The Scaling and Psychometric Properties of an Acute Pain Scale for use in Dogs

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Abstract

Quantifying and managing clinical pain in animals has become increasingly important. In the Pain and Welfare Group of Glasgow University, a method of assessing acute clinical pain in dogs, the Composite Pain Measurement Scale (CMPS) has been created. The CMPS contains 7 categories each describing a number of behaviours (Holton et al, 2001). To date, of the few multi-item pain scales for animals that exist, most have not been tested for their psychometric properties and none has attempted to apply psychometric principals to determine appropriate weights for each item, when using the scale to calculate a global pain score. To estimate such weights in the CMPS, Thurstone's Law of Comparative Judgement (Case V) was applied using paired comparisons of the items within each sub-scale from sixteen independent judges. A clinical trial involving 80 dogs and 5 observers demonstrated that the inter-rater reliability of the CMPS was unsatisfactory (R=0.50), and was indeed lower than reliability calculated for a simple Numerical Rating Scale score (R=0.70) from the same trial.

The validity of the Thurstone's scaling model assumptions was subsequently investigated, with goodness-of-fit χ^2 test statistics demonstrating that the assumptions of additivity and normality did not hold. (For all sub-scales, p-value<0.05). The limitations, in this case, of classical test modelling has led to the consideration of item response theory for transforming the scale's item responses into trait score estimates. The fitting of a 1 Parameter Logistic (Rasch) Model and a 2 Parameter Logistic Model have provided mixed results, though a polytomous model that accommodates the CMPS's original format, appears more promising.

References

Holton, L. Reid, J. Scott, E. M. Pawson, P. Nolan, A. (2001). Development of a behaviour-based scale to measure acute pain in dogs. *Veterinary Record. 2001.* ***148****: 17, 525- 531. 32 ref.*