Armstrong MJ, O'Connell DG, Barger BA, Brabham TD, Hansen CA, Lamm WS, Switzenberg BD. DETERMINING THE VALIDITY AND RELIABILITY OF EASY ANGLE® AND THE iPHONE MEASUREMENT APP FOR MEASURING SCAPULAR TILT. Hardin-Simmons University Department of Physical Therapy, Abilene, TX.

PURPOSE: To determine the validity, as well as the intra-rater and interrater reliability of the Easy Angle® and the iPhone Measurement app compared to a digital inclinometer (gold standard) in the measurement of scapular tilt. **SUBJECTS:** A convenience sample of 26 (M=11, F=15) graduate students with a mean age of 23.28 years +/- 1.34 were studied. One male participant was dropped from the study due to previous shoulder pathology. **METHODS:** Subjects provided informed consent and those with a Beighton score of >4 or a history of shoulder pathology were excluded from the study. Preliminary seated measurements (decreasing thoracolumbar compensation) included investigators palpating and marking two specific points on the scapula. Additionally, the height of the radial styloid process was marked on a PVC pole with the glenohumeral joint at 90º and 120º of flexion. Two investigators assessed subjects scapular tilt with a dynamic inclinometer (gold standard), the Easy Angle® and iPhone measuring app. The order of investigator's measures and measurement devices were randomized. Measurement devices were applied to the points marked on the scapula and anterior/posterior tilt was measured at a resting position, arm abduction at about 0º, 90º and 120º degrees of glenohumeral flexion. Three measurements, utilizing all three devices, were made at each angle with the arm positioned in shoulder flexion and again with the arm in shoulder scaption, defined as 30º laterally from flexion plane. Subjects performed these motions actively with cueing from an investigator. All devices were calibrated prior to each set of trials. Investigators were blinded to the scapular tilt data visible on each device which was recorded by a different investigator. Intraclass correlational coefficients (ICC) were computed to test the validity of the Easy Angle® and iPhone Measurement app, and to compare the measurements from the other devices to the measurements obtained from the dynamic inclinometer. ICCs were also computed to determine intra-rater and interrater reliability for each device. Statistical significance was set at $p \leq 0.05$. **RESULTS:** ICC's for Easy Angle® and the iPhone Measurement App for flexion were .905 and .917 and for scaption were .886 and .917, respectively. Intra-rater reliability ICC's ranged from .976 to .993 and .977 to .995 in flexion and scaption, respectfully. The interrater reliability ICCs for the measurement investigators ranged from .888 to .925 and .856 to .920 for the flexion and scaption plane, respectively. **CONCLUSIONS:** Findings revealed that the Easy Angle® and iPhone Measurement app were reliable and valid in measuring anterior-posterior (AP) scapular tilt when compared to the digital inclinometer between the same measurer. **CLINICAL RELEVANCE:** Valid, reliable measurement of scapular tilt have been clinically elusive. Clinicians may select either the Easy Angle® or iPhone Measurement App to obtain valid and reliable scapular tilt angles on their patients. Further research is needed to determine reliability and validity of the Easy Angle® and iPhone Measurement app in measuring scapular tilt in athletic, active and sedentary pediatric, adult, geriatric populations, as well as with patients with a variety of diagnosed pathologies, to determine external generalizability for a variety of different range of motions.