Received: 7 October 2023 | Revised: 10 January 2024 | Accepted: 12 January 2024

DOI: 10.1002/vetr.3898

Vet Record

ORIGINAL RESEARCH

The need for recovery: An investigation into short-term work-related fatigue in veterinary nurses

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Abstract

Background: Veterinary nursing is physically and emotionally demanding, putting veterinary nurses at risk of acute work-related fatigue (AWRF). Despite the increased recognition of chronic occupational syndromes such as burnout and compassion fatigue in recent years, few studies have investigated how AWRF impacts individuals and the profession.

Methods: An anonymous survey open to all UK-based registered veterinary nurses (RVNs) was distributed via email and social media. The survey investigated work patterns, hobbies, opinions about work and intentions to leave the veterinary profession. An English translation of the need for recovery (NFR) scale was used to quantify the AWRF.

Results: The median NFR score from 387 responses was 81.8, indicating high levels of AWRF. Long shifts, sole-charge work and overtime were associated with higher scores, while having support at work and a better work–life balance were associated with lower scores. Higher scores were correlated with intentions to leave the profession.

Limitations: Although validated as a measure of AWRF, the unidimensional NFR scale oversimplifies the complexities of fatigue. A limited number of RVNs responded to the survey, reducing statistical power.

Conclusion: Although there is no single solution to staff turnover, the results from this survey suggest that addressing AWRF may improve retention of RVNs.

INTRODUCTION

Veterinary nursing is physically and emotionally demanding, putting veterinary nurses at risk of acute work-related fatigue (AWRF),[1,2] which is defined as 'a temporary and typically reversible reduction in performance of work-related activities, associated with feelings of tiredness or exhaustion, and resulting from previous work efforts'. In other professions, studies associate fatigue with wide-ranging consequences, including reduced productivity, increased human error and compromised safety for patients and staff.[3,4] Furthermore, if unrecognised or improperly managed between shifts, the effects of AWRF may accumulate, resulting in long-term 'occupational stress', including burnout, compassion fatigue and psychological distress.[5–8] Therefore, recognition and reduction of AWRF may help to reduce deleterious consequences—which have been associated with intentions to leave the veterinary profession—benefitting individuals, patients and the veterinary industry.

Staff turnover

Retention and recruitment within the veterinary nursing profession pose significant challenges, with staff shortages exacerbated by the COVID-19 pandemic and the UK's exit from the European Union.[9] In a recent survey of UK registered veterinary nurses (RVNs), almost half of respondents had worked additional hours due to staff shortages, and many reported an increase in service demand and feeling exhausted, burnt out and under pressure to meet client expectations.[10] Almost one-third of respondents considered leaving the profession in the next year, citing increased workload, stress and low pay as reasons for intending to leave.[10] Similarly, Hagen et al.[9] found that more than 50% of surveyed veterinary

nurses intended to leave the profession within 2 years, with recently qualified RVNs at greater risk of leaving than those who had been working for longer, suggesting a need for targeted interventions in this population.[9] Salary was the only other significant factor influencing retention in this study. These investigations highlight several factors—including fatigue, stress and burnout—contributing to dissatisfaction within the profession and suggest that, if unresolved, these issues could exacerbate staff shortages in future years.[9,10]

Jeffery and Taylor[11] highlighted that surveys often focus on 'intentions to leave' rather than collecting retrospective data from those who have left the profession; actual reasons for leaving may be different from those suggested in the surveys and are often multifactorial. Sonneveld et al.[12] conducted a focus-group study of veterinary surgeons who had left the profession and identified 20 main reasons for leaving, including poor work–life balance, low salary and excessive workload. Factors were categorised as 'excessive job demands', 'insufficient job resources' or 'other' using Demerouti et al.'s psychological job demands–resources (JD-R) model.[13] Veterinary graduates from Utrecht University were subsequently surveyed to determine postgraduate career pathways; respondents who had left the profession were asked to rank and rate the factors identified in the focus group to determine their importance, and provide any additional reasons. This research revealed a high turnover rate within the veterinary profession—almost one-sixth of graduates left the profession within 3.5 years—with multiple factors influencing individual decisions.[12] The authors highlighted how the JD-R model can be used to understand and explain employee wellbeing (including burnout, job satisfaction and performance) and how these factors may influence individuals' intention to leave the profession, supporting previous research linking exhaustion with increased job demands and insufficient resources among veterinary professionals.[14] However, while identifying common reasons for leaving practice may aid retention, it is unlikely that modifying a single factor will be sufficient; instead, a multifactorial individualised approach is required to reduce turnover.

Short-term fatigue

The impact of work demands on the individual and the need to recuperate from work-induced fatigue can be quantified using the need for recovery (NFR) scale, developed as part of the Dutch 'Questionnaire on the Experience and Evaluation of Work'.[15] This 11-item dichotomous scale investigates symptoms indicating work-related effort, with unfavourable responses scored such that a higher value signifies a greater need to recuperate.[16] The authors suggest that the NFR scale is an early indicator of fatigue at work and may predict serious long-term occupational fatigue syndromes such as burnout. The NFR scale has been validated as a consistent and accurate measure of AWRF; the scale is reliable across different workforce populations (Cronbach's $\alpha = 0.88$), with scores from individual respondents correlating well with other validated measurements of fatigue and stress.[16]

Wentz et al.[17] found clear associations between NFR scores, work demands, work resources and poor health in four occupations: engineers, builders, hospital nurses and home-care nurses. Increased job demands were associated with higher levels of fatigue, while better job resources paired with increased recovery opportunities predicted a lower NFR score. However, the researchers converted the original dichotomous NFR scale into a four-point scale (where 0 = never and 3 = always), which limits the ability to directly compare the results to those from other studies using the original scoring system, and may reduce the validity of the model.[18]

Cottey et al.[19] used the NFR scale to investigate AWRF in UK and Irish emergency department physicians. They found a median score of 70.0 (95% confidence interval [CI] 65.5–74.5), with total score significantly associated with sex, pre-existing health conditions, clinical grade, type of work and time spent working out-of-hours. This study population had the highest reported NFR score, with a strong linear correlation between out-of-hours work and NFR, supporting the previous results of Jansen et al.,[20] who reported that shift length, number of hours worked per week and overtime were positively correlated with NFR in multiple professions. As highlighted by the authors, some influential factors are modifiable and could be targeted by occupational health strategies, while others cannot directly be altered but could encourage earlier interventions or more frequent monitoring for individuals at a higher risk of occupational fatigue.[19] The survey had a high response rate, and Cottey et al.[19] suggest that the ease of use and rapid completion of the NFR scale—particularly when compared to more complex 'wellbeing inventories'—make it suitable for evaluating changes in individuals over time or for evaluating the impact of any occupational health interventions. Although the results from this study cannot be directly applied to the veterinary profession, they highlight key influential factors—including type of practice, clinical role and out-of-hours work—for investigations in the veterinary industry.

Knowledge gap

While there has been increased recognition of and research into compassion fatigue and burnout among veterinary professionals in recent years,[2,14,21-23] no studies have investigated AWRF in veterinary nurses. However, research in other professions suggests that early recognition and prevention of AWRF—while the impacts are smaller and potentially reversible—may protect against detrimental longer-term consequences, which have been linked to intentions to leave the profession.

AIMS AND OBJECTIVES

This project aimed to explore personal and organisational factors influencing the NFR in RVNs in the UK and determine whether a higher NFR score is associated with intentions to leave the profession. The objectives of the study were to quantify AWRF among UK-based RVNs using the NFR scale. Secondly, it aimed to identify both personal and organisational factors that are associated with AWRF in this population. Finally, the study intended to explore the relationship between AWRF and RVNs' intention to leave the profession.

It was hypothesised that RVNs facing greater job demands, such as additional roles, longer shifts and out-of-hours work, would exhibit higher NFR scores, indicating heightened levels of AWRF. Secondly, it was expected that RVNs who report increased support from colleagues would have lower NFR scores, suggesting a potential effect of social support on work-related fatigue. Thirdly, it was hypothesised that RVNs reporting higher levels of work enjoyment, improved work-life balance and engagement in hobbies outside of work would display reduced NFR scores, indicating a possible protective effect of personal well being factors on work-related fatigue. Lastly, it was anticipated that a higher NFR score would be associated with an increased intention to leave the veterinary nursing profession, underscoring the potential influence of work-related fatigue on career intentions and retention within the field.

METHODOLOGY

This cross-sectional online survey targeted RVNs working across the UK.

Survey

An anonymous 15-question survey was created using JISC Online Survey (www.onlinesurveys.ac.uk/). The survey was divided into three sections: 'about you', 'your work patterns' and 'your opinions' (see Appendix 1).

The 'about you' section collected the following demographic information:

- Sex
- Length of time qualified
- Practice location
- Practice type (first opinion, referral, charity)
- Job role (including additional roles)
- Additional demands and hobbies outside of work

The 'your work patterns' section investigated job demands and resources:

- Shift length
- Weekend- and night-shift patterns
- Working overtime or additional shifts
- The number of RVNs the participant worked with

TABLE 1 Items of the 'need for recovery' scale, as used in the survey

1	I find it difficult to relax at the end of a working day
2	By the end of the working day, I feel really worn out
3	Because of my job, at the end of the working day I feel rather exhausted
4	After my break, I feel in good shape and ready to continue working
5	In general, I only start to feel relaxed on my second non-working day
6	I find it difficult to concentrate in my free time after work
7	I cannot really show any interest in other people when I have just come home from work
8	Generally, I need more than an hour before I feel completely recuperated from work
9	When I get home from work, I need to be left in peace for a while
10	Often, after a day's work I feel so tired that I cannot get involved in other activities
11	Towards the end of my shift, a feeling of tiredness prevents me from doing my work as well as I normally would

Note: 'Agreement' with each item signalled an unfavourable response, except for item 4, which was reversed. The total sum of the unfavourable responses is multiplied by 100 and divided by the number of items (11) to give a score from 0 to 100

The 'your opinions' section used five-point Likert scales to measure:

- Levels of help and support at work
- Work–life balance
- Work enjoyment
- Likelihood of remaining in current role over the next 12 months
- Likelihood of remaining in the veterinary nursing profession over the next 12 months

All items in the scales were positively worded to reduce confusion and increase internal validity.[24]

The survey concluded with an English translation of the NFR scale[15] (see Table 1) with the number of unfavourable responses totalled and transformed—[(total × 100)/11]—to give a score between 0 and 100. A higher score indicates a greater NFR and increased AWRF.

The survey was accessible from 5 December 2022 to 5 February 2023 and was open to all UK-based RVNs who met specific inclusion criteria. Participants needed to be currently registered with the RCVS and working in a permanent or fixed-term clinical role in a small animal or mixed practice setting where clinical duties constituted at least 50% of their working day and primarily focused on small animals. Those working solely locum shifts, on long-term leave or having any pre-existing physical or mental health conditions significantly impacting their energy levels or feelings of fatigue at work were excluded from the study.

Participants meeting the inclusion criteria were provided with an information sheet and a link to supplementary information; consent to participation was required when entering the survey and submitting responses. Participants were advised to complete the survey at the end of a work shift to minimise recall

bias. Voluntary participation was incentivised by a 50p donation to the charity 'VetLife' for each response received.

Recruitment

The survey was distributed via social media (LinkedIn, Twitter, relevant Facebook pages—VetProfessionals and Veterinary Anursthesia—and Instagram) and emailed to RVNs at the RVC hospitals (Queen Mother Hospital for Animals and Beaumont Sainsbury Animal Hospital). Participants were also encouraged to share the survey with colleagues and via social media, allowing snowball sampling.[25] Monthly reminder posts were uploaded to LinkedIn by the researcher, and two additional emails were sent to RVNs at the RVC. Precision-based sample size calculations were carried out using Epitools.[26] Based on an estimated population of 20,916 RVNs[27] and a predicted proportion of 50% intending to leave the profession,[9,11] a minimum sample size of 378 was required to reach a 95% confidence level and 5% precision when analysing influential factors. A more conservative estimate of 33% intending to leave[10] required a minimum of 335 responses for the same precision and confidence level.

Data analysis

All the returned surveys were screened, and ambiguous and incomplete responses were discarded. The data from the completed surveys were entered into an Excel spreadsheet,[28] and answers to open questions were coded to create categories. Responses to the optional question 'please provide further details' for considering staying in or leaving the profession were categorised into positive, mixed and negative reasons for statistical analysis.

Data were analysed using IBM SPSS statistics software,[29] with the transformed NFR score treated as a continuous variable.[30] Descriptive statistics were performed (reported as frequency, median and minimum and maximum range), and the internal reliability of the five-item Likert scale and modified NFR were calculated using Cronbach's alpha. As the distribution of NFRs was negatively skewed, appropriate non-parametric tests were used for univariable analysis (Spearman's rho, Mann–Whitney *U*-test and Kruskal–Wallis test). *p*-Values of less than 0.05 were considered statistically significant.

RESULTS

A total of 408 responses were received, 387 of which provided complete, unambiguous data. Incomplete responses were discarded. Cronbach's alpha for the modified NFR scale was 0.789, representing acceptable internal consistency.[31] Cronbach's alpha for the five-item Likert scale assessing opinions about work was 0.788. The median NFR score was 81.8, with a range of 0.0–100.0 and an interquartile range of 54.5–90.9.

Demographics

Responses were received from RVNs working across the UK (see Figure 1); the majority worked in south-east England ($n = 105$, 27.1%), south-west England ($n = 51$, 13.2%) and London ($n = 49$, 12.7%). Most ($n = 262$, 67.75%) worked in first-opinion practices.

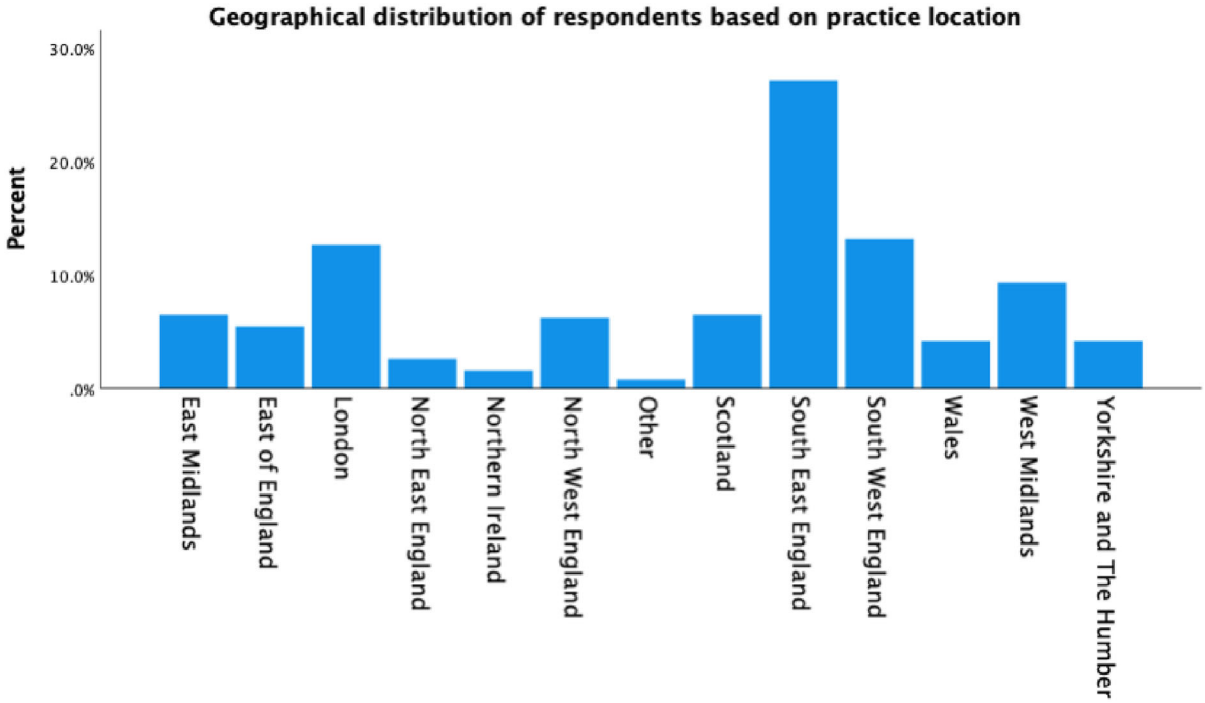

FIGURE 1 Geographical distribution of respondents based on practice location

TABLE 2 Demographic characteristics of respondents

	Frequency	Percentage (%)
Sex		
Female	380	98.2
Male	7	1.8
Practice location		
South-east England	105	27.1
South-west England	51	13.2
London	49	12.7
West Midlands	36	9.3
East Midlands	25	6.5
Scotland	25	6.5
North-west England	24	6.2
East of England	21	5.4
Wales	16	4.1
Yorkshire and the Humber	16	4.1
North-east England	10	2.6
Northern Ireland	6	1.6
Other	3	0.8
Practice type		
First opinion	262	67.7
Referral/hospital	101	26.1
Charity	16	4.1
Out-of-hours only	8	2.1
Job role		
RVN	299	77.3
Medicine nurse	14	3.6
Wards nurse	14	3.6
Anaesthesia nurse	13	3.4
ECC	13	3.4
Surgery nurse	9	2.3
Theatre nurse	7	1.8
Neurology nurse	4	1.0
Consult nurse	3	0.8
Oncology nurse	3	0.8
Other[a]	8	2.1
Number of additional roles at work		
None	143	37.0
1	133	34.4
2	92	23.8
3	16	4.1
4	3	0.8
Number of additional roles outside of work		
None	235	60.7
1	124	32.0
2	17	4.4
3	2	0.5
Prefer not to say	7	1.8
Number of hobbies outside of work		
None	152	39.3
1	150	38.8
2	58	15.0
3	17	4.4
Prefer not to say	10	2.6
Weekend work pattern		
None	51	13.2
Rota	319	82.4
Every weekend	5	1.3
Other[b]	5	1.3
I only work weekends	4	1.0
Every other weekend	3	0.8
Night-shift pattern		
None	302	78.1
Ad hoc/when needed	37	9.6
Set rota	32	8.3
I only work nights	12	3.1
Other[c]	4	1.1
Additional shifts/overtime		
Yes	243	62.8
No	144	37.2
Number of other RVNs in the team		
None (sole charge)	27	7.0
1	52	13.4
2–3	106	27.4
4–6	122	31.5
7–10	40	10.3
>10	40	10.3

Abbreviations: ECC, emergency and critical care; RVN, registered veterinary nurse (unspecialised role).
[a]Other roles included management, radiography, transfusion and mixed roles.
[b]Other responses included 'one in three' and ad hoc shifts.
[c]Other responses included 'seven nights on, 14 off' and 'on-call'.

The median length of time qualified was 6 years, ranging from 1 to 38 years. NFR score was weakly negatively correlated with time qualified, with those who had been qualified for longer having lower NFR scores (Spearman's rho = −0.143, $p = 0.005$).

Table 2 outlines additional personal demographics, work context and shift patterns of the respondents.

Additional roles

Most respondents (n = 244, 63.0%) had at least one additional role at work (see Table 2), including acting as a clinical coach (n = 162), head nurse (n = 72), department senior (n = 16) and management duties (n = 16). Respondents with additional roles appeared to have lower NFR scores (median 72.7, range 0–100.0) than those without (median 81.8, range 9.1–100.0),

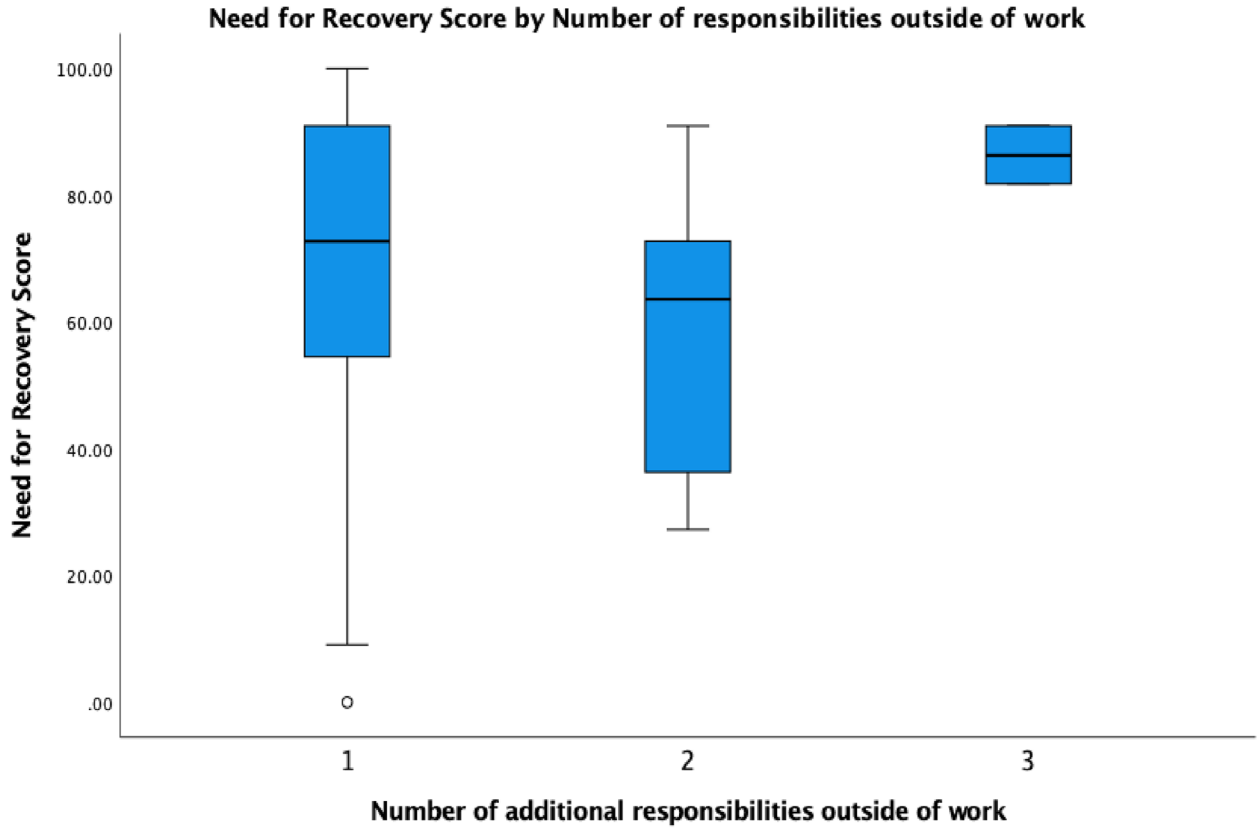

FIGURE 2 Need for recovery score by number of additional responsibilities outside of work. Scores differed significantly between groups and appeared to be lowest for those with two additional responsibilities

although this difference was not statistically significant (Mann–Whitney test, $p = 0.073$).

Most of the respondents (n = 235, 60.7%) had no additional responsibilities outside of work, 145 (37.5%) had additional responsibilities and seven (1.8%) answered 'prefer not to say'—these seven responses were excluded from further statistical analysis of this question. Additional responsibilities included being a parent (n = 97), working an additional job (n = 33), being a carer ($n = 14$) and being a student ($n = 10$).

Those with additional responsibilities outside of work had significantly lower NFR scores (median 72.7, range 0–100) than those without additional responsibilities (median 81.8, range 0–100.0) (Mann–Whitney test, p = 0.027). NFR scores were also significantly different for respondents with different numbers of additional responsibilities outside of work (Kruskal–Wallis test, $p = 0.032$), with those with two additional responsibilities having the lowest NFR scores (median 63.6, range 27.3–90.9) (Figure 2).

Hobbies

Over half of the respondents had at least one hobby outside of work (58.1%, n = 255), with common hobbies including sports and fitness ($n = 131$), horse riding (n = 51) and volunteering (n = 28). Ten respondents (2.6%) answered 'prefer not to say' and were excluded from further statistical analysis for this question. As shown in Figure 3, respondents with hobbies had significantly lower NFR scores (median 72.7, range 0–100.0) than those without hobbies (median 81.8, range 0–100.0) (Mann–Whitney test, $p = 0.005$). However, there was no significant difference in NFR score when comparing respondents by number of hobbies (Kruskal–Wallis test, $p = 0.411$).

Work patterns

Most respondents (n = 308, 79.6%) reported their contracted shift length in hours, with the remainder (n = 79, 20.4%) reporting their weekly contract; these responses were analysed separately. The median shift length was 8.75 hours (range 4.0–15.0 hours). Shift length was weakly positively correlated with NFR score (Spearman's rho = 0.209, $p < 0.001$), with nurses working longer shifts having higher NFR scores. The median weekly contract was 40 hours per week (20–48 hours), but this was not significantly correlated with NFR score (Spearman's rho = 0.143, $p = 0.208$).

Most respondents worked on weekends (n = 336, 86.8%), with most working on a set rota (n = 319, 82.4%). The reported weekend work patterns are shown in Table 2. There was no significant difference in median NFR score between those working weekends (81.8, range 0–100) and those not working weekends (72.7, range 18.2–100) (Mann–Whitney test, p = 0.445), or between those with different weekend work patterns (Kruskal–Wallis test, $p = 0.331$).

Less than a quarter of respondents worked nights (n = 86, 22.2%). Of these, the majority worked night shifts on an occasional 'ad hoc' basis ($n = 37$, 43.0%) or on a set rota ($n = 32$, 37.6%), with 12 (14.1%) working nights only. Nurses who worked nights had a lower median

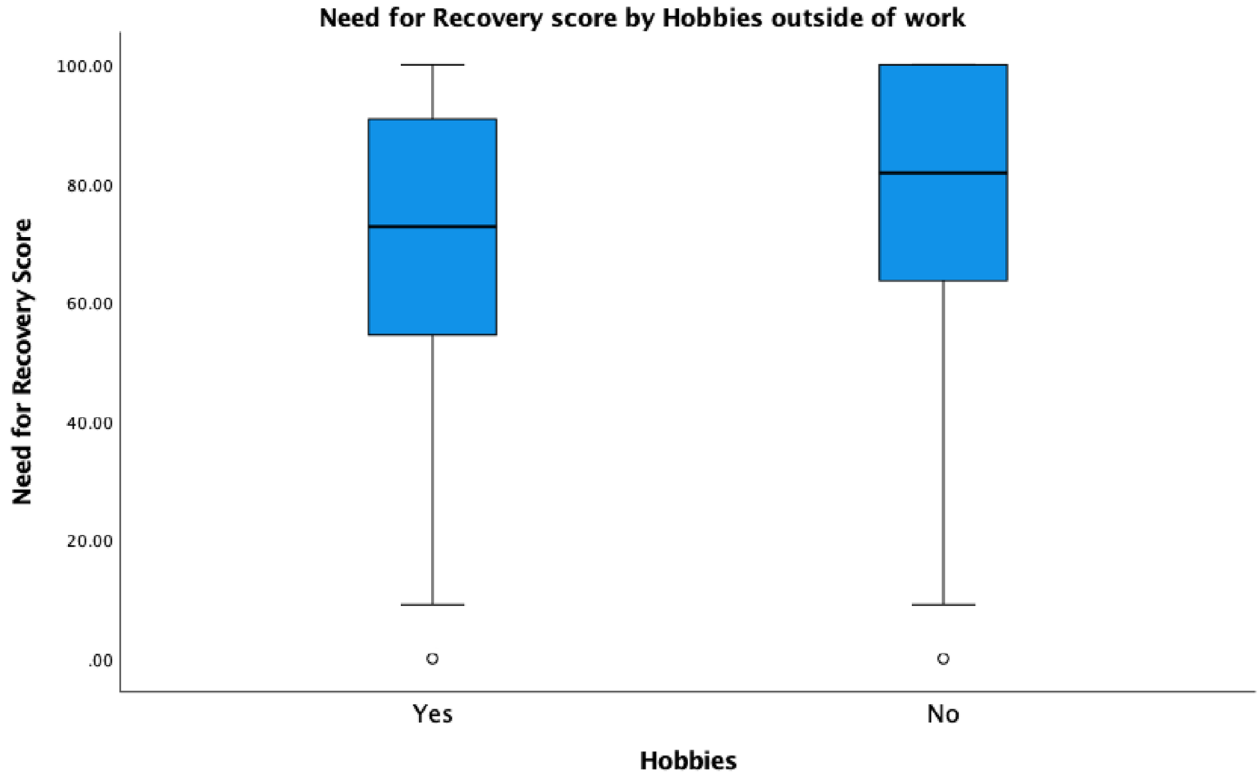

FIGURE 3 Need for recovery score by answer to the question 'Do you have hobbies outside of work?'. Those answering 'yes' had significantly lower scores than those answering 'no'

NFR score (72.7, range 0–100.0) than those who did not (81.8, range 9.1–100), but the difference was not significant (Mann–Whitney test, $p = 0.118$). Similarly, there was no significant difference in NFR score between different night-shift work patterns (Kruskal–Wallis test, $p = 0.946$).

Almost two-thirds of the respondents (n = 243, 62.8%) worked overtime or additional shifts at least once a month. As shown in Figure 4, these respondents had a significantly greater NFR score (median 81.8, range 0–100) than those who did not (median 72.7, range 9.1-100) (Mann–Whitney test, $p = 0.018$).

Most RVNs worked as part of a team (Table 2); only 7.0% (n = 27) worked alone, and most worked with four to six other RVNs (n = 122, 31.5%). RVNs working alone had a significantly higher median NFR score (90.9, range 27.3–100.0) than those working with others (81.8, range 0–100) (Mann–Whitney test, $p = 0.033$).

As shown in Figure 5, NFR score appeared to decrease with team size, with those working alone having the highest NFR scores (median 90.9, range 27.3–100) and those working with 10 or more colleagues having the lowest scores (median 72.7, range 0–100). However, this difference was not significant (Kruskal–Wallis test, $p = 0.361$).

Opinions about work

A five-item five-point Likert scale was used to analyse respondents' opinions about their work. The scale had acceptable internal consistency, assessed using Cronbach's alpha (α = 0.788). Figure 6 shows the distribution of responses; 305 respondents (78.8%) indicated that they felt supported by their colleagues, 309 (79.8%) had someone to ask for help when needed and 282 (72.9%) enjoyed their current role (partly or totally agree). However, only 144 (37.2%) participants felt that they had a healthy work–life balance, with only 161 (41.6%) looking forward to work each day.

Spearman's correlation tests showed significant negative correlations between responses to each item and NFR score ($p < 0.001$ for each item) (Table 3), with respondents with negative opinions having higher NFR scores than those with positive opinions. As shown by Figures 7–11, those with negative opinions (responding 'totally disagree' or 'partly disagree' to each item) had higher NFR scores than those who responded positively ('partly agree' or 'totally agree').

Intentions to leave the profession

As shown by Figure 12, more than 60% of respondents intended to continue working in their current role for the next 12 months ('very likely' $n = 125$, 32.3%; 'quite likely' n = 123, 31.8%). Similarly, most intended to continue working in the veterinary nursing profession ('very likely' $n = 166$, 42.9%; 'quite likely' $n = 117$, 30.2%).

Respondents 'very likely' to continue working in their current role had the lowest NFR scores (median 63.6, range 0–100). Similarly, NFR scores were lowest for those 'very likely' to continue working in the

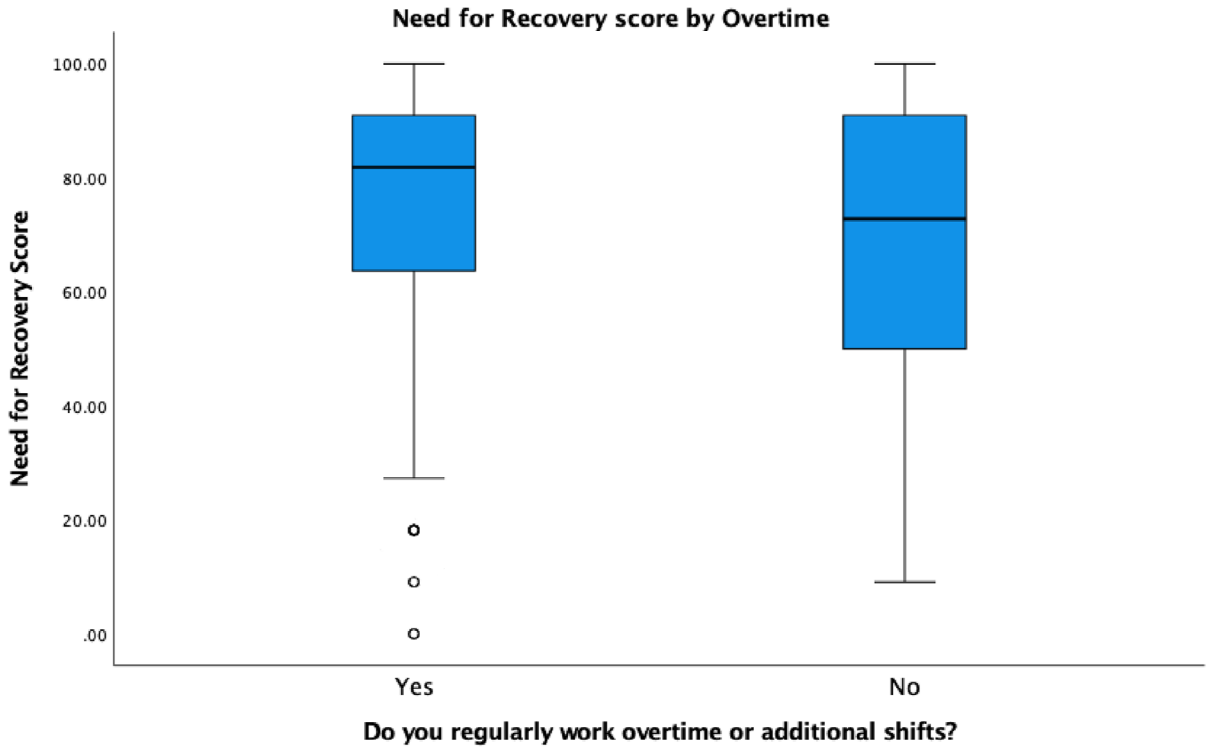

FIGURE 4 Need for recovery score by answer to the question 'Do you regularly work overtime or additional shifts', defined as at least 1 hour outside of contracted shift length at least once a month. Those answering 'yes' had significantly higher scores than those answering 'no'

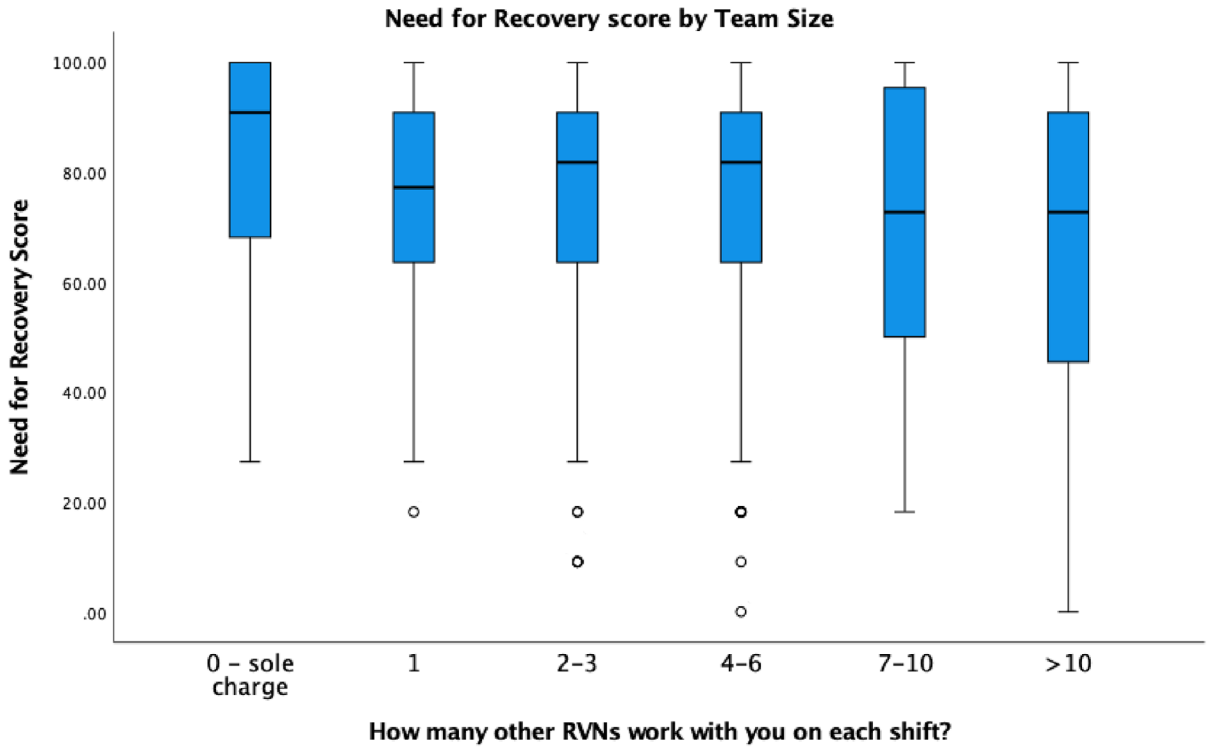

FIGURE 5 Need for recovery score by number of colleagues. Scores appeared to decrease with team size, but there was no significant difference between categories

veterinary nursing profession (median 63.6, range 0–100). Spearman's correlation tests (Table 4) showed significant negative correlations between NFR score and response for both questions, with those unlikely to remain in their current position or in the veterinary industry having higher NFR scores than those likely to continue.

A total of 231 respondents answered the optional free-text question regarding their reasons for staying or leaving the profession. Comments were

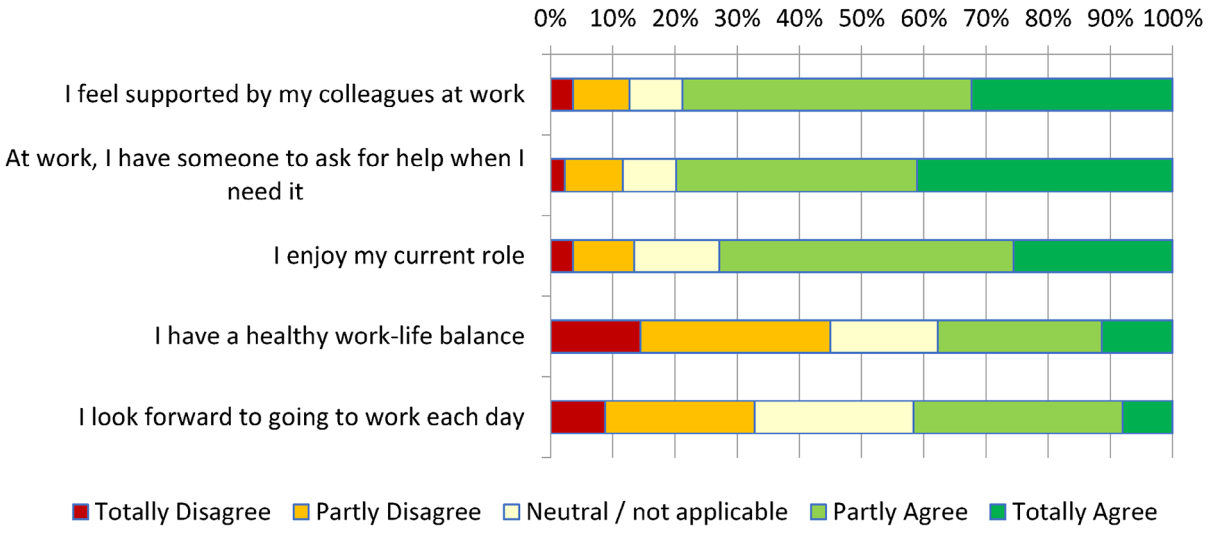

FIGURE 6 Responses to the five-item Likert scale assessing participants' opinions about work

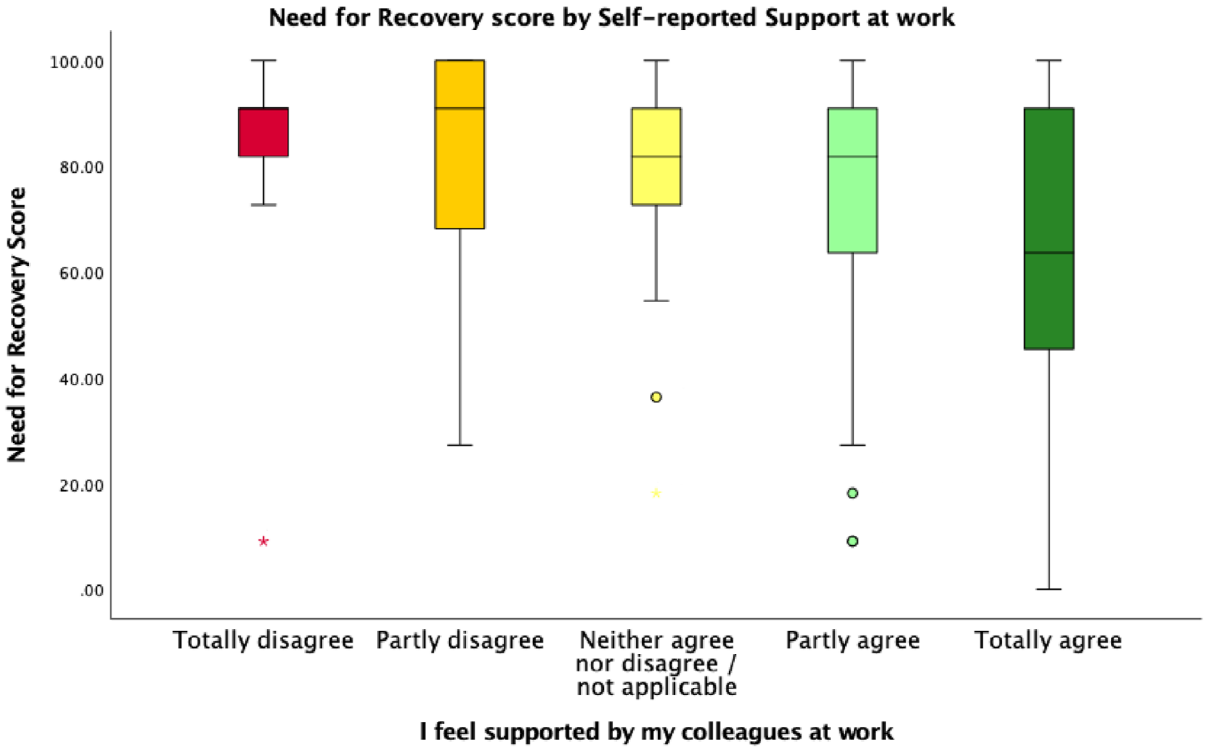

FIGURE 7 Need for recovery (NFR) score by agreement with the statement 'I feel supported by my colleagues at work'. There was a significant negative correlation between NFR score and response

thematically analysed and categorised as positive (n = 54, 23.4%), negative (n = 93, 40.3%) or mixed (n = 84, 36.4%). Positive themes included enjoying the role (n = 40), working as part of a good team (n = 24) and work being in a convenient location (n = 15). The negative themes included low salary (n = 47), physical and emotional demands (n = 31) and high levels of stress (n = 30). As highlighted by Figure 13, respondents providing positive comments had the lowest NFR scores (median 63.6, range 0–100), with scores significantly different across categories (Kruskal–Wallis test, $p < 0.001$). Post hoc adjusted Dunn's tests suggested that positive responses were associated with significantly lower NFR scores than mixed ($p = 0.001$) or negative ($p < 0.001$) responses.

DISCUSSION

The aim of this research was to explore factors influencing NFR scores in UK RVNs and to determine whether NFR score was associated with intentions to leave the profession. The surveyed population had a high NFR score (median 81.8), indicating high levels of AWRF. This score is similar to the average scores reported by Cottey et al.[19] and Sun et al.[32] when

TABLE 3 Correlations between need for recovery score and each item of the five-point Likert scale used to assess participants' opinions about work, assessed using Spearman's rho

Likert-scale item	Correlation coefficient (Spearman's rho)	Significance (two-tailed)
I feel supported by my colleagues at work	–0.259[a]	<0.001
At work, I have someone to ask for help when I need it	–0.218[a]	<0.001
I enjoy my current role	–0.349[a]	<0.001
I have a healthy work–life balance	–0.463[b]	<0.001
I look forward to going to work each day	–0.381[a]	<0.001

[a]Weak correlation.
[b]Moderate correlation.

TABLE 4 Correlations between need for recovery score and paticipants' intentions to continue working in their current role and the veterinary nursing profession over the next 12 months, assessed via Spearman's rho

Likert-scale item	Correlation coefficient (Spearman's rho)	Significance (two-tailed)
I will continue working in my current role	–0.306	<0.001
I will continue working in the veterinary nursing profession	–0.289	<0.001

investigating NFR in doctors in the UK and China, respectively.

Work demands

As hypothesised, increased work demands, such as longer shifts, overtime and sole-charge work, were associated with higher NFR scores. Surprisingly, having additional roles at work was not associated with a higher NFR score. While the difference was not statistically significant, those with additional roles and responsibilities had a lower median NFR score than those without. However, those with additional roles may have reduced clinical responsibilities or may be working at a more senior level and therefore exposed to different stressors than those with mostly clinical duties. These results support those of Wentz et al.,[17] who found that the JD-R model significantly predicted NFR scores across multiple occupations. Similarly, de Croon et al.[33] found that unfavourable working conditions, such as long hours and increased job demands, were associated with cumulative inter-shift stress, increasing the risk of long-term occupational syndromes such as burnout and cardiovascular and musculoskeletal diseases.

In contrast to previous studies, working out-of-hours (weekend and night shifts) did not significantly impact NFR score. Nurses working nights only appeared to have lower NFR scores than those working day shifts, although this was not statistically significant. Farag et al.[7] highlighted that most core patient-care activities occur during the day, increasing workload and thus levels of fatigue in day-shift nurses. Furthermore, those working nights often work fewer shifts per week, resulting in longer inter-shift periods for recovery. Patterson et al.[34] found that shift schedules with prolonged (>12 hours) inter-shift periods facilitated increased recovery in emergency medical service (EMS) clinicians even when shift length was increased, supporting this theory. However, many respondents in the current study cited weekend work, unsociable shift patterns and having little free time as reasons for considering leaving the veterinary nursing profession, regardless of NFR score. Furthermore, some free-text comments highlighted that working longer hours but fewer days a week gave a better work–life balance despite increased fatigue at the end of the shift. This supports the previous findings of Patterson et al.,[35] who found that many EMS clinicians favoured longer shifts as this allowed increased recovery between shifts and reduced time spent travelling and transitioning to and from work. This suggests a need to balance the risk of increased work-related fatigue with optimising work–life balance. Different strategies are favoured by individuals, and there is unlikely to be a universally beneficial approach.

Job resources

As anticipated, RVNs reporting increased levels of support and help available at work had lower NFR scores. Similarly, RVNs working as part of larger teams had lower NFR scores than those working alone. Occupational culture and teamwork were also cited in 40 free-text responses as influencing individuals' intentions to remain in the profession; however, while 14 responses were positive, 26 were negative. One respondent stated, 'My current workplace and team are amazing… (but) my last workplace was the polar opposite', suggesting significant disparity between practices. These results suggest that the creation of a supportive workplace environment may both reduce fatigue and increase retention. de Jonge and Huter[36] suggested that matching emotional demands and resources, such as support from colleagues, can mitigate multiple dimensions of fatigue; they also highlighted that boosting resources is easier than alleviating workplace demands, emphasising the need for improved organisational culture and workplace relationships. As highlighted by Barker and Nussbaum,[37] identifying workplace variables associated with fatigue allows modifiable factors to be targeted by occupational health programmes to improve levels of fatigue in the workforce. A meta-analysis by Patterson et al.[38] found that fatigue education and training significantly improved sleep quality in human emergency medical personnel,

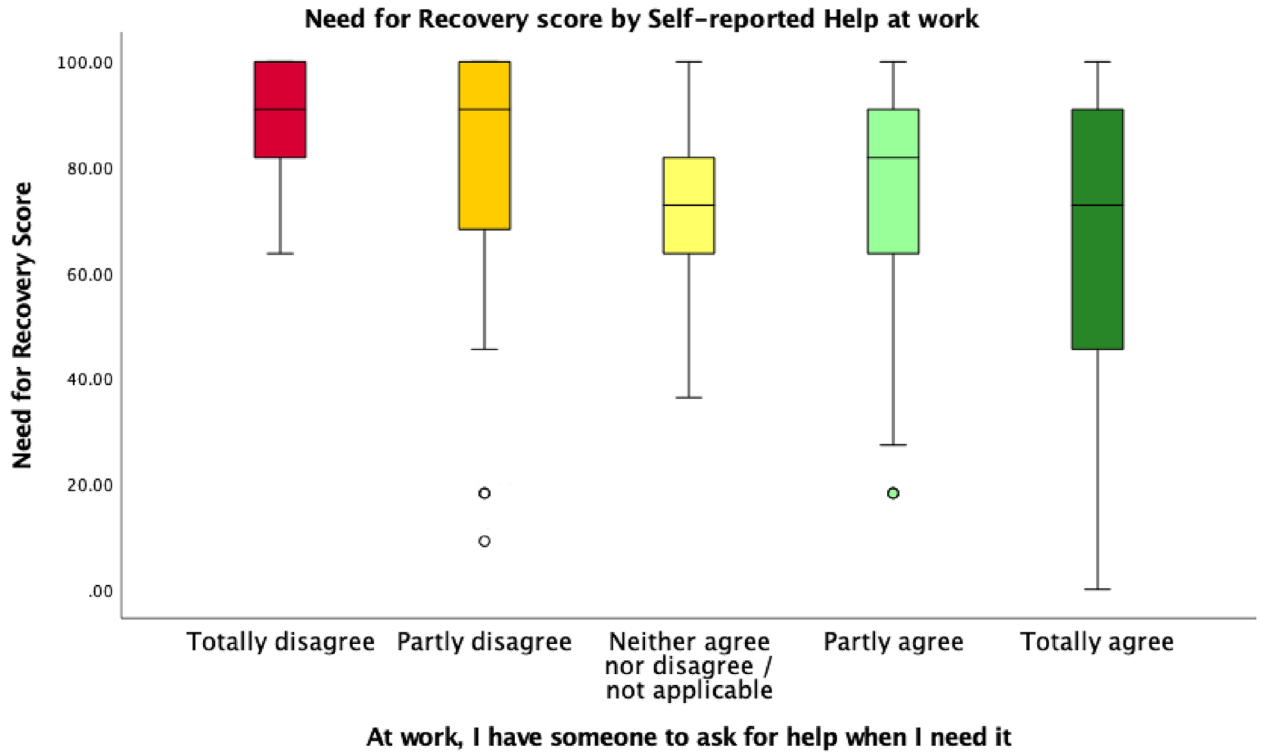

FIGURE 8 Need for recovery (NFR) score by agreement with the statement 'At work, I have someone to ask for help when I need it'. NFR score was significantly negatively correlated with response

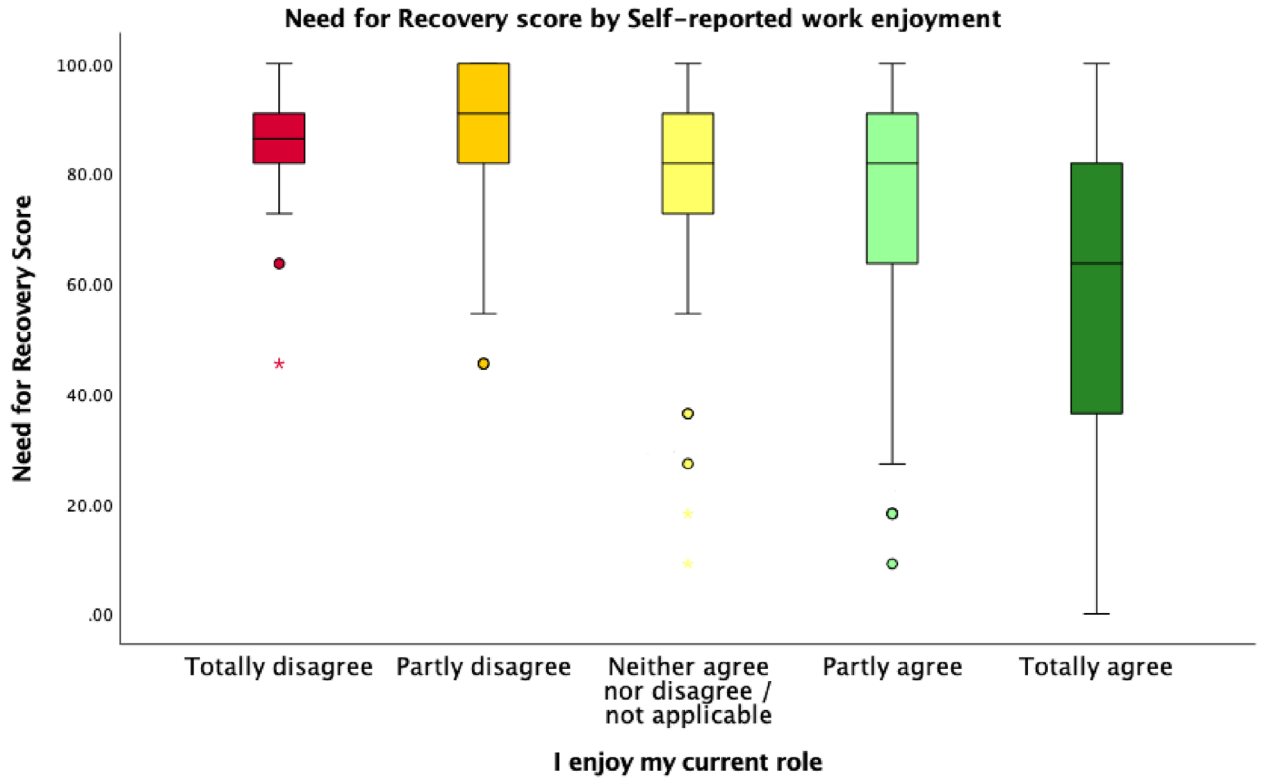

FIGURE 9 Need for recovery (NFR) score by agreement with the statement 'I enjoy my current role'. There was a significant negative correlation between NFR score and response

improving staff and patient safety outcomes. However, these effects were short-lived, suggesting a need for large-scale change in organisational culture for more permanent improvements.

Personal factors

As hypothesised, higher levels of work enjoyment, positive work anticipation and better work–life

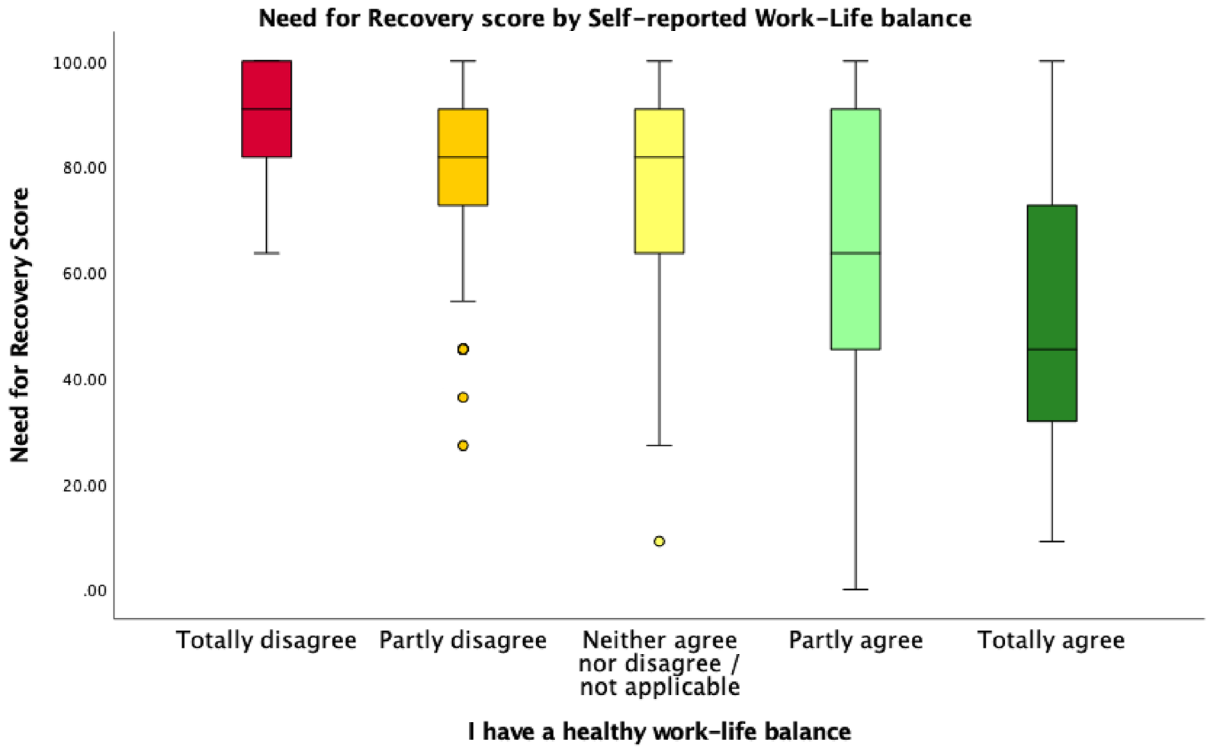

FIGURE 10 Need for recovery (NFR) score by agreement with the statement 'I have a healthy work–life balance'. NFR score was significantly negatively correlated with response

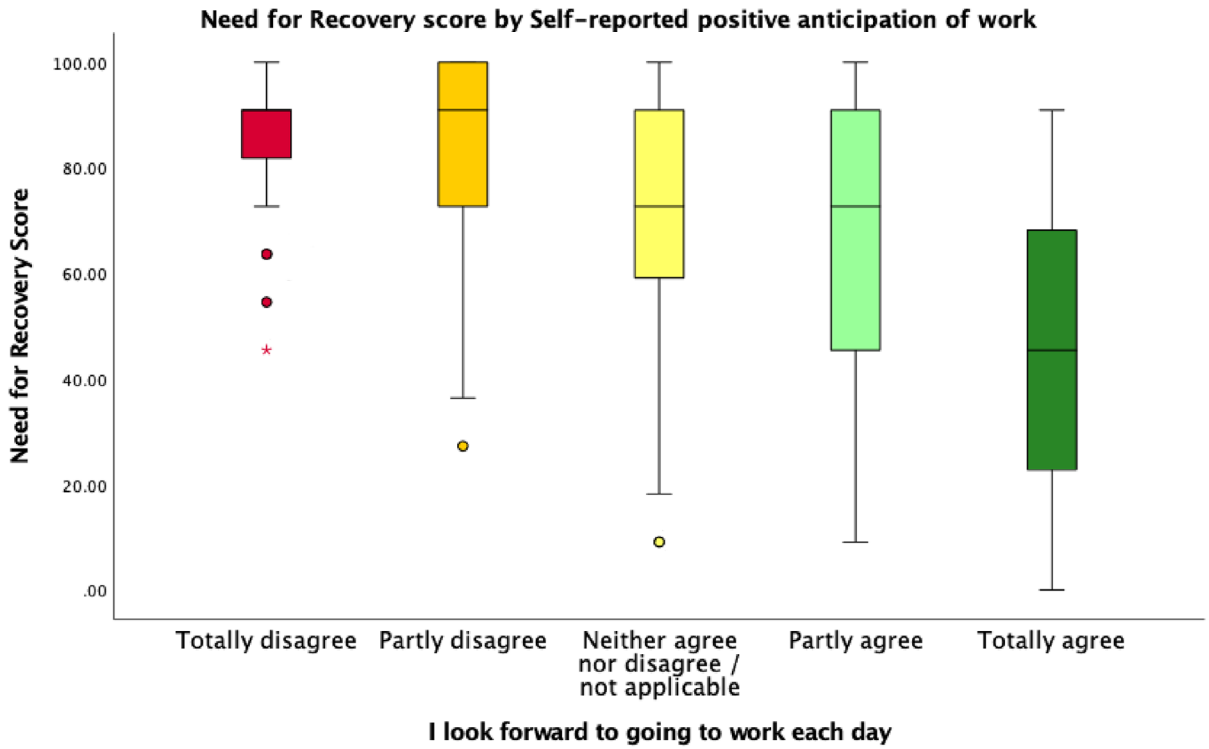

FIGURE 11 Need for recovery (NFR) score by agreement with the statement 'I look forward to going to work each day'. There was a significant negative correlation between NFR score and response

balance were associated with lower NFR scores. Furthermore, respondents with hobbies outside of work had significantly lower NFR scores than those without, suggesting that these may be protective against the negative impacts of work-related stressors. However, it is not possible to determine the direction of the relationship—it may be that those who feel less fatigued are able to enjoy work more and have more energy to engage in activities outside of work, or that having a more positive outlook and

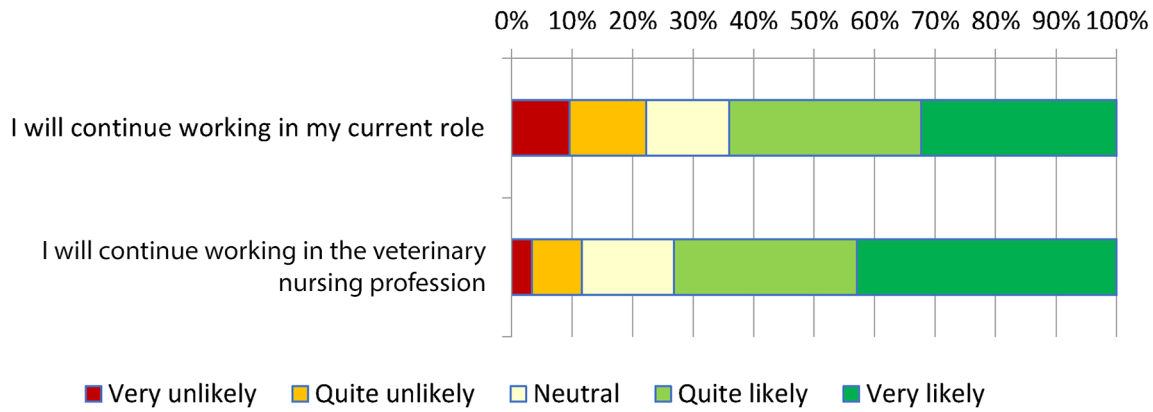

FIGURE 12 Responses to the two-item Likert scale assessing intentions to remain in the current role and within the veterinary nursing profession over the next 12 months. The majority of respondents answered 'quite likely' or 'very likely' to both questions

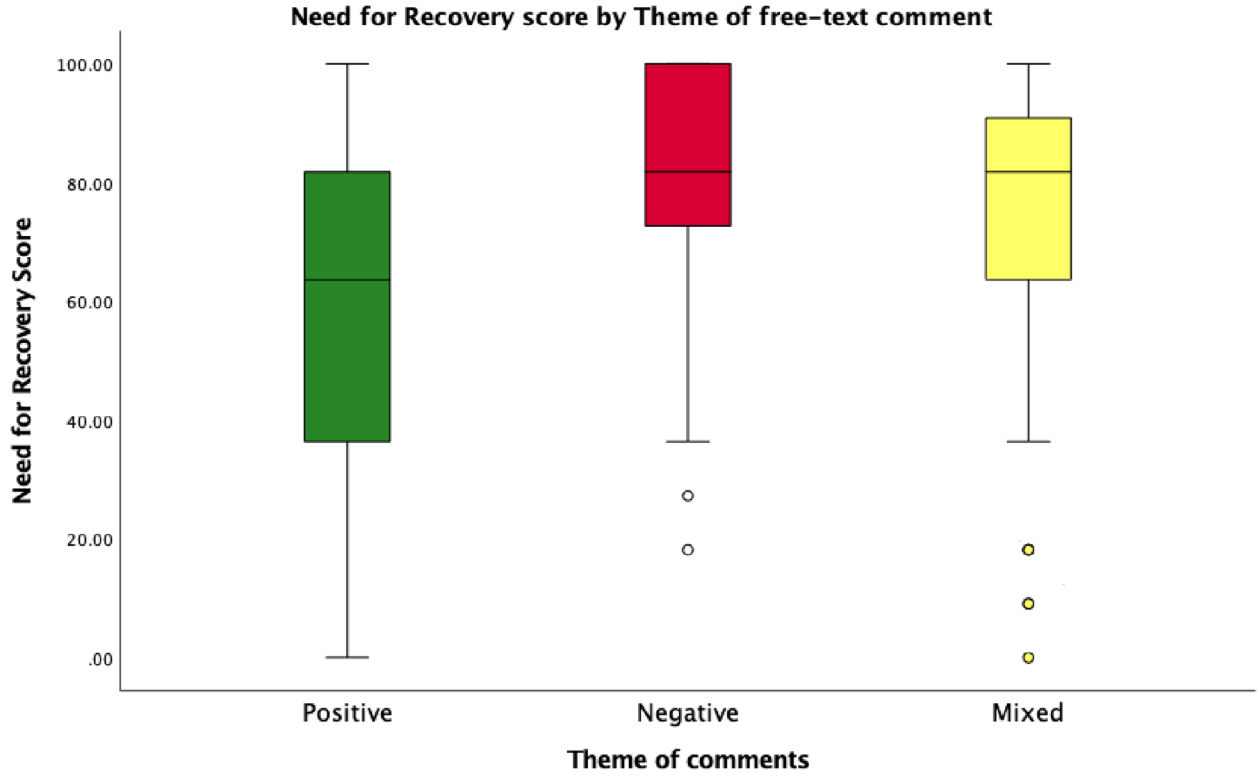

FIGURE 13 Need for recovery (NFR) score by theme of free-text response when respondents were asked to provide a reason for considering staying or leaving the profession. There were significant associations between NFR score and comment theme

prioritising a healthier work–life balance are protective against fatigue. Casper and Sonnentag[39] suggested that leisure activities may offset worry or anticipation of future workload, while work-related worry during the evening may contribute to next-morning exhaustion and poor wellbeing. Respondents who agreed with the statement 'I look forward to going to work each day' had lower NFR scores than those who disagreed with the statement. Casper and Sonnentag[39] suggested that workload anticipation contributes to exhaustion and strain before the shift has started, adding to the effort accumulated during the shift and thus worsening fatigue.

Similarly, respondents with additional responsibilities outside of work, such as being a parent or carer, had lower median NFR scores than those without such responsibilities. This finding supports those of Winwood et al.,[40] who found that nurses without any dependents (children or family members requiring care) tended to score worse on measures of fatigue and ability to recover than those with dependents. The authors suggested that family life may be protective against work-related stressors.[40]

Intentions to leave

As expected, RVNs with higher NFR scores had increased intentions to leave their current role and the veterinary nursing profession compared to those with lower NFR scores. The majority of respondents intended to continue working in their current role and

the veterinary nursing profession within the next 12 months, contrasting with the responses received by Hagen et al.,[9] where more than half of respondents were planning to leave the profession. However, when considering the free-text comments, not all respondents intending to remain in the profession had positive opinions; some ($n = 23$) highlighted a wish to leave the profession but felt limited by personal circumstances such as a lack of transferrable skills or other qualifications. As highlighted in previous studies,[11,12] numerous factors influence intentions to leave the profession. In this study, increased NFR score was significantly correlated with increased intention to leave the profession but it was not the sole influential factor. However, many ($n = 30$) respondents mentioned 'feelings of exhaustion and fatigue' and that the work was 'emotionally and physically draining'. One respondent stated that they often 'end up sleeping on days off because so exhausted (sic.)'. Although a full thematic analysis of the comments received is beyond the scope of this project, the responses to this survey suggest that fatigue is one of many factors influencing individuals' intentions to leave the veterinary nursing profession.

Study limitations

Due to the cross-sectional nature of the study, it is not possible to infer causation. For ease of completion and analysis, assessment of fatigue was limited by the need for inter-shift recovery, as defined by the NFR score—validated as a measure of symptoms of AWRF[16]; however, using a unidimensional measure inherently oversimplifies the multidimensional nature of fatigue.[7]

Although the response rate for the survey met the minimum sample size required for 95% confidence and 80% power to detect significant differences between groups intending to leave or remain in the profession, the sample is still only a small percentage of the total UK RVN population and may not reflect the overall views of the profession. Furthermore, small subpopulations limit the statistical power to detect significant differences between groups when considering individual factors. For example, very few respondents to the survey worked night shifts, reducing the power to detect a significant difference in NFR between those who did and did not work nights.

Data from voluntary surveys are subject to response bias, as those with strong opinions or interest in the subject are more likely to participate. As the survey was distributed online there may have been coverage error and an inability to represent the entire target population. However, the demographic distribution (sex, location, practice type) of respondents reflects that reported by the RCVS[41] and Veterinary Nurses Council,[27] suggesting that the sample is representative of the UK RVN population. The results are useful as a preliminary investigation into AWRF in this profession. Further research using additional recruitment strategies, including assistance from veterinary nursing associations and alternative distribution methods, would be valuable.

Further research

To overcome the inherent limitations posed by self-administered closed-question surveys, focus groups could be used to gain additional insight into factors influencing fatigue and the impact that this has on individuals. Future studies should also include other veterinary professionals to gain a broader picture across the multidisciplinary team. As the NFR score is quick and simple to complete, it could be repeated sequentially to evaluate the impact of occupational health measures. Finally, as both fatigue and intentions to leave the profession are complex and multidimensional, conducting a mixed-methods study including qualitative analysis may provide deeper insight.

CONCLUSION

RVNs working in the UK have high levels of AWRF, as measured by the NFR score. While intentions to leave the profession are multifactorial, increasing levels of fatigue are significantly correlated with intention to leave the profession, suggesting that this is an important factor in the retention of RVNs. Occupational factors, including long shift length, working overtime and sole-charge work, are associated with higher levels of fatigue. Therefore, these factors represent targets for future occupational health and management strategies to improve staff health and wellbeing, in turn improving retention within the profession. Having additional responsibilities and hobbies outside of work is associated with lower levels of fatigue. While not directly modifiable by occupational health strategies, increasing awareness of the benefits of hobbies—and facilitating improved work–life balance—may also reduce levels of fatigue.

AUTHOR CONTRIBUTIONS

Primary author—project design, background research, data collection and analysis and writing of final manuscript: Flora Foxx. *Project supervisor—assistance with project design, advertising survey, proofreading and editing of manuscript*: Hilary Orpet.

ACKNOWLEDGEMENTS

The authors would like to thank Gareth Jones for his advice regarding the statistical analysis and use of SPSS software, Marc van Veldhoven for granting his permission to use the need for recovery scale in this project, and all those who participated in the survey or aided in its distribution. This article was produced as part of the primary author's BSc Veterinary Nursing studies at the Royal Veterinary College.

CONFLICT OF INTEREST STATEMENT

The authors declare they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

ETHICS STATEMENT

Ethical approval was granted by the Social Sciences Research Ethical Review Board at the Royal Veterinary College, University of London (URN: SR2022-0156).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Foxx F, Orpet H. The need for recovery: An investigation into short-term work-related fatigue in veterinary nurses. Vet Rec. 2024;e3898. https://doi.org/10.1002/vetr.3898