# CAO 61st Annual Scientific Session

CFAO Graduate Student Posterboard Abstracts – Sponsored by

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### THE VALIDITY AND RELIABILITY OF MIXED DENTITION ANALYSIS METHODS: A SYSTEMATIC REVIEW

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***Objectives:*** The purpose of this systematic review was to determine the best technique to perform a Mixed Dentition Analysis with regards to validity and reliability as well as any relevant factors which could influence the prediction.

***Methods:*** Papers were indentified from a search of seven online databases and evaluated based on technique modality: study models alone, radiographs alone, or combinations of study models and radiographs.

***Results:*** 460 papers were identified and ultimately distilled to 32 papers after application of specific inclusion criteria.

***Conclusions:*** Our findings indicate that all mixed dentition analysis techniques and modalities have high reliability. All modalities have positively correlated validity, but there appears to be no difference in terms of overall validity between modalities. The predictions based on combinations of study models and radiographs have the lowest variability in overall validity; radiographs alone have higher variability in overall validity; study models alone have the most variable overall validity. Dimorphisms based on ethnicity, jaw, gender, or side do not appear to have any meaningful influence on the validity of mixed dentition analysis methods.

### TOOTH LENGTH MEASUREMENT ACCURACY WITH FILM AND CBCT PANORAMIC RECONSTRUCTIONS

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***Objectives:*** 2-D panoramic images (film and digital) have been used to identify and monitor changes in root length and morphology during orthodontic treatment. Magnification, overlapping anatomy, and variations in patient and tooth position lead to unreliable results. Cone beam computed tomography (CBCT) images correct the aforementioned limitations when viewed in 3-D volumes. Third party imaging suites also can also reconstruct CBCT data into panoramic images. This study compares the accuracy of panoramic images from film and CBCT reconstructions with direct caliper measurements for tooth length.

***Methods:*** Prior to extraction of 48 premolar teeth, CBCT images were taken and panoramic radiographs reconstructed using Dolphin Imaging. Film panoramic radiographs previously taken for orthodontic screening, were scanned and calibrated for digital tooth length measurement. The extracted teeth were measured for length by micro-calipers to provide a "true" measure of length for comparison.

***Results:*** Panoramic radiographs produced images with tooth sizes that were clinically (‡ 1mm) and statistically significantly different in length compared to their true length ($p < 0.001$). Panoramic reconstruction from CBCT volumes resulted in tooth lengths 1.6mm (95% C.I.: 1.1, 2.0) longer than direct caliper measurement, while film panoramic images resulted in measurements 6.3mm (95% C.I.: 5.6, 7.1) shorter.

***Conclusions:*** Although more accurate than 2-D imaging, panoramic reconstructions from 3-D volumes represent significantly different length measurements compared to extracted teeth measured directly. Clinicians must exercise caution when attempting to infer tooth length changes from panoramic images from 2-D and 3-D sources.