleste spørsmålene skal du angi svar ved å sette et kryss i en rute slik ☒
Vennligst benytt en penn og sett krysset tydelig i ruten.

Noen steder skal du sette tall eller bokstaver i en eller flere ruter, slik [1] eller slik [A]

Skjemaene vil bli lest maskinelt, derfor er det viktig at du skriver tydelig i rutene.

Det er svært viktig at du velger å merke av bare ett svaralternativ, der ikke annet fremgår av teksten. Hvis to alternativer synes like dekkende, bes du velge det ene. Dette vil jevne seg ut på gruppenivå.

Selv om det kanskje er noen spørsmål du synes er mindre viktige, ber vi deg svare likevel.
Det vil bidra til å styrke undersøkelsen.

Det vil være en del spørsmål som blir gjentatt flere ganger i skjemaet. Dette skyldes at de utgjør en integrert del av standardiserte måleinstrumenter. Noen ganger spørres det også om opplysninger for ulike tidsperioder. Dette gjøres for å kunne foreta pålitelige sammenligninger med flere andre grupper, nasjonalt og internasjonalt.

LYKKE TIL, OG PÅ FORHÅND TUSEN TAKK FOR INNSATSEN!

A. BAKGRUNNSOPPLYSNINGER

A1 Kjønn:
☐ Kvinne
☐ Mann
☐ Annen kjønnsidentitet

A3 Nåværende sivilstatus
☐ Ugift ☐ Separert
☐ Samboende ☐ Skilt
☐ Gift ☐ Enke/enkemann

A2 Alder:
☐ 20-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60 ☐ 61-65 ☐ 66-70 ☐ >70

Partner

A4 Har du fast partner (kjæreste/samboer/ektefelle)?
☐ Nei
☐ Ja

A5 Hvis JA, er din partner i arbeid?
☐ Nei
☐ Ja

A6 Hvis JA, er din partner veterinær?
☐ Nei
☐ Ja

Barn og familie

A7 Hvor mange barn har du?
☐ Ingen ☐ 1 barn ☐ 2 barn ☐ 3 eller flere barn

HAR DU I LØPET AV DE SISTE 12 MND. OPPLEVD NOE AV DET FØLGENDE?

A8 En alvorlig sykdom eller ulykke ☐
A9 Skilsmisse/separasjon med samboer eller kjæreste ☐
A10 Giftet deg/flyttet sammen med samboer ☐
A11 Fått barn ☐
A12 Dødsfall familie/nære venner ☐
A13 Andre vansker hos nær familie ☐
A14 Alvorlige økonomiske problemer ☐
A15 Ektefelle har vært arbeidsløs/permittert ☐
A16 Alvorlige bomessige problemer ☐
A17 Du selv, eller noen i nær familie, har vært utsatt for, eller innblandet i, alvorlig lovbrudd ☐
A18 Samlivsproblemer ☐
A19 Flyttet fra foreldre ☐
A20 Permisjon ☐
A21 Sykefravær 21 dager eller mer ☐
A22 Du selv har vært involvert i tilsynssak fra tilsynsmyndigheter ☐
A23 Alvorlig sykdom hos et nærtstående familiemedlem (partner/barn/foreldre) ☐
A24 Andre alvorlige hendelser Spesifiser: ☐

B. ARBEIDSFORHOLD OG ARBEIDSBELASTNING

Hovedstilling

B1 Hvilken tilknytningsform har du til arbeidslivet?

☐ Ansatt ☐ Selvstendig næringsdrivende ☐ Annet, spesifiser:_____

B2 Har du en lederrolle?

☐ Ja ☐ Nei

B3 Hva slags hovedstilling har du nå?

☐ Smådyrpraksis
☐ Produksjonsdyrpraksis
☐ Kombinertpraksis
☐ Hestepraksis
☐ Akvakultur
☐ Offentlig forvaltning
☐ Akademia/forskning
☐ Pensjonist
☐ Annet, eventuelt spesifiser: _____

B3a Hva slags stilling er dette?

☐ Fast stilling
☐ Tidsbegrenset utdanningsstilling
☐ Vikariat Hvis vikariat, fyll inn antall mnd (samlet lengde) ☐☐☐
☐ Annet

B3b Jobber du i

☐ Bedrift som er del av kjede ☐ Frittstående bedrift

B4 Hvor mange måneder har du vært i din nåværende stilling? I ca. ☐☐☐ måneder

Arbeidstidsforhold

B5 Hvor mange prosent er din hovedstilling? Angi prosent: ☐☐☐ %

B6 Hvor lang er din fastlagte arbeidstid i timer per uke i din hovedstilling?

☐☐ timer og ☐☐ minutter pr uke

B7 Hvor mange timer jobber du faktisk i gjennomsnitt pr. uke (inkludert alle stillinger)?

☐☐ timer

B8 I en gjennomsnittlig arbeidsuke, inkludert ev. bistilling(er), omtrent hvor mange timer pr. uke bruker du på:

1.1 Klinisk arbeid	☐☐ timer	1.2 Møtevirksomhet	☐☐ timer
1.3 Papirarbeid	☐☐ timer	1.4 Telefoner/e-post	☐☐ timer
1.5 Reisetid	☐☐ timer	1.6 Totalt	☐☐ timer

B9 Hvor mange timer overtid har du i gjennomsnitt i din hovedstilling i en vanlig arbeidsuke? (Ikke forlenget arbeidstid eller utrykning på vakt, kun tilfeldig overtid.)

Betalt: ☐☐ timer pr. uke

Ubetalt: ☐☐ timer pr. uke

B10 Hvor ofte har du overtidsarbeid/forlenget arbeidstid (betalt eller ubetalt)?

☐ Aldri
☐ Sjeldnere enn en gang i måneden
☐ Minst en gang i måneden
☐ Omtrent annenhver uke
☐ Hver uke

Bistilling

B11 Har du noen fast bistilling eller ekstrajobb i tillegg til din hovedstilling?

☐ Nei
☐ Ja

B12 Hvis du har en bistilling, hvor mange arbeidstimer utgjør denne stillingen gjennomsnittlig pr. uke?

☐☐ timer pr. uke

Vakter som veterinær

B13 Hvis du har faste vakter ut over normal arbeidstid i din hovedstilling, hva slags vaktdelingsordning har du nå?

☐ Tar ikke faste vakter * ☐ 9-delt **Gå til spørsmål B18*
☐ 2-3-delt ☐ 10-delt
☐ 4-5-delt ☐ 11-delt
☐ 6-7-delt ☐ >12-delt
☐ 8-delt

B14 Hvilken type vaktordning deltar du i?

☐ Offentlig vakt ☐ Privat vakt

B15 Hvis du tar faste vakter ut over normal arbeidstid i din hovedstilling, hvor lange er vaktene?

☐ Ca 1/2 døgn
☐ Ca. 1 døgn
☐ Mer enn 1 døgn
☐ Annet; hva _____

B16 Ca. hvor mange timer av dine faste vakter tilbringer du

Aktiv: ☐☐ timer

Hvilende: ☐☐ timer

Sovende: ☐☐ timer

Har du

☐ tilstedevakt eller ☐ hjemmevakt

B17 Hvis du har faste vakter, cirka hvor lenge arbeider du dagen etter vakt?

☐ Arbeider ikke rett etter vakt
☐ 1-3 timer
☐ 4-6 timer
☐ 7 timer eller mer

B18 Hvis du har vakter som en del av en bistilling, cirka hvor mange timer av disse vaktene tilbringer du

Hvis du ikke har vakt som del av bistilling, gå til B19

Aktiv: ☐☐ timer

Hvilende: ☐☐ timer

Sovende: ☐☐ timer

Har du

☐ tilstedevakt eller ☐ hjemmevakt

B19 Cirka hvor mange avspaseringsuker pr. halvår benytter du til ikke-faglig aktivitet?

☐ Ingen uke
☐ 1 uke
☐ 2 uker
☐ 3 uker
☐ 4 uker
☐ 5 uker
☐ 6 uker eller flere

B20 Dersom du jobber i klinisk praksis, hvor mange avlivinger utfører du omtrent på en vanlig uke?

☐ 0-4
☐ 5-9
☐ 10-14
☐ 15 eller fler

Belastningsfaktorer

I hvilken grad gjør de følgende situasjoner/faktorer deg belastet (stresset)?
Sett ett kryss i den ruten som passer best for deg.

		Ikke noen belastning	Litt belastning	Endel belastning	Mye belastning	Svært mye belastning
B21	Kritikk av veterinærer i media	☐	☐	☐	☐	☐
B22	Kundene/dyreeierne setter ikke pris på det du gjør	☐	☐	☐	☐	☐
B23	Bekymring over klager fra kunder/dyreeiere	☐	☐	☐	☐	☐
B24	Å ha ansvar for dyrenes liv 24 timer i døgnet	☐	☐	☐	☐	☐
B25	Telefoner, sykebesøk og utrykning om natten	☐	☐	☐	☐	☐
B26	Å ta seg av vanskelige veterinærmedisinske problemstillinger	☐	☐	☐	☐	☐
B27	Å ta seg av vanskelige kunder/dyreeiere	☐	☐	☐	☐	☐
B28	Krysspress mellom økonomi og dyrevelferd/etikk	☐	☐	☐	☐	☐
B29	Bekymringer knyttet til egen økonomi	☐	☐	☐	☐	☐
B30	Bekymringer knyttet til bedriftens økonomi	☐	☐	☐	☐	☐
B31	Sykejournaler og annet papirarbeid	☐	☐	☐	☐	☐
B32	Kirurgiske inngrep	☐	☐	☐	☐	☐
B33	Arbeidsmiljøet	☐	☐	☐	☐	☐
B34	Tidspress	☐	☐	☐	☐	☐
B35	Jobben går ut over familieliv	☐	☐	☐	☐	☐
B36	Jobben går ut over sosialt liv	☐	☐	☐	☐	☐
B37	Daglig kontakt med døende og kritisk syke dyr	☐	☐	☐	☐	☐
B38	Å ta seg av dødssyke dyr og deres eiere	☐	☐	☐	☐	☐
B39	Forespørsler om dyr fra venner og bekjente	☐	☐	☐	☐	☐
B40	Forespørsler om dyr fra slektninger	☐	☐	☐	☐	☐
B41	Være i generell beredskap	☐	☐	☐	☐	☐

	Ikke noen belastning	Litt belastning	Endel belastning	Mye belastning	Svært mye belastning
B42 Følelsesmessig engasjement i dyrene	☐	☐	☐	☐	☐
B43 Forventninger om at veterinæren også skal hjelpe med ikke-medisinske problemer	☐	☐	☐	☐	☐
B44 Avbrytelser og mas i arbeidssituasjonen	☐	☐	☐	☐	☐
B45 Å ta seg av lidende dyr	☐	☐	☐	☐	☐
B46 Konflikt med kolleger/medarbeidere	☐	☐	☐	☐	☐
B47 Å få til en balanse mellom arbeid og privatliv	☐	☐	☐	☐	☐

Forhold til kolleger

	Ingen grad						I svært høy grad
B48 I hvilken grad trives du i det store og det hele blant dine kolleger?	☐	☐	☐	☐	☐	☐	☐
B49 I hvor stor grad har du følt deg ivaretatt av dine veterinærkolleger?	☐	☐	☐	☐	☐	☐	☐

	Stemmer helt	Stemmer ganske bra	Stemmer ikke særlig bra	Stemmer ikke
B50 Det er rolig og behagelig stemning på min arbeidsplass	☐	☐	☐	☐
B51 Det er godt samhold	☐	☐	☐	☐
B52 Mine arbeidskolleger stiller opp for meg	☐	☐	☐	☐
B53 Det er forståelse for at jeg kan ha en dårlig dag	☐	☐	☐	☐
B54 Jeg kommer godt overens med mine overordnede*	☐	☐	☐	☐
B55 Jeg trives bra med mine arbeidskolleger	☐	☐	☐	☐

**Besvares bare dersom du har en overordnet.*

B56 Når du føler deg bekymret, engstelig eller nervøs - drikker du noen gang alkohol for å klare situasjonen bedre?

☐ Aldri ☐ Sjelden ☐ Av og til ☐ Ofte

Vedrørende ditt arbeid		Meget sjelden eller aldri	Nokså sjelden	Av og til	Nokså ofte	Meget ofte eller alltid
B57	Er det fastsatt klare mål for din jobb?	☐	☐	☐	☐	☐
B58	Vet du hva som er ditt ansvarsområde?	☐	☐	☐	☐	☐
B59	Vet du nøyaktig hva som forventes av deg i jobben?	☐	☐	☐	☐	☐
B60	Må du gjøre ting du mener burde vært gjort annerledes?	☐	☐	☐	☐	☐
B61	Får du oppgaver uten tilstrekkelig hjelpemidler og ressurser til å fullføre dem?	☐	☐	☐	☐	☐
B62	Mottar du motstridende forespørsler fra to eller flere personer?	☐	☐	☐	☐	☐
B63	Fordeler din nærmeste sjef arbeidsoppgaver rettferdig og upartisk?*	☐	☐	☐	☐	☐
B64	Behandler din nærmeste sjef de ansatte rettferdig og upartisk?*	☐	☐	☐	☐	☐
B65	Er forholdet mellom deg og din nærmeste sjef en kilde til stress for deg?*	☐	☐	☐	☐	☐

**Besvares bare dersom du har en overordnet.*

		Ja, ofte	Ja, noen ganger	Nei, sjelden	Nei, så godt som aldri
B66	Krever arbeidet ditt at du arbeider meget raskt?	☐	☐	☐	☐
B67	Krever arbeidet ditt at du arbeider meget hardt?	☐	☐	☐	☐
B68	Krever arbeidet ditt for stor arbeidsinnsats?	☐	☐	☐	☐
B69	Har du tilstrekkelig tid til å utføre arbeidsoppgavene dine?	☐	☐	☐	☐
B70	Forekommer det ofte motstridende krav i arbeidet ditt?	☐	☐	☐	☐
B71	Får du lære nye ting i ditt arbeid?	☐	☐	☐	☐
B72	Krever ditt arbeid dyktighet?	☐	☐	☐	☐
B73	Krever ditt arbeid oppfinnsomhet/kreativitet?	☐	☐	☐	☐
B74	Innebærer ditt arbeid at du gjør samme ting om og om igjen?	☐	☐	☐	☐
B75	Har du frihet til å bestemme hvordan ditt arbeid skal utføres?	☐	☐	☐	☐
B76	Har du frihet til å bestemme hva som skal utføres i ditt arbeid?	☐	☐	☐	☐

C HELSE

Nedenfor finner du en oppstilling av plager som man av og til har.
Les nøye gjennom dem, en for en, og angi deretter hvor mye hvert enkelt problem har plaget deg eller vært til besvær i løpet av de siste 14 dagene

		Ikke i det hele tatt	Litt	Måtelig	Ganske mye	Veldig mye
C1	Nervøsitet, indre uro	☐	☐	☐	☐	☐
C2	Stadig redd eller engstelig	☐	☐	☐	☐	☐
C3	Følelse av håpløshet med tanke på fremtiden	☐	☐	☐	☐	☐
C4	Mye bekymret eller urolig	☐	☐	☐	☐	☐
C5	Nedtrykt, tungsindig	☐	☐	☐	☐	☐

C6 Hvis du har hatt psykiske problemer i løpet av det siste året, har du da søkt/fått hjelp for dette?

☐ Ikke hatt psykiske problemer av betydning* **Gå til spørsmål C13*
☐ Har ikke søkt hjelp selv om jeg nok kunne ha hatt behov for det
☐ Ja, har konsultert allmennlege eller fastlege
☐ Ja, har konsultert psykolog/psykiater
☐ Ja, har vært innlagt i psykiatrisk avdeling

C7 Hvis du har vært i kontakt med psykolog/psykiater, hva slags behandling har du fått?
Det er mulig å sette flere klyss

☐ 1-5 samtaler
☐ Flere enn 5 samtaler
☐ Psykoterapi/psykoanalyse
☐ Gruppeterapi
☐ Medikamentell behandling

Hvis du har hatt psykiske problemer i løpet av det siste året, i hvilken grad mener du at følgende forhold var medvirkende til at det ble vanskelig for deg?

		Betydde ingenting	Betydde litt	Betydde endel	Betydde ganske mye	Betydde svært mye
C8	Personlige forhold	☐	☐	☐	☐	☐
C9	Forhold til familie/ektefelle/partner	☐	☐	☐	☐	☐
C10	Sosiale forhold	☐	☐	☐	☐	☐
C11	Problemer i forbindelse med veterinæryrket	☐	☐	☐	☐	☐
C12	Andre forhold	☐	☐	☐	☐	☐

Livslyst

De følgende spørsmål dreier seg om du i løpet av det siste året har mistet livslysten, og i så fall i hvilken grad?

C13 **Har du noen gang i løpet av det siste året følt at livet ikke er verdt å leve?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

C14 **Har du i løpet av det siste året ønsket at du var død - f.eks. at du skulle sovne inn og aldri våkne igjen?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

C15 **Har du noen gang i løpet av det siste året tenkt på å ta livet ditt, selv om du vet at du ikke vil gjøre det?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

C16 **Har du noen gang i løpet av det siste året vært i den situasjonen at du alvorlig har overveiet å ta livet ditt og til og med planlagt hvordan du i såfall skulle gjøre det?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

Hvis det har hendt, i hvilken grad mener du de følgende forhold var medvirkende til at det ble så vanskelig for deg?

	Betydde ingenting	Betydde litt	Betydde endel	Betydde ganske mye	Betydde svært mye
C17 Personlige forhold	☐	☐	☐	☐	☐
C18 Forhold til familie/ektefelle/partner	☐	☐	☐	☐	☐
C19 Sosiale forhold	☐	☐	☐	☐	☐
C20 Problemer i forbindelse med veterinæryrket	☐	☐	☐	☐	☐
C21 Andre forhold	☐	☐	☐	☐	☐

C22 **Har du i løpet av det siste året forsøkt å ta ditt eget liv?**

☐ Aldri ☐ Nesten aldri ☐ Noen ganger ☐ Mange ganger

Hvis det har hendt, i hvilken grad mener du de følgende forhold var medvirkende til at det ble så vanskelig for deg?

	Betydde ingenting	Betydde litt	Betydde endel	Betydde ganske mye	Betydde svært mye
C23 Personlige forhold	☐	☐	☐	☐	☐
C24 Forhold til familie/ektefelle/partner	☐	☐	☐	☐	☐
C25 Sosiale forhold	☐	☐	☐	☐	☐
C26 Problemer i forbindelse med veterinæryrket	☐	☐	☐	☐	☐
C27 Andre forhold	☐	☐	☐	☐	☐

Holdninger til aktiv dødshjelp

Aktiv dødshjelp er en samlebetegnelse på eutanasi og legeassistert selvmord. I noen europeiske land er aktiv dødshjelp tillatt, men i Norge er det ulovlig.

Eutanasi er en leges tilsiktede drap på en person ved å sette en sprøyte med dødbringende medikamenter etter at personen frivillig har bedt om det.

Legeassistert selvmord er en leges hjelp til selvmord, ved å skaffe til veie medikamenter som personen kan innta selv.

	Ta stilling til følgende påstander	Svært enig	Litt enig	Verken enig eller uenig	Litt uenig	Svært uenig
C28	Legeassistert selvmord bør tillates for personer som har en dødelig sykdom med kort forventet levetid.	☐	☐	☐	☐	☐
C29	Eutanasi bør tillates for personer som har en dødelig sykdom med kort forventet levetid.	☐	☐	☐	☐	☐
C30	Aktiv dødshjelp bør tillates også for personer som har en uhelbredelig kronisk sykdom, men ikke er døende.	☐	☐	☐	☐	☐
C31	Det finnes tilfeller der det kan være riktig/moralsk forsvarlig av legen å utføre aktiv dødshjelp, selv om det er ulovlig.	☐	☐	☐	☐	☐

Holdninger til psykiske lidelser

	Ta stilling til følgende påstander	Svært enig	Noe enig	Ikke sikker/ ubestemt	Noe uenig	Svært uenig
C32	Behandling kan hjelpe mennesker med psykiske lidelser til å føre et normalt liv.	☐	☐	☐	☐	☐
C33	Folk er generelt sett omsorgsfulle og positivt innstilte overfor personer med psykiske lidelser.	☐	☐	☐	☐	☐

D Personlige egenskaper

Ta stilling til følgende påstander

		Stemmer ikke	Stemmer
D1	Det er vanskelig for meg å stole på folk ettersom de så ofte vender seg mot meg eller lar meg i stikken	☐	☐
D2	På en eller annen måte føler jeg at jeg ikke vet hvordan jeg skal oppføre meg sammen med andre mennesker	☐	☐
D3	Jeg opplever meg selv som helt ulik til ulike tidspunkter	☐	☐
D4	Jeg føler meg ensom mesteparten av tiden	☐	☐
D5	Folk som virker bra til å begynne med, ender ofte opp med å skuffe meg	☐	☐
D6	Jeg føler det av og til som om jeg lever i en tåke	☐	☐
D7	Noen ganger føler jeg at jeg ikke er meg selv	☐	☐
D8	Folk kan oppfatte meg som uhøflig eller hensynsløs uten at jeg skjønner hvorfor	☐	☐
D9	Av og til får jeg rare tanker i hodet som jeg ikke er i stand til å få vekk	☐	☐

D10 Eventuelle kommentarer til spørreskjemaet?

Supplementary File 2 – Description of sample for veterinarians with serious suicidal thoughts

Variable	Range of values	Frequency (%)	Mean (SD)
Gender			
Female		108 (79.4%)	
Male		28 (20.6 %)	
Age			
20-30		16 (11.7 %)	
31-40		47 (34.3 %)	
41-50		41 (29.9 %)	
51-60		21 (15.3 %)	
61-70		10 (7.3 %)	
>70		2 (1.5 %)	
Marital status			
Married/cohabiting		82 (61.2 %)	
Single/divorced/widow(er)		52 (38.8 %)	
Life events	0-9		1.3 (1.4)
SCL-5	1-5		3.3 (1.0)
Reality weakness	0-8		3.2 (2.1)
Alcohol to cope			
Never		73 (53.3 %)	
Any frequency		64 (46.7 %)	
Main field of work			
Companion animal practice		53 (39.6 %)	
Public administration		21 (15.7 %)	
Mixed clinical practice		13 (9.7 %)	
Academia/research		11 (8.2 %)	
Production animal practice		11 (8.2 %)	
Aquaculture		6 (4.5 %)	
Equine practice		6 (4.5 %)	
Other		10 (7.5 %)	
Pensioner		3 (2.2 %)	
Job stress			
Emotional demands	1 - 5		2.44 (0.84)
Work/life-balance	1 - 5		3.22 (0.98)
Fear of complaints	1 - 5		3.63 (1.11)
Connection to work-life			
Employed		80 (58.4 %)	
Self-employed		37 (27.0 %)	
Other		11 (8.0 %)	
Two or more connections to work life		9 (6.6 %)	
Position type			
Permanent position		115 (87.8 %)	
Temporary position		6 (4.6 %)	
Temporary educational position		2 (1.5 %)	
Other		8 (6.1 %)	
Working full-time		101 (75.4 %)	

Frequency of working overtime (weekly or bi-weekly)		92 (71.9 %)	

Supplementary File 3 – Additional analysis predictor model – Predictors of serious suicidal thoughts among veterinarians in Norway, without mental distress and reality weakness

	Adjusted[2]	
	OR	95 % CI
Female	0.88	0.50 to 1.53
Age	1.02	0.92 to 1.13
Single	2.17***	1.44 to 3.27
Negative life events[1]	1.61***	1.39 to 1.86
Alcohol to cope	1.52*	1.02 to 2.27
Main field of work (ref. category= mixed clinical practice)		
Companion animals	1.17	0.59 to 2.30
Production animals	1.72	0.71 to 4.19
Equine practice	1.02	0.34 to 3.04
Aquaculture	1.23	0.39 to 3.89
Public administration	1.47	0.65 to 3.31
Academia/research	1.53	0.59 to 4.01
Other	0.80	0.29 to 2.17
Job stress		
Emotional demands	1.05*	1.003 to 1.104
Work/life-balance	1.08**	1.03 to 1.13
Fear of complaints	1.08*	1.001 to 1.164

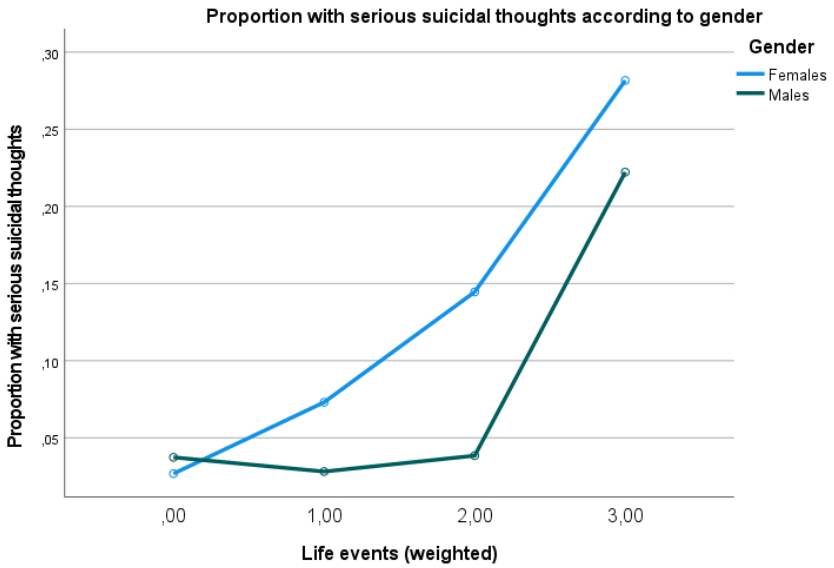
[1]The variable life events was entered into the model as a weighted variable ('Negative life events'), comprising the sum score of life events that was significant in a univariate model with the dependent variable.

*P<0.05

**P<0.01

***P<0.001

[2] In the adjusted model, all listed variables were simultaneously entered in the model, i.e. gender, age, civil status, negative life events, use of alcohol to cope, main field of work and the three job stress factors.



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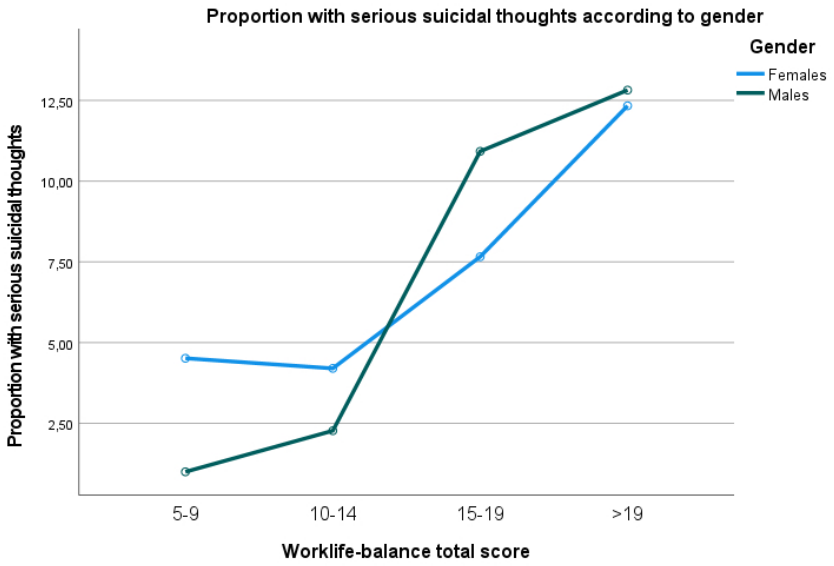

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-8
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6-8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA
		(*e*) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	NA
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9-11
		(b) Indicate number of participants with missing data for each variable of interest	9-14
Outcome data	15*	Report numbers of outcome events or summary measures	9-14
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13-14
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	13-14
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.