

Evaluating the reliability of the Ovako Working Posture Assessment System (OWAS) to characterize firefighter injury risk using Dartfish video analysis software

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Firefighter Statistics

- Job demands: repetitive and heavy load handling tasks¹
- Musculoskeletal Workplace Injuries: 65% strains and sprains
- Claim Expenses: \$500 000 (Alberta 2012)²
- Clinician Challenges for Risk Assessment
- Risk Assessment Tools
 - REBA
 - RULA
 - OWAS
 - NIOSH lifting equation



Ovako Working Postures Assessment System (OWAS)

- Widely used as a postural risk assessment tool
- Developed in Finland (1973)³
- Assess: Workload of manual handling tasks in the steel industry
- Clinically: Easy to use, valid, good intra-rater reliability^{3,4}



Dartfish

- A kinematic video analysis software used for dynamic observational assessment of work-related tasks^{1,5}
- Clinically: an ideal tool for analysing firefighter postures and providing ergonomic feedback
- Valid and reliable^{6,7}



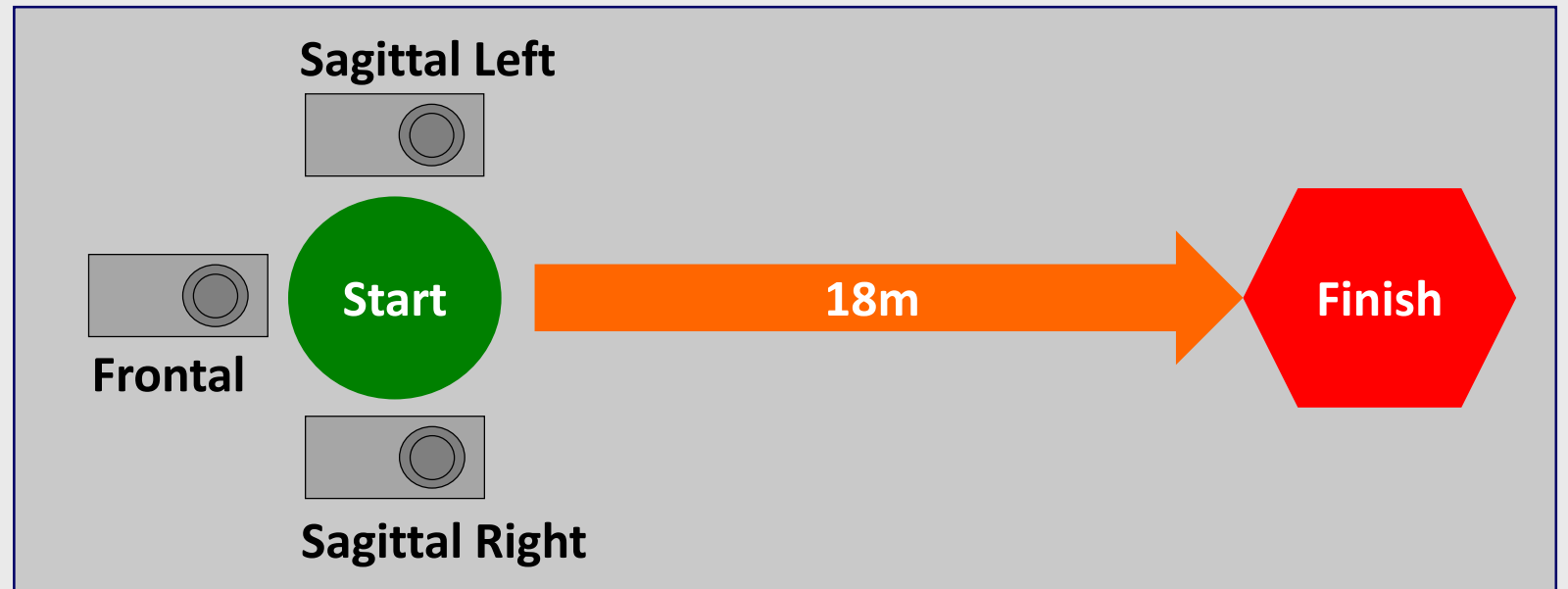
Purpose

- 1) Establish the inter-rater reliability of OWAS using Dartfish
- 2) Determine how inter-rater reliability of video-based OWAS scores is affected by the plane of filming



Methods

- Population: 20 active-duty firefighters
- Task: Hose Drag
- Camera Views
 - I. Sagittal Left
 - II. Sagittal Right
 - III. Frontal



Phases of the Hose-Drag Task



OWAS Scoring

OWAS Scoring: 3 raters performed separate scoring

- By phase
- By camera views

OWAS Action Categories (ACs)

- AC 1: Normal postures, no special attention required;
- AC 2: Postures must be examined
- AC 3: Examination required within a short period of time;
- AC 4: Urgent re-examination and modification



OWAS

Task: 1

Description of the task:

% time in this task: %

Back (Task 1)

1. Straight
2. Bent
3. Twisted
4. Bent and twisted

Arms (Task 1)

1. Both arms below shoulder level
2. One arm at or above shoulder level
3. Both arms at or above shoulder level

Legs (Task 1)

1. Sitting
2. Standing on two straight legs
3. Standing on one straight leg
4. Standing or squatting on two bent legs
5. Standing or squatting on one bent leg
6. Kneeling
7. Walking

Load (Task 1)

1. Less than 10 kg (22 lb)
2. Between 10 - 20 kg (22 - 44 lb)
3. Greater than 20 Kg (44 lb)

RESULT (Task 1)

SAVE

DATABASE

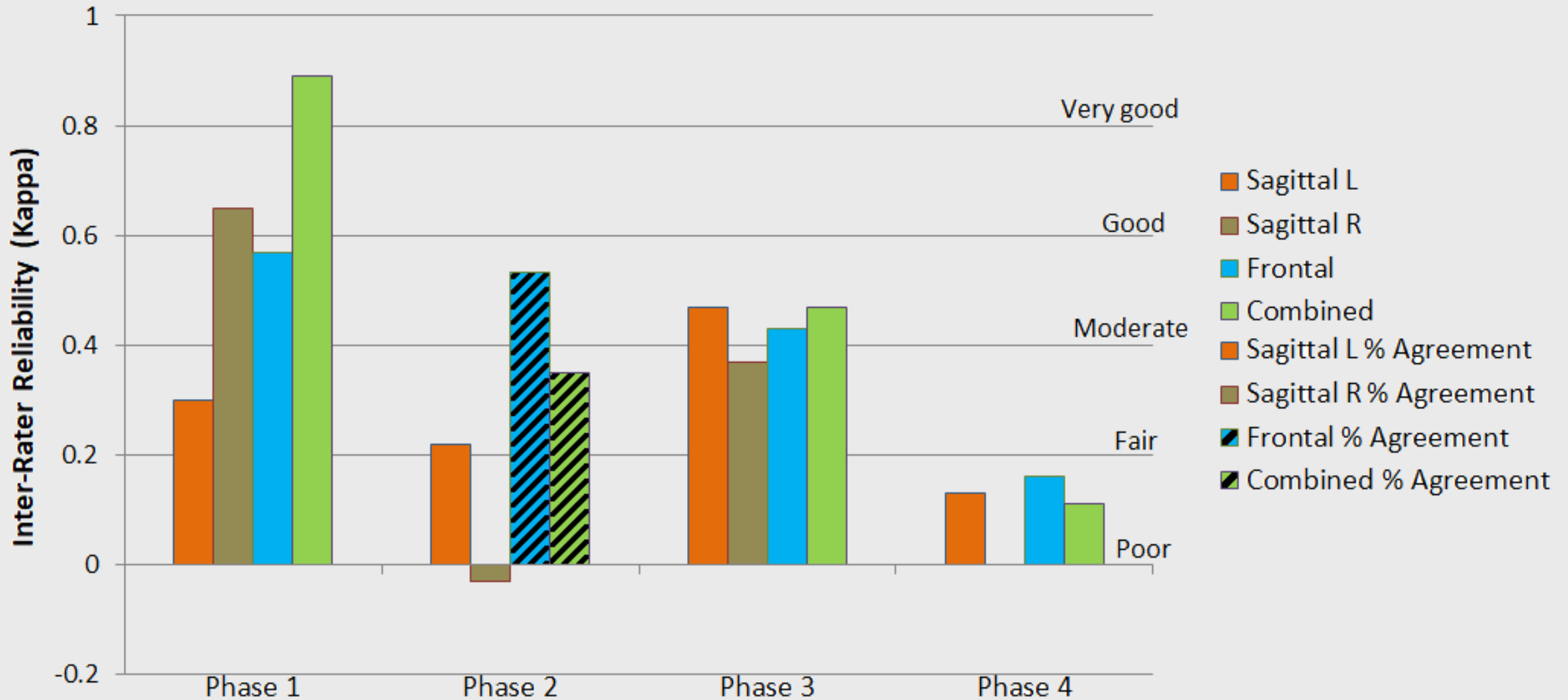
INFORMATION

Statistical Analysis

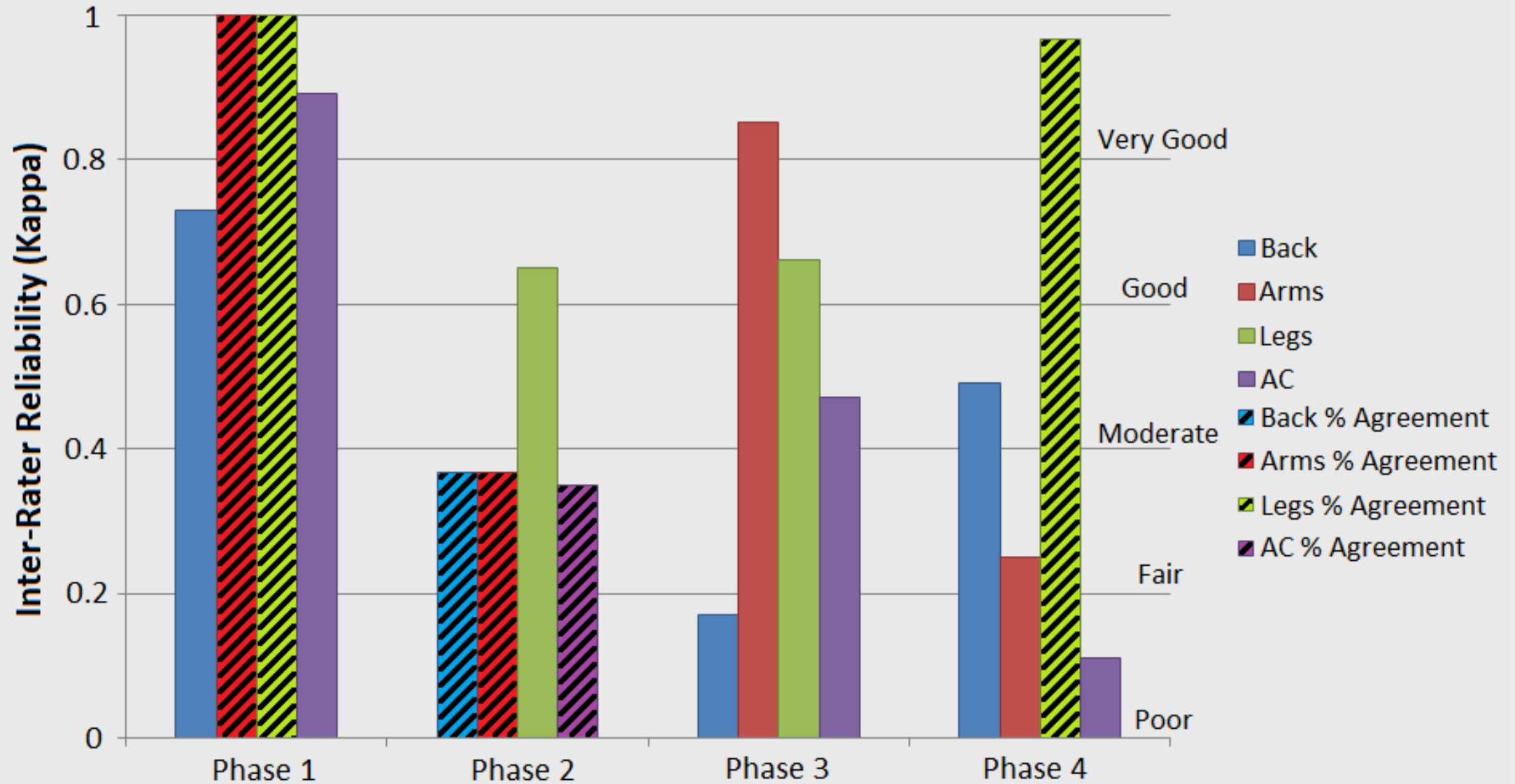
- Relative Inter-Rater Reliability:
 - Cohen's kappa with quadratic weighting
 - % Agreement (when lack of variance prevented Cohen's kappa calculation)
- Reliability analyzed separately by:
 - Phase of the hose drag task
 - Camera view



Inter-Rater Reliability between Camera Views



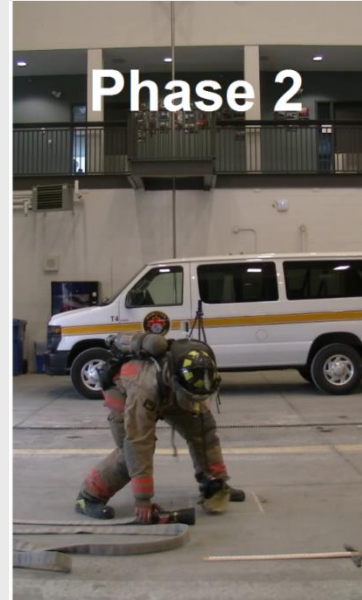
Inter-Rater Reliability between Postures



Discussion



- Simple, static posture
- Very good OWAS inter-rater reliability
- Reliability improved by using multiple camera views



- Complex, dynamic postures
- Poor to moderate OWAS inter-rater reliability
- Reliability not improved by using multiple camera views

- No trend in reliability among OWAS Postures Scores

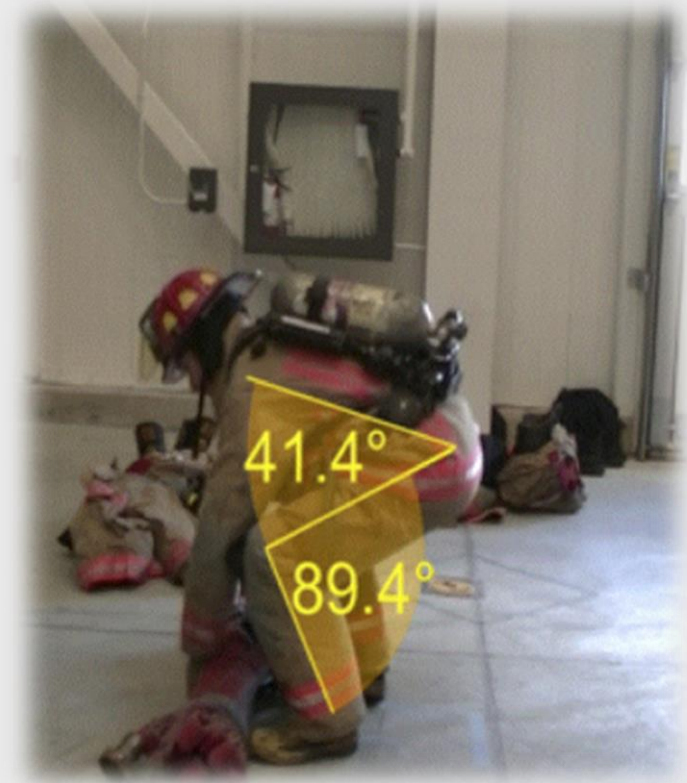
Study Limitations

- Previous studies have found good to very good OWAS inter-rater reliability ($\kappa > 0.6$)^{8,9}
- Limitations of our work:
 - Lack of standardized training
 - Lack of statistician blinding
 - Small sample size
 - Convenience sample
 - Data entry errors



Directions for Future Research

- Rapid Entire Body Assessment (REBA)
 - Detailed scoring system¹¹
 - Adept at scoring dynamic postures¹²
 - Not validated in firefighters
- Dartfish features
 - Angle tracking^{6,12}
 - Coordinate tracking



Conclusion

- Overall OWAS is not recommended for dynamic postural assessments (Inter-rater reliability: poor to moderate)
- Physiotherapists should use caution if utilizing OWAS to assess postural risk in firefighters
- Further research is required to determine the optimal risk assessment tool to be used in conjunction with the capabilities of Dartfish software



Thank you!

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- REBP6 Program Coordinator: Dr. Patricia Miller



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Questions?



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