

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	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)
AUTHORS	Dalum, Helene; Tyssen, Reidar; Hem, Erlend

VERSION 1 – REVIEW

REVIEWER	Elena Toffol University of Helsinki Faculty of Medicine, Department of Public Health
REVIEW RETURNED	23-Sep-2021

GENERAL COMMENTS	<p>Suicidal behavior in a nationwide cross-sectional study of veterinarians in Norway (The NORVET study): individual and work-related factors</p> <p>I would like to thank the authors for the opportunity of reviewing this well-written manuscript. In this study the authors examined the rate of suicidal behavior among 75% of all authorized veterinarians in Norway, and its related factors. The authors found relatively high levels of self-reported suicidality among veterinarians, with a gender difference in the perceived contributing factors. In my opinion the paper is clear and well written; the study question is of scientific and clinical relevance, and the findings have a range of clinical and public health implications. I have only some, mostly minor questions and comments for the authors:</p> <ol style="list-style-type: none">1. Introduction, page 5, lines 8-9: "Recent studies have also indicated increased raised suicide rates in the profession." I think it should be either increased or raised2. Introduction, page 5, lines 51-55: "The prevalence of psychological distress, such as anxiety symptoms and depressive symptoms, is also higher among female veterinarians": higher than what?3. Methods, page 7, lines 37-39: "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." I would suggest listing here the five examined contributing factors, as it was difficult, while reading the results section, to understand where the five factors (personal, family, social, work, other problems) were retrieved from.4. Results, page 13, Table 3: as mentioned before, the examined contributing factors should be described in the Methods.5. Results, page 14, lines 25-27: "An additional multivariate analysis
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was conducted, similar to the multivariate analysis in the previous sub-section, but without the variables reality weakness and mental distress". Although it could be intuitive, I would suggest providing a rationale for conducting these sensitivity analyses by excluding the two important covariates.

6. Results, page 14, lines 38-42: "This means that all the job stress factors were probably confounded by mental distress and reality weakness, AND THEY □ WHICH..."

7. Results, page 14, lines 38-42: this point is very interesting, would it be possible to test any possible mediation or interaction effect?

8. Results, page 15, lines 24-30: "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". The authors may consider adding a figure (even as supplementary material) to illustrate the results of interaction analyses.

9. Discussion, page 15, lines 52-54 : "Furthermore, veterinarians regarded work problems as the most important contributing factor...." I would suggest highlighting here that this was true especially for women, not as much for men.

10. Discussion, page 15, lines 54-56: "which suggests that work factors play a more important role in suicidal thoughts in veterinarians than in physicians." This conclusion cannot be drawn for what the authors report so far, as they have not reported any data regarding physicians. I suggest reformulating this and the next sentences.

11. Discussion, page 16, paragraph at lines 7-21: The authors explain the difference in rates of serious suicidal thoughts between Norway and Canada with the different time-span covered by the two studies. Doesn't the same bias also apply to the other inquired suicidal items (suicidal feelings, suicidal thoughts)? If so, why would it result in different levels of serious suicidal thoughts, but not feelings or suicidal thoughts in general?

12. Discussion, page 16, lines 27-28: "Veterinarians consider work problems more important than physician". This is a quite strong claim as such, and not totally consistent with the study results. I would suggest reformulate it in a more neutral way (e.g., "according to our and others' (REF) results, work problems are more often considered a contributing factor to suicidal thoughts by veterinarians than by physicians").

13. Discussion, page 16, paragraph at lines 23-39: I suggest adding here a few considerations on the detected gender differences. The contribution of work problems to suicidal thoughts was significantly more relevant for women (53%) than for men (28%); how do the authors explain this? Is there more work/social/other pressure on women? Are women more sensitive to work stress, professional isolation etc.? Or what else?

14. Discussion, page 17, paragraph on alcohol use: even though this is a relevant point, please note that alcohol use is a risk factor for

	<p>suicidal behavior in general, irrespective of the profession.</p> <p>15. Discussion, page 17, paragraph at lines 21-42: A consideration here is that those with specific personality traits and mental distress are probably more likely to perceive the job-related stress, and to react to stressful situations with suicidal thoughts (in this sense, it would be interesting to explore the possible interaction and/or mediation effects). This is partly confirmed by the fact that work problems were considered by veterinarians as the main contributing factor to suicidal thoughts, but they were not significant in the regression model when controlling for mental distress and personality traits.</p> <p>16. Abstract: I think the Objectives are not well presented in the abstract, I suggest rephrasing the whole section.</p>
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REVIEWER	Cynthia LeardMann Naval Health Research Center
REVIEW RETURNED	07-Oct-2021

GENERAL COMMENTS	<p>Overall, this is a well written paper that explores factors associated with suicidal behaviors among Norwegian veterinarians. While this is an important examination of a specific occupation group that has been understudied, my enthusiasm for the paper was diminished by some aspects of the analysis. Below is a list of my comments, questions, and concerns:</p> <ol style="list-style-type: none"> 1. The descriptive analyses are quite limited. It would be nice for the reader to see (In Table 1 or in an additional table) the characteristics/factors by the outcome. Suggest authors add two more columns in Table 1, which would show the characteristics by the outcome of suicidal thoughts. Otherwise, they should add another table to display this important information. 2. Related to #1, it seems the figure is unnecessary. Suggest removing as it does not feel like it adds anything to the paper. 3. If I am understanding the analyses correctly, the authors completed multivariable analyses (multiple independent variables in the model) not multivariate (“models that have 2 or more dependent or outcome variable”) models. Please check and update this term throughout the paper. For more details, please refer to this article: Hidalgo B, Goodman M. Multivariate or multivariable regression?. Am J Public Health. 2013;103(1):39-40. doi:10.2105/AJPH.2012.300897 4. I am not familiar with this term “Reality weakness”. Can author explain a bit more in depth the first time it is used for their audience? 5. On Page 7, lines 57, I think the correct word is “drawing” or “lottery” not “draw”. 6. Please provide more details of examples of the life events in methods (pg 9, starting line 10). Is this like a death in the family or sexual assault? 7. In regards to the work-related factors, they are challenging to compare since the ranges and total sum scores are different. Authors should consider using mean scoring, in which would all the three factors to have the same range and total possible score, rather than sum scoring, for the ease of comparability between the scales. 8. For Table 4 to be a stand along table, the authors should add a footnote about which variables were adjusted for in the “adjusted” model. Also consider adding this information to the text of the methods as well as the reasoning for this type of modeling. 9. Also check and update the indentation for Table 4, it is challenging to determine which rows are separate variables and
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	<p>which ones are categories of the same variable.</p> <p>10. For the factors that are significant moderators, I think more details are needed. Consider adding the ORs and 95% CIs in some form for those models with significant moderators.</p> <p>11. Based on the description, it sounds like the authors are performing nested or hierarchical modeling (as mentioned in the stats section), where they adjust for a set of variables and then adjust for additional set of variables. However, this is not clear in Table 4. Also, it seems like a full, final model should include all predictors/factors together to see which ones prevail. Again, it is not clear to me the authors have done this. At a minimum, this should be clarified in the paper.</p> <p>12. Related to some of the comments above, I think it would be helpful for the reader if the stats section of the methods was expanded to include more details of the analysis. For example, more specifics should be provided about which variables were added into the hierarchical modeling at which points, mention if any variables were removed or added (if so, how was that decided?), and mention the steps were taken if interaction terms were found to be significant.</p> <p>13. Typically to examine associations between certain factors and an outcome, such as risk factors associated with suicidal behaviors, researchers will use various multivariable modeling approaches. I find it interesting that these researchers asked the participants themselves to comment/surmise about this association (“What do veterinarians in Norway regard as contributing factors to their serious suicidal thoughts?”). Should the comparison between the self-reported presumptive associations be explored/discussed in more depth in comparison with the tested associations (“independent individual and work-related predictors for serious suicidal thoughts”)?</p> <p>14. Please explain why an additional model was conducted without the variables reality weakness and mental distress? I am not sure why the authors performed these analyses and it is not well explained in the paper. From what I gather, the authors hypothesize that some of the other coping factors may be confounded by reality weakness and mental distress. However, they do not test for this possibility; furthermore, I think their results may indicate that reality weakness and mental distress mediate the relationship between job stress and suicidal thoughts/behaviors. Suggest that the authors do more to further examine or test to see if job stress is mediated by reality weakness and mental distress.</p> <p>15. In addition, it may be helpful for the authors to display the estimates from the two models with varying levels of adjustment (based on the hierarchical models). For example, in Table 4 authors could display the estimates of the two different adjusted models (Model 1: adjusted for demographics, alcohol, field of work, job stress; Model 2: adjusted for demographics, alcohol, field of work, job stress, reality weakness and mental distress).</p> <p>16. In the discussion the authors mention the limited amount of data in regards to veterinarians and alcohol use. There is another recently published paper that examined the association between alcohol use among US Army veterinarians which did not find an association (Rivera AC et al. Health of Army veterinarians and veterinary technicians in the Millennium Cohort Study. <i>Journal of the American Veterinary Medical Association</i>. 2021;258(7):767-775. doi: 10.2460/javma.258.7.767).</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Dr. Elena Toffol, University of Helsinki Faculty of Medicine Comments to the Author:
Suicidal behavior in a nationwide cross-sectional study of veterinarians in Norway (The NORVET study): individual and work-related factors

I would like to thank the authors for the opportunity of reviewing this well-written manuscript. In this study the authors examined the rate of suicidal behavior among 75% of all authorized veterinarians in Norway, and its related factors. The authors found relatively high levels of self-reported suicidality among veterinarians, with a gender difference in the perceived contributing factors. In my opinion the paper is clear and well written; the study question is of scientific and clinical relevance, and the findings have a range of clinical and public health implications. I have only some, mostly minor questions and comments for the authors:

1. Introduction, page 5, lines 8-9: “Recent studies have also indicated increased raised suicide rates in the profession.” I think it should be either increased or raised
Authors’ response: The authors apologize for this error. ‘Raised’ has been removed, and the sentence now reads: “Recent studies have also indicated increased suicide rates in the profession.”
2. Introduction, page 5, lines 51-55: “The prevalence of psychological distress, such as anxiety symptoms and depressive symptoms, is also higher among female veterinarians”: higher than what?
Authors’ response: The sentence has been clarified as follows: “The prevalence of psychological distress, such as anxiety symptoms and depressive symptoms, is also higher among female veterinarians *compared to male veterinarians.*”
3. Methods, page 7, lines 37-39: “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.” I would suggest listing here the five examined contributing factors, as it was difficult, while reading the results section, to understand where the five factors (personal, family, social, work, other problems) were retrieved from.
Authors’ response: The five examined contributing factors has been added to the Methods section (Page 6, line 20-21). Please see revised manuscript.
4. Results, page 13, Table 3: as mentioned before, the examined contributing factors should be described in the Methods.
Authors’ response: Please see response to question 3.
5. Results, page 14, lines 25-27: “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”. Although it could be intuitive, I would suggest providing a rationale for conducting these sensitivity analyses by excluding the two important covariates.
Authors’ response: The authors agree that the justification for the additional analysis should be more clearly stated. The manuscript has been amended with a rationale for conducting the additional analysis, please see revised manuscript (Results, page 13, line 11-12).
6. Results, page 14, lines 38-42: “This means that all the job stress factors were probably confounded by mental distress and reality weakness, AND THEY ☐ WHICH...”
Authors’ response: There seems to be a formatting error in displaying this comment in the document, which makes it hard to interpret what is meant by the peer reviewer. However, the abovementioned sentence in the manuscript has been removed, and the possible mediating/confounding effect is discussed in more detail in the discussion (Discussion, page 17, line 10-17). The authors hope that this resolves this question. See also the response to the next question (Question 7).
7. Results, page 14, lines 38-42: this point is very interesting, would it be possible to test any possible mediation or interaction effect?
Authors’ response: In principle, we could test for a mediation effect for pairs of independent variables, but unless the causal relationship between the two independent variables is unambiguous it is not possible to differentiate between mediation and confounding effects when the effect of one of the

variables vanishes/disappears when simultaneously controlled. The manuscript has been revised to illustrate the difference between possible mediation and confounding effects in our sample (Discussion, page 17, line 10-17). There are in fact interactions between high levels of mental distress and job stress as well as between reality weakness and job stress on serious suicidal thoughts, indicating that for the highest level of mental distress the association between job stress and serious suicidal thoughts is particularly strong. However, the nature of these interactions is not theoretically very interesting and hardly a reason for presenting them explicitly. We therefore suggest not including these results in the manuscript.

8. Results, page 15, lines 24-30: "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". The authors may consider adding a figure (even as supplementary material) to illustrate the results of interaction analyses.

Authors' response: The results from the two-way interaction analyses (i.e., gender and life events, and gender and work life-balance) have been added as a supplementary file ("Supplementary File 4-1.tif and Supplementary File 4-2.tif").

9. Discussion, page 15, lines 52-54 : "Furthermore, veterinarians regarded work problems as the most important contributing factor..." I would suggest highlighting here that this was true especially for women, not as much for men.

Authors' response: Amended as proposed, the sentence now reads: "Furthermore, veterinarians, *especially females*, regarded work problems as the most important contributing factor to their suicidal thoughts."

10. Discussion, page 15, lines 54-56: "which suggests that work factors play a more important role in suicidal thoughts in veterinarians than in physicians." This conclusion cannot be drawn for what the authors report so far, as they have not reported any data regarding physicians. I suggest reformulating this and the next sentences.

Authors' response: The authors agree. The paragraph has been amended as follows, and the inclusion of "may" has been added to make the statement less conclusive: "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." (Discussion, page 15, line 11-15).

11. Discussion, page 16, paragraph at lines 7-21: The authors explain the difference in rates of serious suicidal thoughts between Norway and Canada with the different time-span covered by the two studies. Doesn't the same bias also apply to the other inquired suicidal items (suicidal feelings, suicidal thoughts)? If so, why would it result in different levels of serious suicidal thoughts, but not feelings or suicidal thoughts in general?

Authors' response: The authors agree that this section may have led to some confusion regarding the reporting period for suicidal thoughts. In the Canadian survey, they used a reporting period of "past 12 months" for questions of suicidal feelings and thoughts, while for *serious suicidal thoughts* the reporting period was 'since the start of veterinary education'. The manuscript has been slightly rephrased to clarify this (Discussion, page 15, line 21-27).

12. Discussion, page 16, lines 27-28: "Veterinarians consider work problems more important than physician". This is a quite strong claim as such, and not totally consistent with the study results. I would suggest reformulate it in a more neutral way (e.g., "according to our and others' (REF) results, work problems are more often considered a contributing factor to suicidal thoughts by veterinarians than by physicians").

Authors' response: The paragraph has been reformulated as proposed (Discussion, page 15, line 31-32).

13. Discussion, page 16, paragraph at lines 23-39: I suggest adding here a few considerations on the detected gender differences. The contribution of work problems to suicidal thoughts was

significantly more relevant for women (53%) than for men (28%); how do the authors explain this? Is there more work/social/other pressure on women? Are women more sensitive to work stress, professional isolation etc.? Or what else?

Authors' response: The authors agree that this is an interesting result. Unfortunately, in the present study we do not have data or measurements in our survey that could explain this finding further.

14. Discussion, page 17, paragraph on alcohol use: even though this is a relevant point, please note that alcohol use is a risk factor for suicidal behavior in general, irrespective of the profession.

Authors' response: Thank you for an important clarification. The section has been amended (Discussion, page 16, line 23).

15. Discussion, page 17, paragraph at lines 21-42: A consideration here is that those with specific personality traits and mental distress are probably more likely to perceive the job-related stress, and to react to stressful situations with suicidal thoughts (in this sense, it would be interesting to explore the possible interaction and/or mediation effects). This is partly confirmed by the fact that work problems were considered by veterinarians as the main contributing factor to suicidal thoughts, but they were not significant in the regression model when controlling for mental distress and personality traits.

Authors' response: The authors thank the peer reviewer for an important consideration, in which we agree. Two references have been added to the section (ref. 50 and 51), addressing the relationship between psychosocial factors at work and psychological distress (Discussion, page 17, line 15-17): "*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*" For the question regarding interaction/mediation, please see response to question 7.

16. Abstract: I think the Objectives are not well presented in the abstract, I suggest rephrasing the whole section.

Authors' response: The Objective section in the abstract has been amended, please see revised manuscript.

Reviewer: 2

Dr. Cynthia LeardMann, Naval Health Research Center Comments to the Author:

Overall, this is a well written paper that explores factors associated with suicidal behaviors among Norwegian veterinarians. While this is an important examination of a specific occupation group that has been understudied, my enthusiasm for the paper was diminished by some aspects of the analysis. Below is a list of my comments, questions, and concerns:

1. The descriptive analyses are quite limited. It would be nice for the reader to see (In Table 1 or in an additional table) the characteristics/factors by the outcome. Suggest authors add two more columns in Table 1, which would show the characteristics by the outcome of suicidal thoughts. Otherwise, they should add another table to display this important information.

Authors' response: The authors agree that the characteristics of veterinarians with serious suicidal thoughts are interesting. We suggest including this additional table as a supplementary file ("Supplementary File 2 – Descriptives for veterinarians with serious suicidal thoughts.doc"), as adding more columns or an additional table in the main text may reduce readability.

2. Related to #1, it seems the figure is unnecessary. Suggest removing as it does not feel like it adds anything to the paper.

Authors' response: The figure has been removed.

3. If I am understanding the analyses correctly, the authors completed multivariable analyses (multiple independent variables in the model) not multivariate ("models that have 2 or more dependent or outcome variable") models. Please check and update this term throughout the paper. For more details, please refer to this article: Hidalgo B, Goodman M. Multivariate or multivariable regression?. *Am J Public Health.* 2013;103(1):39-40. doi:10.2105/AJPH.2012.300897

Authors' response: The authors apologize for this error and thank the peer reviewer for a useful reference. The correct term is 'multivariable analyses' (multiple independent variables in the model). The term has been updated throughout the manuscript.

4. I am not familiar with this term “Reality weakness”. Can author explain a bit more in depth the first time it is used for their audience?

Authors’ response: The term reality weakness is only briefly mentioned in the introduction, and further described in the Methods section (Page 6, line 24-31). The authors suggest that any further description of the instrument should be retained in the Methods section.

5. On Page 7, lines 57, I think the correct word is “drawing” or “lottery” not “draw”.

Authors’ response: Amended to ‘drawing’.

6. Please provide more details of examples of the life events in methods (pg 9, starting line 10). Is this like a death in the family or sexual assault?

Authors’ response: Examples of life events has been added to the Methods section (Page 7, line 7-8). In addition, the full questionnaire in Norwegian has been included as a Supplementary file (“Supplementary File 1 – Full questionnaire NORVET.pdf”), and the Methods section amended accordingly (Page 5, line 30-31).

7. In regards to the work-related factors, they are challenging to compare since the ranges and total sum scores are different. Authors should consider using mean scoring, in which would all the three factors to have the same range and total possible score, rather than sum scoring, for the ease of comparability between the scales.

Authors’ response: The authors agree that using mean scores when describing the three subscales of job stress makes comparison easier. Table 1 is updated (bottom page 10). The instrument has also been more thoroughly described in the Methods section (Page 8, line 4-6).

8. For Table 4 to be a stand along table, the authors should add a footnote about which variables were adjusted for in the “adjusted” model. Also consider adding this information to the text of the methods as well as the reasoning for this type of modeling.

Authors’ response: A footnote has been added to Table 4 describing which variables are adjusted for in the Adjusted model (Page 14, line 11-12). The Methods section has also been updated accordingly (Page 8, line 21-33).

9. Also check and update the indentation for Table 4, it is challenging to determine which rows are separate variables and which ones are categories of the same variable.

Authors’ response: Indentations have been made for the rows that are categories of the same variable (Page 14). The three job stress factors (Emotional demands, Work/life-balance and Fear of complaints) are strictly speaking three separate variables, but they all stem from a factor analysis of the Cooper’s Job Stress Questionnaire (as described in the Methods section), and we suggest indentations for these three factors as they all stem from the same, mentioned factor analysis. The editors are welcome to edit the layout as appropriate.

10. For the factors that are significant moderators, I think more details are needed. Consider adding the ORs and 95% CIs in some form for those models with significant moderators.

Authors’ response: ORs and 95 % CI for the significant two-way interactions are added in the results section (Page 14, line 15-17). Results and p-values for the interaction terms is virtually identical when main effects for all independent variables are controlled for simultaneously. Results for interaction terms could be added as separate rows in Table 4, but this was considered superfluous.

11. Based on the description, it sounds like the authors are performing nested or hierarchical modeling (as mentioned in the stats section), where they adjust for a set of variables and then adjust for additional set of variables. However, this is not clear in Table 4. Also, it seems like a full, final model should include all predictors/factors together to see which ones prevail. Again, it is not clear to me the authors have done this. At a minimum, this should be clarified in the paper.

Authors’ response: Please see the response to the next question.

12. Related to some of the comments above, I think it would be helpful for the reader if the stats section of the methods was expanded to include more details of the analysis. For example, more specifics should be provided about which variables were added into the hierarchical modeling at which points, mention if any variables were removed or added (if so, how was that decided?), and mention the steps were taken if interaction terms were found to be significant.

Authors' response: The Methods section – Statistical analysis has been amended to give a more comprehensive description of the statistical analyses performed, especially the logistic regression analysis (Methods, Page 8, line 21-33). As for interactions, please see response to question 10 above.

13. Typically to examine associations between certain factors and an outcome, such as risk factors associated with suicidal behaviors, researchers will use various multivariable modeling approaches. I find it interesting that these researchers asked the participants themselves to comment/surmise about this association (“What do veterinarians in Norway regard as contributing factors to their serious suicidal thoughts?”). Should the comparison between the self-reported presumptive associations be explored/discussed in more depth in comparison with the tested associations (“independent individual and work-related predictors for serious suicidal thoughts”)?
 Authors' response: The authors agree that this is an interesting point. However, a comparison between self-reported associations and the tested associations would be quite uncertain exemplified by the fact that the regression model comprises only two work factors (main field of work and three job stress factors).

14. Please explain why an additional model was conducted without the variables reality weakness and mental distress? I am not sure why the authors performed these analyses and it is not well explained in the paper. From what I gather, the authors hypothesize that some of the other coping factors may be confounded by reality weakness and mental distress. However, they do not test for this possibility; furthermore, I think their results may indicate that reality weakness and mental distress mediate the relationship between job stress and suicidal thoughts/behaviors. Suggest that the authors do more to further examine or test to see if job stress is mediated by reality weakness and mental distress.

Authors' response: The authors agree that the justification for the additional analysis should be more clearly stated. The manuscript has been amended with a rationale for conducting the additional analysis, please see revised manuscript (Results, page 13, line 11-13). Our results are compatible with the assumption that mental distress and reality weakness mediate the effects of job stress, but such a model is not considered theoretically viable. Also, please see response to question 7 from peer reviewer 1, which addresses possible mediation/interaction effects. The manuscript has been amended to better reflect the theoretical foundation of possible mediation/confounding effects (Discussion, Page 17, line 10-17).

15. In addition, it may be helpful for the authors to display the estimates from the two models with varying levels of adjustment (based on the hierarchical models). For example, in Table 4 authors could display the estimates of the two different adjusted models (Model 1: adjusted for demographics, alcohol, field of work, job stress; Model 2: adjusted for demographics, alcohol, field of work, job stress, reality weakness and mental distress).

Authors' response: The authors suggest including the full table of the 'additional analysis' as a supplementary file (“Supplementary File 3 – Additional analysis predictor model.pdf”). A reference to the supplementary file has been added in the results section accordingly (Results, Page 14, line 1-3). The Methods section has also been updated to give a more thorough description of the two analyses (Methods, Page 8, line 21-33).

16. In the discussion the authors mention the limited amount of data in regards to veterinarians and alcohol use. There is another recently published paper that examined the association between alcohol use among US Army veterinarians which did not find an association (Rivera AC et al. Health of Army veterinarians and veterinary technicians in the Millennium Cohort Study. Journal of the American Veterinary Medical Association. 2021;258(7):767-775. doi: 10.2460/javma.258.7.767).

Authors' response: The authors thank the peer reviewer for this useful reference. Findings from this study has been included in the paragraph on alcohol use in the discussion (Discussion, Page 16, line 27-29).

VERSION 2 – REVIEW

REVIEWER	Elena Toffol University of Helsinki Faculty of Medicine, Department of Public Health
REVIEW RETURNED	26-Nov-2021

GENERAL COMMENTS

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

I would like to thank the authors for revising the manuscript and answering my previous questions. Although the manuscript quality has improved, I still have a few questions and comments for the authors:

1. Introduction, page 4, line 3: "A review from 2010 found elevated suicide rates in all but one of the 15 studies published at the time": I think "elevated suicide rates" in veterinarians should be put into context, i.e. it may be a good idea to report the rate (or range of rates) found in the review.

2. Introduction, page 4, lines 9-11: "An interview study found that patient issues, responsibility, and poor work/life balance contributed to suicidal behavior among veterinarians". What is meant by suicidal behavior here? Does the cited study examine suicidal attempts, completed suicide, self-harm, suicidal ideation, or all of these?

3. If included (even as supplementary material), shouldn't the questionnaire be translated into English?

4. Methods: there may be a discrepancy when suicidal ideation/behavior was assessed in the past 12 months, but mental distress in the past 2 weeks; I would suggest addressing this issue in the "limitations" section.

5. Statistical analyses, page 8, lines 21-22: "Table analyses and the chi-squared test were used to test for differences in categorical variables": how about continuous variables (e.g., life events, SLC-5 etc)?

6. It is not clear how the outcome variable for the regression analyses was categorized: if I understood correctly, the 139 veterinarians with serious suicidal thoughts were coded e.g. with "1", but what was the reference group? Did it include all the others, irrespective of their suicidal feelings? Or were those with positive answers ("any frequency") at items 1 to 3 of the Paykel's questionnaire excluded? How about the six persons who reported previous suicide attempts? Were they excluded from the analyses, or included in the "0" category? This should be explained in the statistical analyses.

7. In line with the previous question, the Supplementary File 2 (table with characteristics of those with suicidal thoughts) could include a column with characteristics of the reference group. Additionally, the supplementary table 2 should be referred to in the paragraph "Prevalence of suicidal thoughts and behavior" rather than in the "Demographics".

8. I would add "Self-reported" to the heading of Table 3.

9. In the "Methods" section (page 7, lines 1-3) the authors state "age was reported in the following intervals: 20-25, 26-30 (...) up to 66-70 and >70 years.", but in Table 4 there is only one OR for the variable "age" (rather than one for each category): I assume it was then entered as a continuous variable in the regression analyses?

	<p>10. Footnote 2 of Table 4: "In the adjusted model, all listed variables were adjusted for": maybe "were reciprocally adjusted for", or "were simultaneously entered in the model"?</p> <p>11. Results of unadjusted analyses do not need to be reported in Supplementary File 3</p> <p>12. Discussion, Page 15, lines 5-6: "The veterinarians considered their serious suicidal thoughts mainly as work and personal problems". Maybe "as RELATED to work and personal problems"</p> <p>13. Discussion, page 15, line 23: "whereas suicidal thoughts IN the past year"</p> <p>14. Discussion, page 16, lines 11-14: "In contrast to physicians, where family and relationship issues were the most significant negative life events, economic problems (OR = 10.88, 95 % CI 5.20-22.78, p<0.001) were the most significant negative life event for veterinarians." Is this figure a result from the current study or from a referred paper? If it is from the current study, I think I could not find this result reported in the text nor in the tables: please, report all the results in the "Results" section of the study (either in the text, or in tables/supplementary material). If instead it is from a referred paper, please make the reference clear.</p> <p>15. In the conclusion section the authors state that "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." I think the discrepancy between self-reported and more objectively measured contributors to suicidal thoughts should be discussed and interpreted more in detail in the discussion.</p>
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REVIEWER	Cynthia LeardMann Naval Health Research Center
REVIEW RETURNED	30-Nov-2021

GENERAL COMMENTS	<p>The authors have done a good job responding to our comments and suggestions. There are just a couple remaining minor issues:</p> <ol style="list-style-type: none"> 1) In the stats section, line 23 I think "were used as" should be rephrased, perhaps "were examined as possible predictors" 2) In the stats section, line 29, I think it should state, "multivariable regression leaving out" not "multiple regression with leaving" 3) In stats section, line 30 says "The level of significance was set at 5 % (p<0.05)." Is this for the sub-analysis or all analyses? Please clarify/specify. Also, it may be more appropriate to say something like "p < .05 was considered statistically significant for all analyses" 4) Page 14, line 5, should header say "Multivariable logistic regression..."? I am not sure why it says "multiple". Although then the unadjusted results are mentioned, so perhaps should say something like "Predictors of Serious Suicidal Thoughts" and not mention the type of modeling in the header and just do that in the text. 5) In the results (line 12-14), these statements are not needed as already explained in the stats section and not considered a result, "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." With the
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	<p>explanation in the next sentence, these statements can be removed from the results section.</p> <p>5) In discussion, page 17 line 23 please change multivariate to multivariable.</p>
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VERSION 2 – AUTHOR RESPONSE

Reviewer: 1

Dr. Elena Toffol, University of Helsinki Faculty of Medicine Comments to the Author:

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

I would like to thank the authors for revising the manuscript and answering my previous questions. Although the manuscript quality has improved, I still have a few questions and comments for the authors:

1. Introduction, page 4, line 3: “A review from 2010 found elevated suicide rates in all but one of the 15 studies published at the time”: I think “elevated suicide rates” in veterinarians should be put into context, i.e. it may be a good idea to report the rate (or range of rates) found in the review.

Authors’ response: The authors agree. We suggest including the suicide rate from one of the high-quality studies reviewed (UK: at least three times the general population rate) (Page 4, line 3-4).

2. Introduction, page 4, lines 9-11: “An interview study found that patient issues, responsibility, and poor work/life balance contributed to suicidal behavior among veterinarians”. What is meant by suicidal behavior here? Does the cited study examine suicidal attempts, completed suicide, self-harm, suicidal ideation, or all of these?

Authors’ response: The cited study assessed both suicidal attempts and suicidal ideation among veterinarians. The mentioned work-factors in our manuscript refer to suicidal ideation, and this has been clarified in our manuscript. (Page 4, line 11).

3. If included (even as supplementary material), shouldn’t the questionnaire be translated into English?

Authors’ response: The authors agree that a translation of the questionnaire might be useful for the readers. However, we suggest not to translate the full questionnaire because most of the measures used can be found in English in the cited references, or in the Method section in the manuscript. Moreover, a translation into English would imply to make a new questionnaire including the same layout as the original Norwegian questionnaire. The authors will do this if the editor insists.

4. Methods: there may be a discrepancy when suicidal ideation/behavior was assessed in the past 12 months, but mental distress in the past 2 weeks; I would suggest addressing this issue in the “limitations” section.

Authors’ response: The authors agree that different time measures may be a limitation in this study. We have added the following to the limitations section: “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.” (Page 18, line 3-6).

5. Statistical analyses, page 8, lines 21-22: “Table analyses and the chi-squared test were used to test for differences in categorical variables”: how about continuous variables (e.g., life events, SLC-5 etc)?

Authors’ response: We did not test for any differences in continuous variables, we therefore suggest to not include any description of such tests. The only categorical variable where differences was tested was for gender, we therefore amended the sentence to the following: “Table analyses and the chi-squared test were used to test for gender differences”.

6. It is not clear how the outcome variable for the regression analyses was categorized: if I understood correctly, the 139 veterinarians with serious suicidal thoughts were coded e.g. with “1”, but what was the reference group? Did it include all the others, irrespective of their suicidal feelings? Or were those with positive answers (“any frequency”) at items 1 to 3 of the Paykel’s questionnaire excluded? How about the six persons who reported previous suicide attempts? Were they excluded from the analyses, or included in the “0” category? This should be explained in the statistical analyses.

Authors’ response: The outcome variable in the regression analyses included only Paykel item number four; i.e., serious suicidal thoughts. We have added a sentence in the Method section, Instruments – dependent variable, to clarify this: “For the regression analyses, Paykel item number four was used (serious suicidal thoughts) as the outcome variable, dichotomized as specified above.” (Page 6, line 24-26). As stated in Table 2, a total of 2562 respondents answered Paykel item number 4, and 139 of the respondents answered ‘any frequency’. This is also stated in the Abstract, in the Results section.

7. In line with the previous question, the Supplementary File 2 (table with characteristics of those with suicidal thoughts) could include a column with characteristics of the reference group. Additionally, the supplementary table 2 should be referred to in the paragraph “Prevalence of suicidal thoughts and behavior” rather than in the “Demographics”.

Authors’ response: The authors assume that by ‘reference group’ the peer reviewer refers to the sample as a whole. The descriptive of the sample as a whole is presented in Table 1. We suggest keeping these two tables separate, to avoid reducing the readability of the table(s). The reference to Table 2 has been moved to ‘prevalence of suicidal thoughts and behavior’ as suggested. (Page 12, line 2-4).

8. I would add “Self-reported” to the heading of Table 3.

Authors' response: Amended as proposed.

9. In the "Methods" section (page 7, lines 1-3) the authors state "age was reported in the following intervals: 20-25, 26-30 (...) up to 66-70 and >70 years.", but in Table 4 there is only one OR for the variable "age" (rather than one for each category): I assume it was then entered as a continuous variable in the regression analyses?

Authors' response: Ideally, the authors would have included 'age' as a continuous variable (for instance birth year). However, the Norwegian Centre for Research Data claimed the use of age intervals to keep the data as unidentifiable as possible, as described in the Methods section. Since the age categories can be considered as ordinal data, we treated age as a continuous variable in the regression analysis. Additionally, keeping age as a categorical variable would have generated an excessive number of effect estimates, and this was not considered feasible for this model.

10. Footnote 2 of Table 4: "In the adjusted model, all listed variables were adjusted for": maybe "were reciprocally adjusted for", or "were simultaneously entered in the model"?

Authors' response: The authors agree. The sentence has been amended as follows: "were simultaneously entered in the model".

11. Results of unadjusted analyses do not need to be reported in Supplementary File 3

Authors' response: The authors agree. Amended as proposed, please see new Supplementary File 3. Footnote 2 in the supplementary file has also been amended, in line with question 10 above.

12. Discussion, Page 15, lines 5-6: "The veterinarians considered their serious suicidal thoughts mainly as work and personal problems". Maybe "as RELATED to work and personal problems"

Authors' response: The authors agree. "Related to" is added to the sentence. (Page 15, line 8).

13. Discussion, page 15, line 23: "whereas suicidal thoughts IN the past year"

Authors' response: Amended as proposed.

14. Discussion, page 16, lines 11-14: "In contrast to physicians, where family and relationship issues were the most significant negative life events, economic problems (OR = 10.88, 95 % CI 5.20-22.78, $p < 0.001$) were the most significant negative life event for veterinarians." Is this figure a result from the current study or from a referred paper? If it is from the current study, I think I could not find this result reported in the text nor in the tables: please, report all the results in the "Results" section of the study (either in the text, or in tables/supplementary material). If instead it is from a referred paper, please make the reference clear.

Authors' response: The authors agree. This finding is from the present study. We have included this information in the result section (Page 12, line 1-2).

15. In the conclusion section the authors state that "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." I think the discrepancy between self-reported and more objectively measured contributors to suicidal thoughts should be discussed and interpreted more in detail in the discussion.

Authors' response: The authors agree. We have included a paragraph discussing this in more depth, and added two references. (Page 17, line 22-31).

Reviewer: 2

Dr. Cynthia LeardMann, Naval Health Research Center Comments to the Author:

The authors have done a good job responding to our comments and suggestions. There are just a couple remaining minor issues:

1) In the stats section, line 23 I think "were used as" should be rephrased, perhaps "were examined as possible predictors"

Authors' response: Amended as proposed.

2) In the stats section, line 29, I think it should state, "multivariable regression leaving out" not "multiple regression with leaving"

Authors' response: Amended as proposed.

3) In stats section, line 30 says "The level of significance was set at 5 % ($p < 0.05$)." Is this for the sub-analysis or all analyses? Please clarify/specify. Also, it may be more appropriate to say something like " $p < .05$ was considered statistically significant for all analyses"

Authors' response: The significance levels is for all analyses. The sentence is amended as follows: " $p < 0.05$ was considered statistically significant for all analyses."

4) Page 14, line 5, should header say "Multivariable logistic regression..."? I am not sure why it says "multiple". Although then the unadjusted results are mentioned, so perhaps should say something like "Predictors of Serious Suicidal Thoughts" and not mention the type of modeling in the header and just do that in the text.

Authors' response: The authors agree. The header has been amended as proposed.

5) In the results (line 12-14), these statements are not needed as already explained in the stats section and not considered a result, "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." With the explanation in the next sentence, these statements can be removed from the results section.

Authors' response: The authors agree. The sentence has been removed.

6) In discussion, page 17 line 23 please change multivariate to multivariable.

Authors' response: Amended as proposed.