OBJECTIVES
The majority of FAI literature focuses on patients greater than 18 years of age with little data addressing FAI etiology, radiographic parameters and intraoperative findings in the adolescent age group. Morphological differences between male and female adolescents with FAI have not been examined, nor is there a good understanding of the degree of potential intra-articular pathology linked to their condition. We compared male and female adolescents who underwent hip arthroscopy for FAI to ascertain radiographic and intraoperative differences. The purpose of our study is to determine if adolescent males have more preoperative bony hip abnormalities and more severe acetabular cartilage pathologies than adolescent females.

METHODS
We retrospectively reviewed the records of 177 adolescents, 13 to 18 years of age, who were treated for FAI with hip arthroscopy. We examined and analyzed preoperative MRI and plain radiographs, measuring lateral center edge angle, Tonnis angle, and alpha angle and then compared these measurements with intraoperative findings. The intraclass correlation coefficient between readers was calculated. We created multiple linear regression models incorporating age, gender and BMI with the radiographic measurements as outcomes to evaluate differences while controlling for other variables. Intraoperative findings utilizing the Outerbridge grading system and procedure performed were documented. We compared these findings with our preoperative imaging measurements using the Chi-squared test and the Wilcoxon rank-sum test when appropriate.

RESULTS
The intraclass correlation coefficient demonstrated moderate to strong agreement between the three image readers. The BMI and age adjusted mean alpha angle was higher in males than females on both plain radiograph (55.9° versus 45.2°; p < 0.0001) and MRI (54.1° versus 42.5°; p < 0.0001). 38.9% of males demonstrated an alpha angle of > 55° compared to only 1% of females (p=0.0041). The lateral center edge angle and Tonnis angle on MRI and plain radiograph displayed no statistically significant differences between genders after controlling for BMI and age. Males were more likely to have chondral damage intraoperatively (56.3% versus 32.5%; p=0.0041) with no differences seen in labral pathology.

DISCUSSION
Our study is the only published data to date that has evaluated intraoperative findings in conjunction with preoperative imaging in the adolescent population. Mirroring the adult literature, we found significantly higher MRI measured alpha angles in males with an age and BMI adjusted mean of 54.1° in males versus 42.5° in females (p=0.0001). With the majority of orthopaedic literature citing an alpha angle >55° as the threshold for deformity, we found that symptomatic males were almost 40 times more likely to have cam-type morphology (38.9% versus 1%; p=0.0001). Chondral injury was seen more often in males (56.3% versus 32.5%; p=0.0041). Males were on average 16.8 years old who underwent femoroplasty while the average age of males that did not receive a femoroplasty was 15.3 years of age, an age which is generally considered to be physically immature. More studies are needed to truly ascertain if there is a subclinical physeal injury that creates a cam deformity. Regarding the lateral CEA, although the percentage of patients that underwent acetabuloplasty was higher in those with >40° versus those <40°, there was no statistical difference (69.2% versus 50.6%; p=0.1911). Our study showed no statistical difference between genders in mean lateral CEA and Tonnis angle.

CONCLUSIONS
In summary, distinct differences between sexes were seen on both preoperative imaging and at the time of hip arthroscopy. We found that males with FAI displayed a larger mean alpha angle, and therefore a more severe cam-type deformity, than females. Males were 20% more likely to have chondral injury than females. Longitudinal studies are needed to ascertain if such evidence at a young age will predispose the patient to early onset degenerative hip disease.

Contact Information:
Ryan Goodwin, MD – goodwinr@ccf.org
Perry Hooper, DO – hooperp@ccf.org