Research Objective: Demonstrate the Hypothesis that More Sleep Lost, Due to On Call Work, Negatively Impacts Cognitive and Motor Functions

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The effect of on call shifts on the cognitive function and fine motor skills of veterinary clinicians

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RESEARCH OBJECTIVE:

DEMONSTRATE THE HYPOTHESIS THAT MORE SLEEP LOST, DUE TO ON CALL WORK, NEGATIVELY IMPACTS COGNITIVE AND MOTOR FUNCTIONS

INTRODUCTION

The effects of fatigue on cognitive and fine motor function are more pronounced following extended periods of awake time (Falkard and Lombardi 2006; Morrow, Burford, Carter and Iling 2012; Persico et. al.,2018).

- Working 17-19 hours without sleep can impair cognitive function and motor skills similar to the effect of 0.005% blood alcohol (Williamson and Feyer, 2020)
- Procedural error is elevated in sleep deprived individuals which impacts veterinary professionals and patient care (Saul 2019)
- Between 2017 and 2020, 34.5% of disciplinary actions were caused in some part by stress, over-work or mental health problems, all these factors have been linked to fatigue and night shift work (RCVS 2020b)
- In 2017 21% of cases had links to the above factors, in 2018 31% of cases had links whilst in 2019 links had increased to 50% of all cases heard by the RCVS disciplinary committee (RCVS 2020b)

METHOD

- Convenience sampling within the same veterinary practice due to Covid-19 restrictions
- A pool of RVNs and VSs currently working an on-call rota of 'sleeping nights' over a four week period
- A testing sequence devised by adapting the Cambridge Neuropsychological Tests Automated Battery Cognitive Safety Phase 1 and combining it with an adaptation of the Bruininks Motor Ability Test (Table 1)
- Participants logged the hours they were awake during each 'sleeping night, then completed the testing battery the morning after, which was performed in the same order each time
- The results were divided into two groups: 'little sleep lost' and 'lots of sleep lost' according to NHS sleep guidance
- A Wilcoxon signed-rank test for the repeated measures data was performed to determine any differences within data

RESULTS

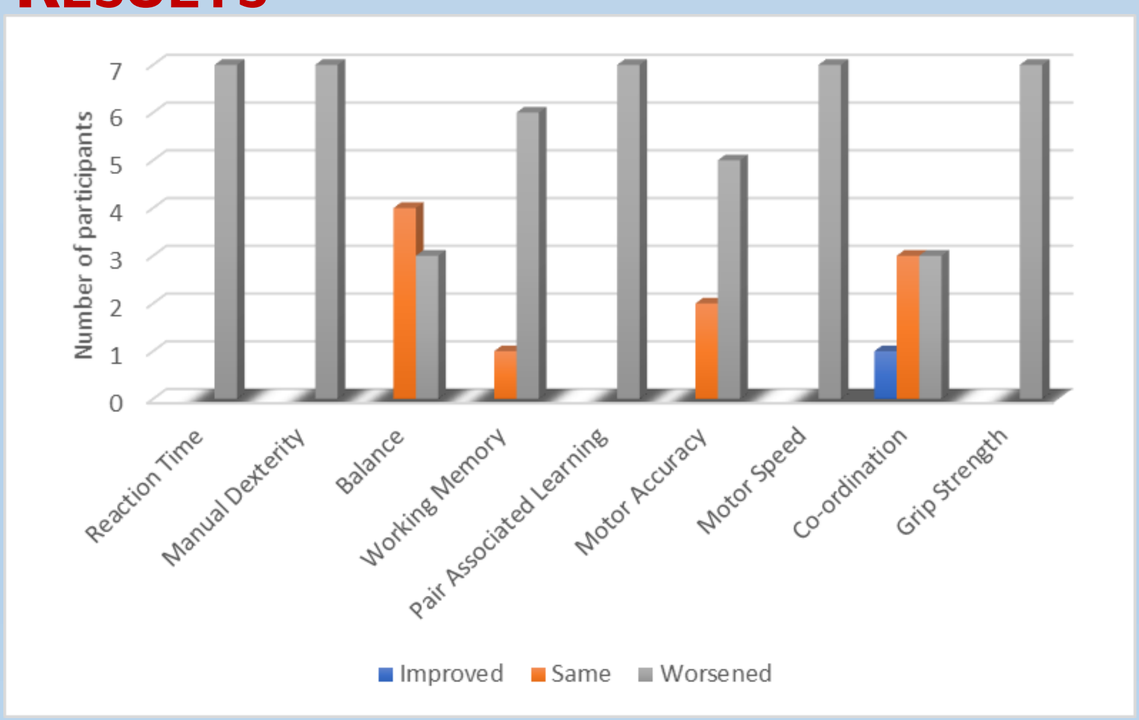


Figure 1: Differences of capabilities (Improved, Same, Worsened) to carry out tests when focusing on 'lots of sleep lost'.

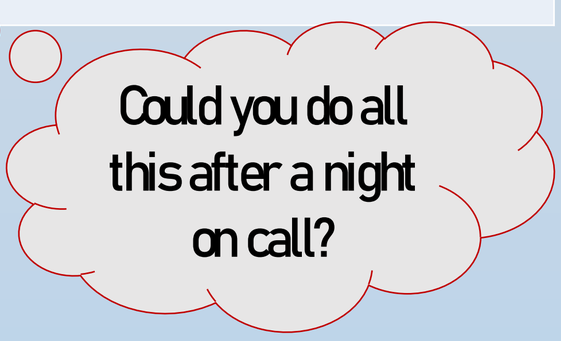
- Seven female VS and RVN participants between the ages of 23-46
- Poorer cognitive functions were noted for reaction time (Z=-2.371, p=0.018), manual dexterity (Z=-2.366, p=0.018), working memory (Z=-2.214, p=0.027), pair associated learning (Z=-2.366, p=0.018) and motor accuracy and speed (Z=-2.121, p=0.034) (Z=-2.366, p=0.018) when participants had less sleep
- Coordination and balance did not elicit statistically significant differences (Figure 1)

ETHICAL CONSIDERATIONS

- Legal and ethical requirements were met and processed through the Hartpury University Ethics Committee
- No changes were made to the structure or length of the working day
- Covid-19 regulations and recommendations were adhered to at all times

Table 1: Adaptions and instructions for testing sequence used by each participant.

Test	Method
Reaction time	Ruler dropped from just above the participants hand, participant to catch. Repeat 3 times and take average distance. Reaction time = √(2d /g).
Manual dexterity	Participants timed stacking the 15 coins into three stacks of five.
Balance	To stand on one leg for up to one minute. To be timed how long they manage balancing without needing to steady themselves on any object, or replace their foot on the floor
Paired associated learning	The cards to be spread out on the table in a random pattern face down. Participants will be asked to play snap until all the cards are matched.
Fine Motor integration	To cut out a leaf shape from an A4 sheet of paper whilst being timed. Accuracy on a scale: 1 = good 2 = fair and 3 = poor.
Working Memory	Participants to be given a list of five random items at the beginning of the battery, after three tests asked to recall which they can remember.
Co-ordination	To be thrown a ball from one metre distance and asked to catch it with one hand only. This will be attempted five times.
Grip strength	Participants to be asked to grasp the dynamometer as hard as they can three times and an average grip strength will be taken.



CONCLUSION

The studies results agreed with previous literature such as that demonstrated by Kaliyaperumal, Elango, Alagesan and Santhanakrishanan (2017) and Stepan, Fenn and Altmann (2019).

- Restrictions of the sample size available did not prevent the hypothesis from being tested, however, further research with a larger sample would allow results to be generalised against the larger population of veterinary clinicians with similar working patterns
- The findings from this study should encourage further research into patient outcomes and procedural errors when reviewed alongside amounts of sleep lost
- It is also hoped that the results of this study will start discussions surrounding out of hours rota systems and wider staff care issues because of the worry that "*people believe that relative to the average working professional clinicians are better able to ignore physical and mental health issues, and physician job performance is less impacted by bodily and emotional limitations*" (Goranson, Sheeran, Katz and Gray, 2020)

REFERENCES:

Hartpury University, Hartpury, Gloucestershire, United Kingdom, GL19 3BE,