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Background:

- Osteoarthritis (OA) was diagnosed in 37.3% of dogs presenting for routine preventive care or evaluation of lameness/stiffness, according to a recent study.¹
- This chronic condition causes pain and mobility impairment in dogs and decreases the quality of life (QoL) of both the dog and owner.^{2,3}
- There is a need for a standardized approach to assess concepts related to QoL and treatment satisfaction in canine OA to help monitor disease progression in clinical trials and veterinary practice, to assess treatment efficacy and to inform treatment decisions.
- While numerous QoL instruments have been developed for use in dogs, no existing canine OA-specific instrument comprehensively assessed all three concepts of interest (the QoL of dogs with OA, the impact of canine OA on owner QoL and owner satisfaction with OA treatments).
- An owner-completed Canine OA QoL, Owner QoL and Treatment Satisfaction (CaOA-QoL-TS) instrument was developed and evaluated.

Objective:

- To generate qualitative and quantitative evidence that the CaOA-QoL-TS is fit-for-purpose (assess canine QoL, owner QoL and owner treatment satisfaction) in the planned context of use (canine OA). This included evidence of content and construct validity and score interpretation thresholds.

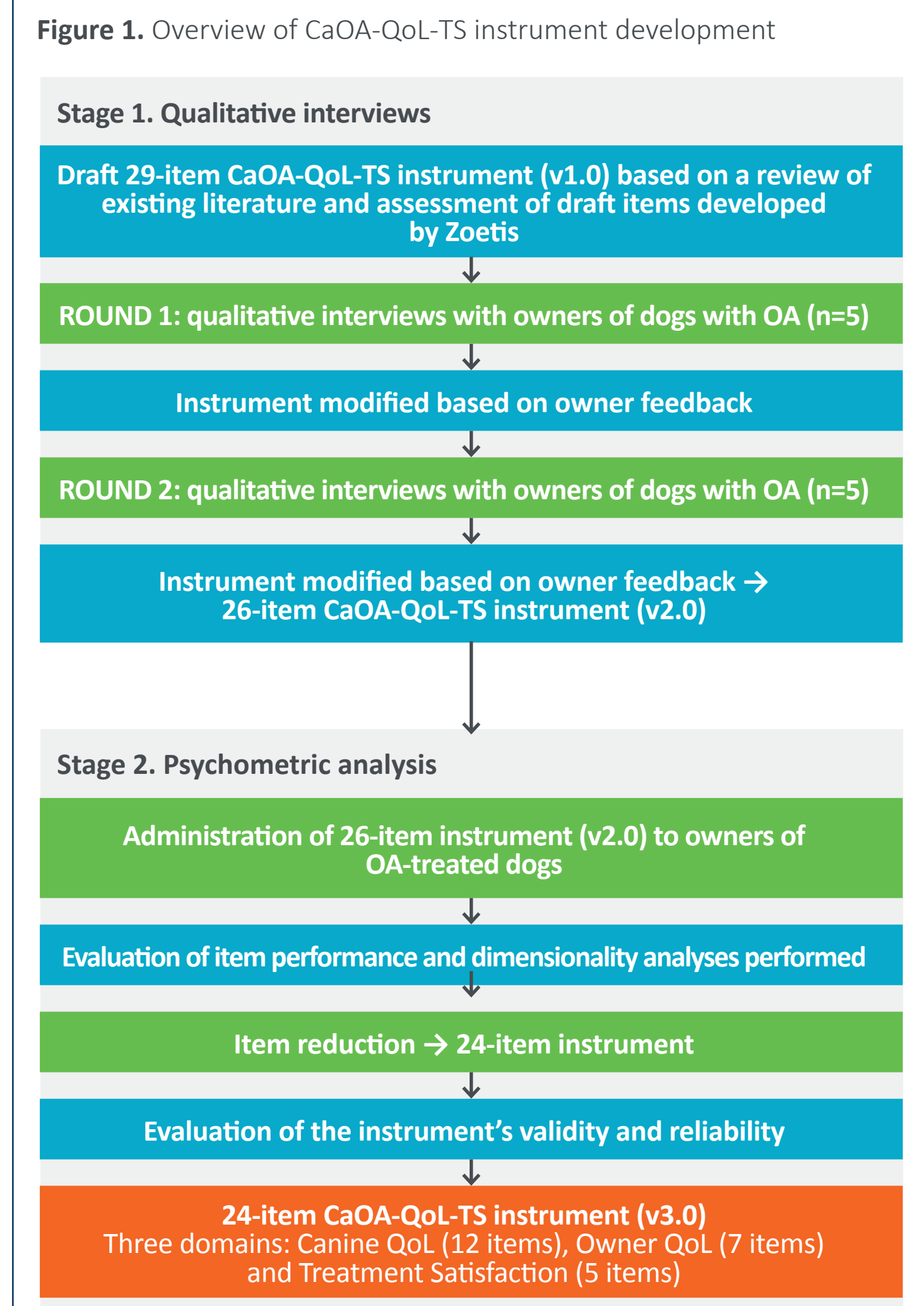
Methods:

Stage 1: Developing the draft CaOA-QoL-TS instrument

- A systematic literature review was conducted to develop a conceptual framework that informed the development of a draft 29-item CaOA-QoL-TS instrument (v1.0). The draft instrument assessed three hypothesized domains: Canine QoL (17 items), Owner QoL (8 items), and Treatment Satisfaction (4 items). It had a recall period of 'past 7-days' and used a five-point Likert response scale (Not at all, A little, Somewhat, Quite a bit, A great deal/Very much). Not applicable response options (labelled 'I do not allow or have not seen my dog do this') were included for two items within the Canine OA QoL domain.

Stage 2: Finalizing and validating the instrument

Following the development of the draft 29-item CaOA-QoL-TS instrument (v1.0), the study included two stages of validation (outlined in Figure 1), adhering with best practice guidelines.⁴



- Stage 1: Qualitative interviews:** Combined concept elicitation (CE) and cognitive debriefing (CD), semi-structured, telephone interviews were conducted with ten owners of dogs with a presumptive diagnosis of OA in the US (n=5) and UK (n=5).
- Interviews aimed to assess the conceptual comprehensiveness of the draft instrument (v1.0) and whether the instrument was understood, relevant to canine OA, and captured the concepts most important to owners.
- Interviews were audio-recorded and transcribed verbatim. Transcripts were analyzed using thematic analysis via Atlas.Ti.
- Stage 2: Psychometric analysis:** The instruments' psychometric properties were assessed using data collected from a multi-center, cross-sectional, uncontrolled, prospective, longitudinal, phase 4 field study of Librela (bedinvetmab) in the UK. Ninety-three owners of dogs aged ≥12 months with a presumptive diagnosis of OA completed the CaOA-QoL-TS (v2.0) at six timepoints: day 0 (baseline), day 14 (two weeks after first dose), day 28 (second dose), day 56 (third dose), day 63 (one week following third dose) and day 70 (two weeks following third dose). Owners also completed the VetMetrica Dog[®] and four QoL global impression items.
- Psychometric analyses were conducted in two phases using SAS version 9.4 and Mplus run in R. Phase 1 determined the item-scale structure of the CaOA-QoL-TS (v2.0) based on item response distributions, inter-item correlations, multi-trait analysis, confirmatory factor analysis, earlier qualitative findings, and the clinical relevance and importance of items. Phase 2 analyses (internal consistency, test-retest reliability, convergent validity, known groups validity, ability to detect change over time, and within-groups meaningful change thresholds) evaluated the psychometric properties of the resulting item-scale structure.

Results:

Sample characteristics:

- The demographics of owners varied across location (rural/city) and education level; on average, participants had 9.5 years (range: 0.4-15.5 years) experience caring for a dog with OA.
- The dogs included in the interview sample (stage 1) and the validation sample (stage 2) had a mean age of 12.7 (2.3 standard deviation [SD]) and 10.3 (3.3 SD) years, respectively. Most dogs were female (≥60% in both samples); there was a wide variety of dog breeds in both stages, including both small (e.g., Chihuahuas) and medium-large dogs (e.g., Labradors).

Qualitative interview results:

- An updated conceptual model (Figure 2) was developed that summarizes the key impacts of canine OA on dog and owner QoL and owner treatment satisfaction identified from the literature and dog owner interviews. Saturation analysis highlighted that no further qualitative interviews were necessary since all important concepts had been identified.
- All 29 items of the draft CaOA-QoL-TS (v1.0) were understood by ≥80% of participants and most were considered relevant to ≥50% of participants.
- The 7-day recall period was understood and considered appropriate to all participants (N=10/10). All participants demonstrated an understanding of response options (N=10/10), and most considered them appropriate (n=9/10).
- Ten items were reworded, four removed, and two added, to improve participant understanding and reduce item redundancy, resulting in 26 items that all owners understood and considered relevant. The 26-item version (v2.0) was taken forward to Stage 2 (psychometric analysis).

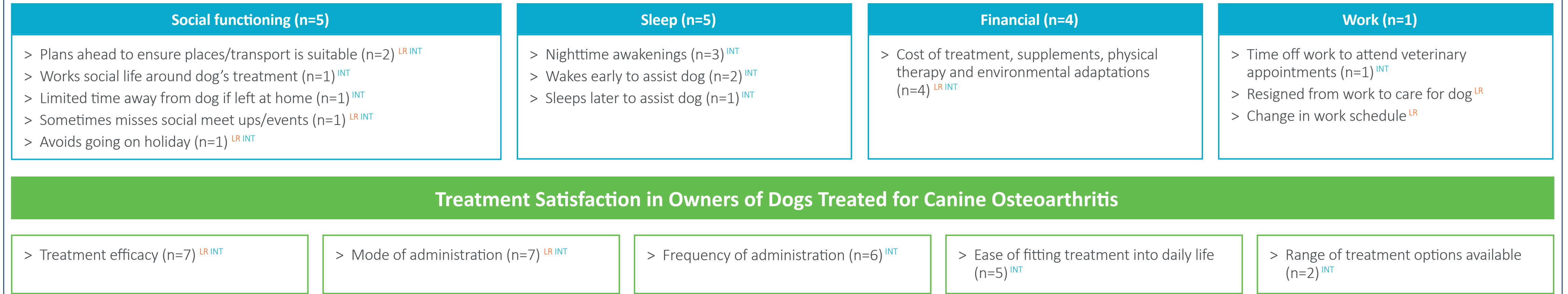
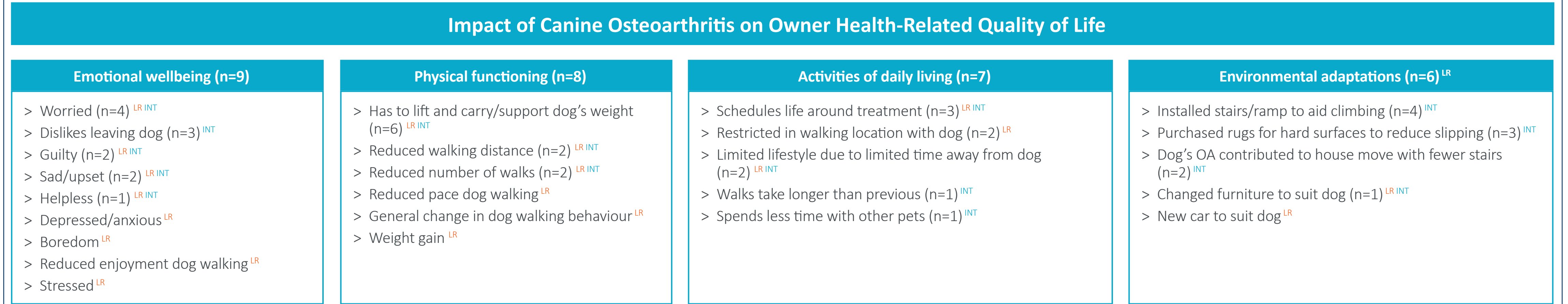
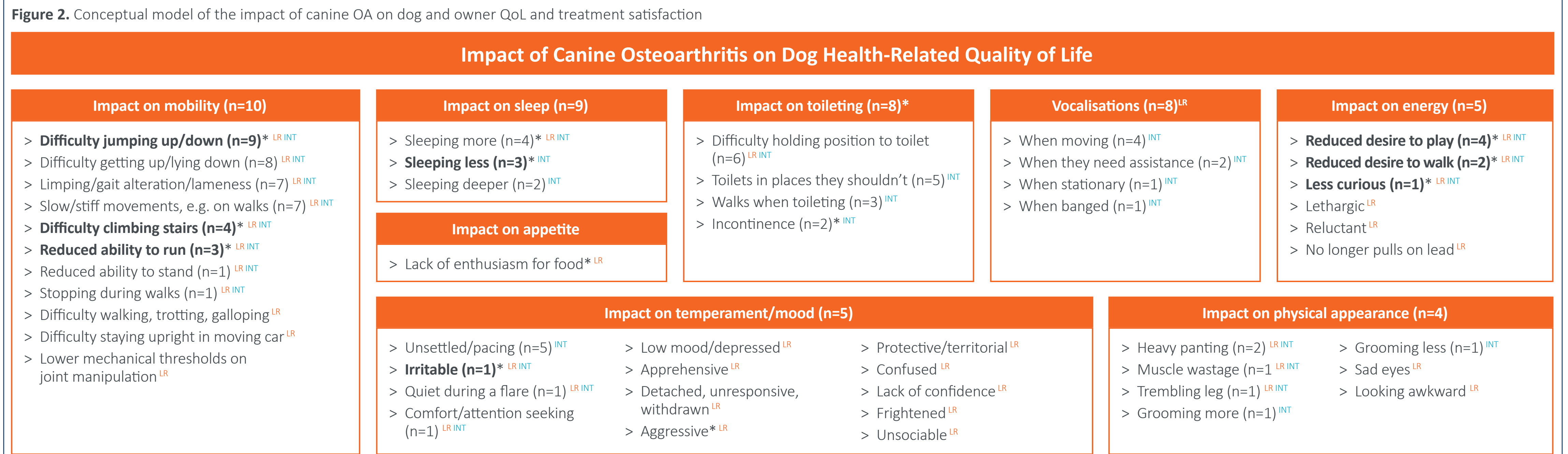


Figure 3. Domain structure of the finalized 24-item CaOA-QoL-TS instrument (v3.0)

Item	Domain
1. In the past 7 days, my dog has been walking slowly	Canine Quality of Life
2. In the past 7 days, my dog has been limping when walking around the house or outside	
3. In the past 7 days, my dog has been slow to get up and/or slow to lie down	
4. In the past 7 days, my dog has had difficulty jumping up and/or jumping down (e.g. onto or off furniture, into or out of a car)	
5. In the past 7 days, my dog has had difficulty climbing up and or down steps or stairs	
6. In the past 7 days, my dog has had difficulty getting into the right position to toilet	
7. In the past 7 days, my dog has appeared stiff in the morning	
8. In the past 7 days, my dog has appeared stiff after activity (e.g. a walk or play)	
9. In the past 7 days, my dog has wanted to go on walks or play	
10. In the past 7 days, my dog has made sounds to show distress (e.g. groans, moans, whimpering)	
11. In the past 7 days, my dog has appeared happy	
12. In the past 7 days, my dog has appeared restless	
13. In the past 7 days, I have felt sad because of my dog's arthritis	Owner Quality of Life
14. In the past 7 days, I have felt worried because of my dog's arthritis	
15. In the past 7 days, I have felt guilty because of my dog's arthritis	
16. In the past 7 days, my dog's arthritis has impacted my social interactions with friends or other dog owners	
17. In the past 7 days, my dog's arthritis has impacted my exercise activities (e.g walking)	
18. In the past 7 days, my dog's arthritis has impacted my day-to-day activities	Treatment Satisfaction
19. In the past 7 days, my dog's arthritis has impacted my sleep	
20. I find it easy to fit my dog's most recently prescribed arthritis treatment into my daily life	
21. I am satisfied with how often my dog receives his/her most recently prescribed arthritis treatment	
22. I am satisfied with the way my dog is given his/her most recently prescribed arthritis treatment	
23. My dog's most recently prescribed arthritis treatment is worth the financial cost	
24. I am satisfied with my dog's most recently prescribed arthritis treatment	

Conclusions:

- The study highlights the significant impact of canine OA on the QoL of both the dog and their owners.
- This study provides evidence that the 24-item CaOA-QoL-TS instrument (v3.0) has strong content and construct validity and reliability to assess canine QoL, owner QoL and treatment satisfaction in Canine OA.
- The instrument can either be administered in its entirety or each domain can be used as an independent tool to inform veterinary decision making, support stakeholder communications in the field of pain management, and/or to support study endpoints in future clinical research in canine OA.

*The Treatment Satisfaction domain was not assessed for convergent validity, known-groups validity, ability to detect change over time, and within-group meaningful change thresholds due to a lack of available anchors.

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 2. Belshaw Z, Dean R, Asher L. Slower, shorter, sadder: a qualitative study exploring how dog walks change when the canine participant develops osteoarthritis. *BMC Vet Res.* 2020;16(1):85.
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