**Results** Mean NMT warm-up exercise test scores were 72% (SD: 13%) for the control and 71% (SD: 13%) for the intervention workshop. Mean change in NMT warm-up self-efficacy scores were 0.98 (SD: 1.33) for the control and 1.77 (SD: 1.19) for the intervention workshop. Multivariable linear regression analyses indicated that workshop delivery method was not associated with the exercise test score (b= - 3.45, 95% CI: -10.80 to 3.91, $R^2$=0.13) but was associated with a greater difference in change of self-efficacy scores for the intervention workshop (b= 0.97, 95% CI: 0.26 to 1.89, $R^2$=0.13).

**Conclusions** A P2P learning technology integrated instructional workshop did not differentially impact coaches' ability to identify exercise errors, but it did increase coaches' self-efficacy in identifying exercise errors compared to a standard workshop.

## 439 BUMBLED VIBRATION: 144 HZ VIBRATION DOES NOT ENHANCE SHOULDER CONTROL

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**Background** Stability of the upper extremity is critical for injury prevention. Vibration may improve proprioception, reducing injury risk. However, traditional vibration methods may be expensive and require a significant level of skill by the technician.

**Objective** Our purpose was to investigate whether an acute bout of shoulder exercise performed with an inexpensive, user-friendly vibration toy ball (BumbleBall, Cardinal Laboratories) improves shoulder position sense and joint control.

**Design** Participants completed an acute bout of shoulder exercise with and without vibration on separate visits. Prior to the exercise bout, participants were assessed for motion sway (path length) using a custom iPhone application previously shown reliable. Path length was reassessed following the exercise bout. A 2-way repeated measures ANOVA was used to determine differences between conditions (vibration/no vibration) and time (pre/post). Significant main effects were examined using paired t-tests - $p < 0.05$.

**Setting** Liberal arts undergraduate institution.

**Patients (or Participants)** Thirty subjects (age 18–22) completed all trials. Subject level of activity ranged from non-athletes to collegiate athletes. Exclusion criterion was an upper extremity injury in the previous month.

**Interventions (or Assessment of Risk Factors)** Sessions started with an app measure. Each subject held the phone on the palm, arm forward at eye level for 20 seconds each arm for all trials. Each subject then completed a full can exercise set with the randomly assigned BumbleBall state (vibration/no vibration), and then repeated the app stability measure. The toy vibrates at 144 Hertz with an amplitude of 8 mm.

**Main Outcome Measurements** Average path length before and after use of the BumbleBall (vibration/no vibration) assessed this intervention.

**Results** There was a significant ($p=0.009$ and $\eta_p^2=0.27$) main effect of time. There were no significant ($p>0.05$) 2-way interactions between condition and time.

**Conclusions** The vibration of this inexpensive toy at 144 Hz did not improve shoulder proprioception.

## 440 EVALUATING EXERCISE FIDELITY DURING NEUROMUSCULAR TRAINING PROGRAMS USING WEARABLE TECHNOLOGY

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**Background** Evaluating exercise fidelity during neuromuscular training (NMT) warm-ups (i.e., completing prescribed repetitions and performing exercises correctly) is important to inform the dose-response relationship of warm-up programs. Wearable technology can be used to measure exercise fidelity.

**Objective** To determine the accuracy of measuring NMT exercise volume and quality with wearable technology.

**Design** Cross-sectional study

**Setting** Youth basketball; Calgary, Canada

**Participants** Twenty-seven youth basketball players

**Assessment of Risk Factors** Players wore a triaxial accelerometer on the lower back during an NMT warm-up with concurrent video recording. A trained observer (physiotherapist) used an observation tool to determine whether each athlete performed the prescribed exercise volume and rate posture.

**Main Outcome Measurements** The number of repetitions during running, skipping and jumping were extracted from the accelerometer signal using a custom peak detection algorithm and compared to the prescribed exercise volume. The algorithm accuracy was calculated as a percentage, with the trained observer evaluation through video-analysis considered the gold standard.

For the plank, participants were evaluated on 'Good Posture (straight body, head to ankle)' and received a score of 'Yes,' 'No,' or 'Partial.' The coefficient of variation (CV) of the accelerometer signal in all three axes was compared for the three fidelity assessment outcomes.

**Results** The algorithm had an accuracy of 100% for the running, skipping and jumping exercise volume.

Participants who scored 'Yes' had a lower CV in the medial-lateral (median: 47.2%) and vertical (42.3%) axes, than participants who scored 'Partial' (85.4% and 67.6%) and 'No' (115.1% and 115.5%). There were no differences in CV in the anterior-posterior axis.

**Conclusions** A custom algorithm can be used to measure the number of running, skipping and jumping repetitions. The variability of the accelerometer signal can identify postural changes during a plank. Accelerometer signals may be used to evaluate movement quantity and quality during NMT.

## 441 LONGITUDINAL CHANGES IN FORCE PLATE MEASURES ARE VALID INDICATORS OF MUSCULOSKELETAL HEALTH IN PROFESSIONAL AMERICAN FOOTBALL PLAYERS

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