

Functional Movement Screen Test and Injury Report



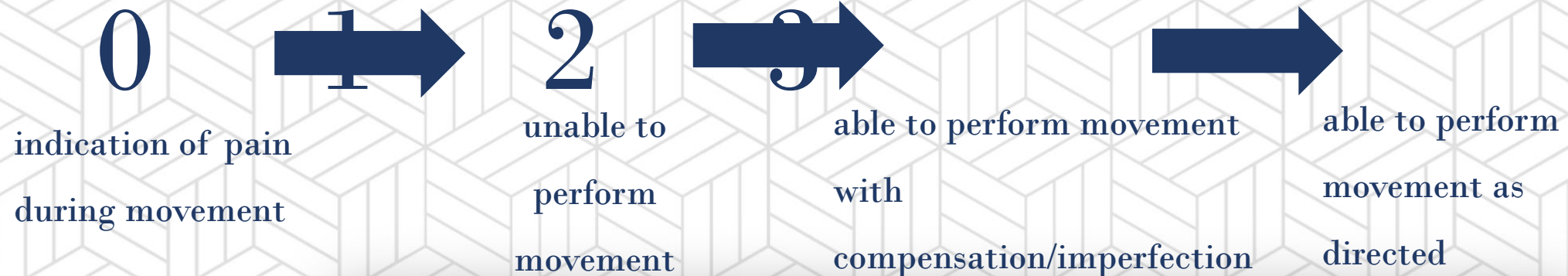
Background Information

- ❑ Functional Movement Screen(FMS) Test
- ❑ Developed in 1997 by Lee Burton, Gray Cook, and Kyle Kiesel
- ❑ Assesses quality of fundamental movement patterns to identify an individual's limitations or asymmetries
- ❑ Basic movements to simultaneously test range of motion, stability, and balance
- ❑ FMS is supposed to be proactive in injury prevention NOT predictive of injuries



FMS Fundamentals

- Seven basic movement tests
- Each test is scored on a scale of 0-3



Project Purpose

- Butler uses the FMS test to see where athletes might be vulnerable to injury
 - Uses this information to give athletes exercises or stretches to improve their weaknesses
- As the athlete stays in Butler's program, the hope is that their FMS scores would improve
- There was a study done in the early 2010s in the NFL that states athletes are 11x less likely to get hurt if they score above a 14 on the FMS
 - Interested to see if this stands for Butler Athletics



Questions

- Is there a difference in FMS scores by class year?
- Is there a difference in FMS scores by positions?
- Is there a difference in FMS scores by top performing athletes?
- Do athletes that have higher FMS scores get injured less?



Teams and Years of Available Data

☐ Baseball (F'20-S'22)



☐ Basketball- Women (F'19-S'23)



☐ Cross Country- Men (F'19-F'22)



☐ Cross Country- Women (F'19-F'22)



☐ Football (F'19-F'22)



☐ Soccer- Men (F'20-F'22)

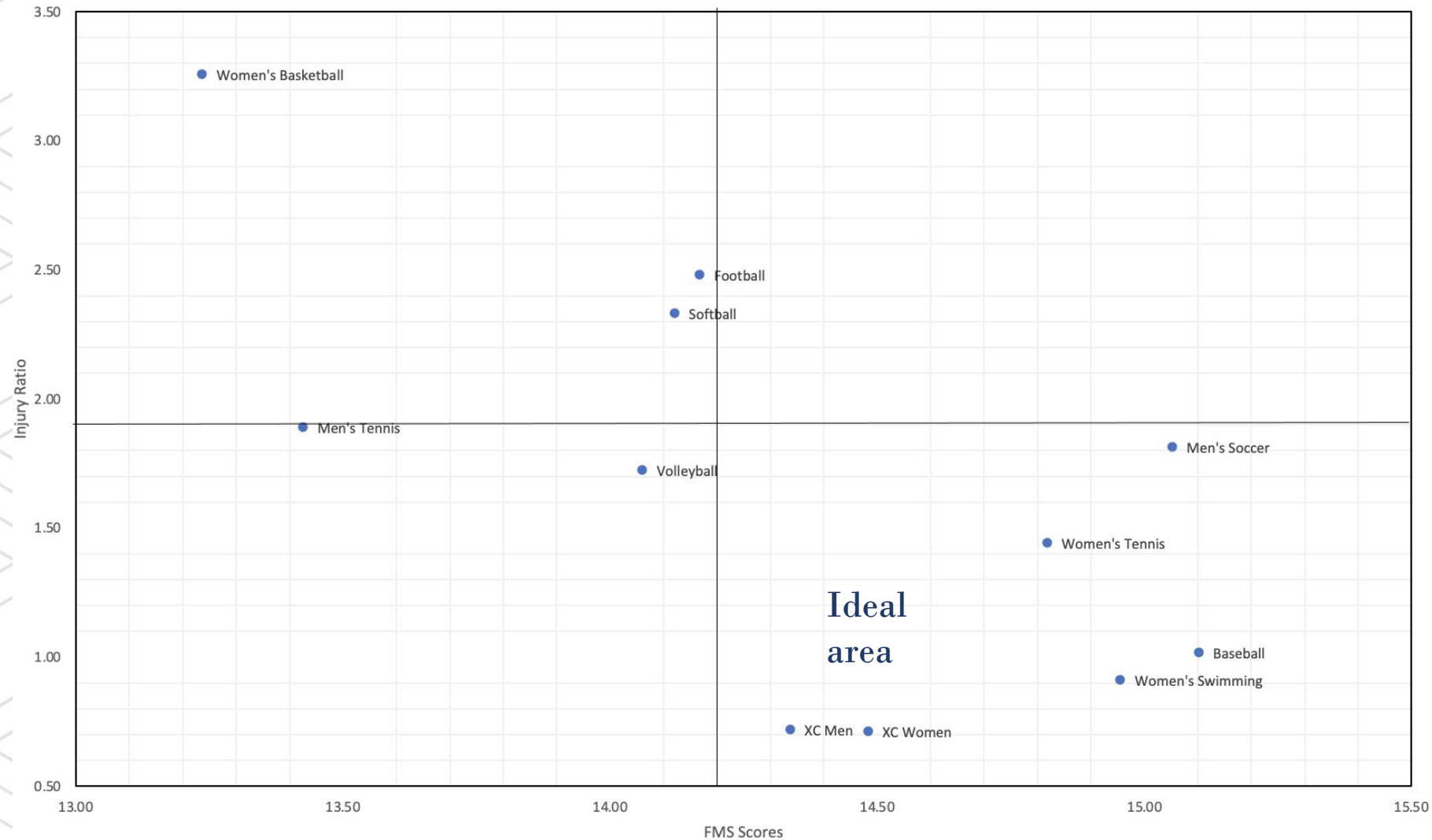


☐ Softball (F'20-S'22)



Team Comparisons

Injury Ratio versus Average FMS Scores



□ Women's basketball had the lowest FMS scores and the highest average injury count



Team Comparisons

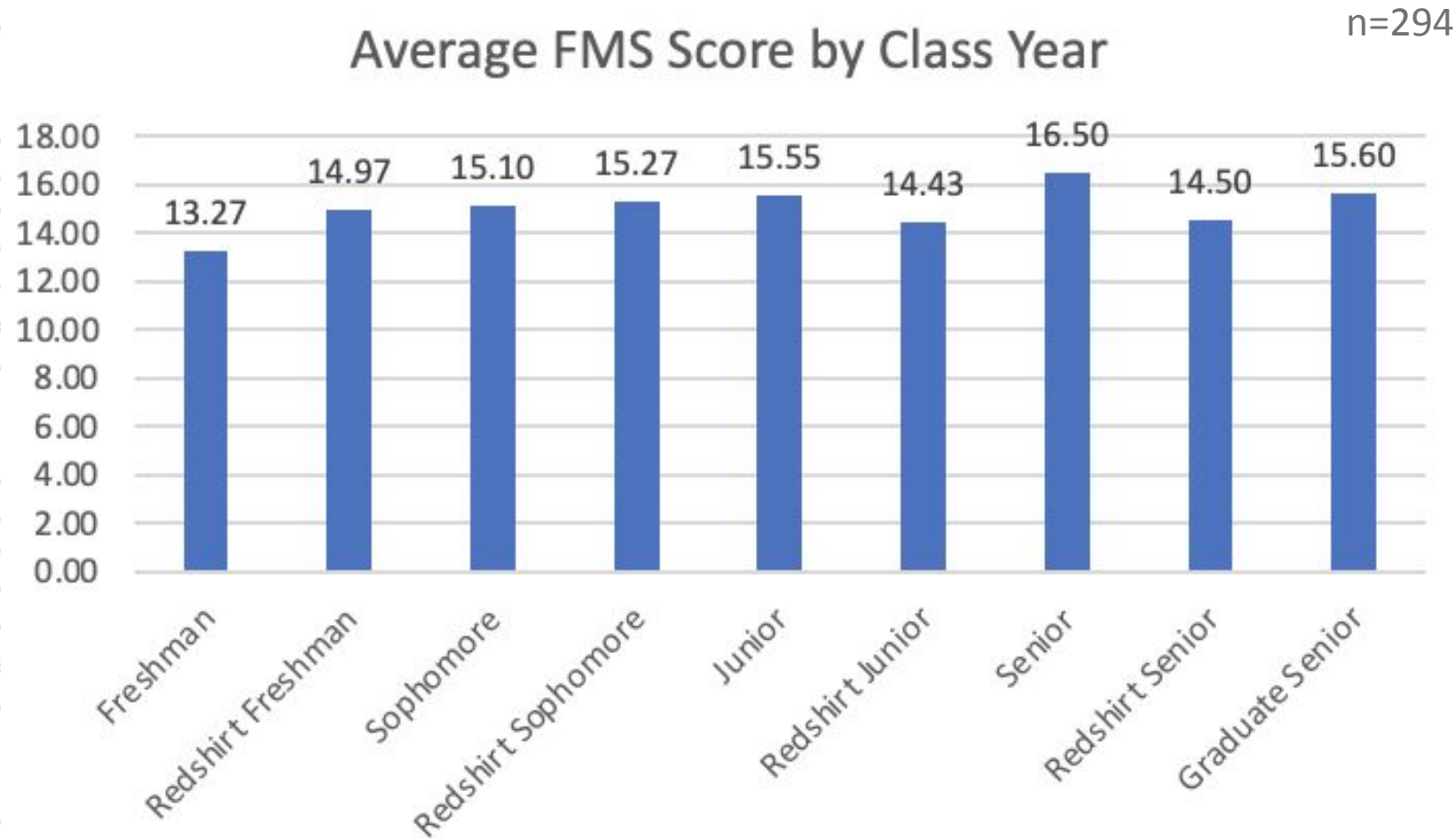
Movement Name	Minimum	Maximum
Overhead Squat	Women's Basketball- 1.39	Baseball- 2.11
Hurdle Step	Softball- 1.85	Volleyball- 2.25
Inline Lunge	Women's Basketball- 1.85	Volleyball- 2.40
Shoulder Mobility	Football- 2.03	Women's Tennis- 2.94
ASLR	XC Men- 2.30	Women's Tennis- 2.91
Pushup	Women's Basketball- 1.44	Men's Soccer- 2.63
Rotary Stability	Volleyball- 1.29	Women's Swimming- 1.73
Total	Women's Basketball- 13.24	Baseball- 15.14



Is there a difference in
FMS scores by class
year?



Football Results

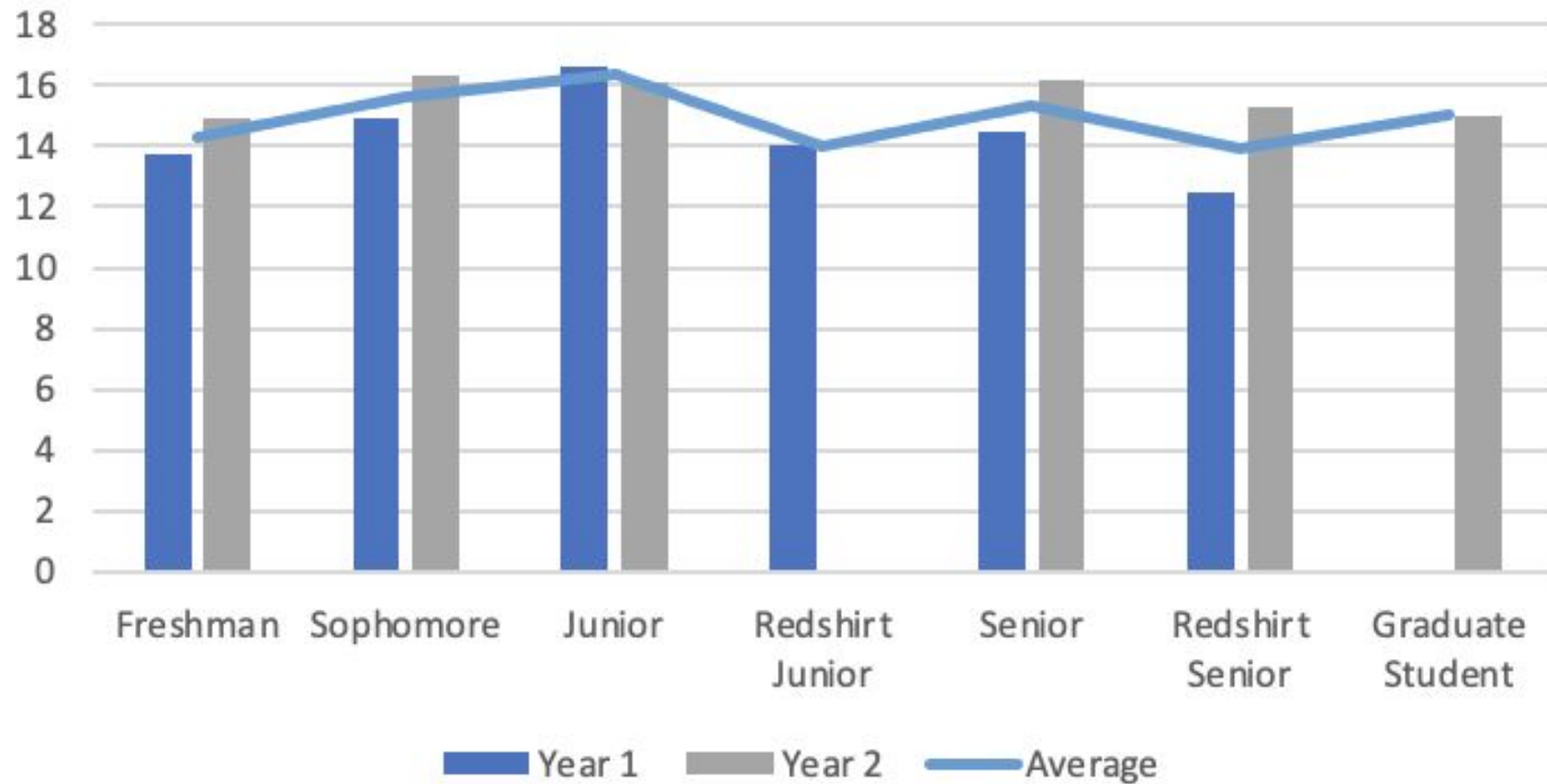


- ❑ No indication that the older players are the higher score the receive
- ❑ Highest average class year was Senior at 16.5
- ❑ Lowest average class year was Freshman at 13.27



Baseball Results

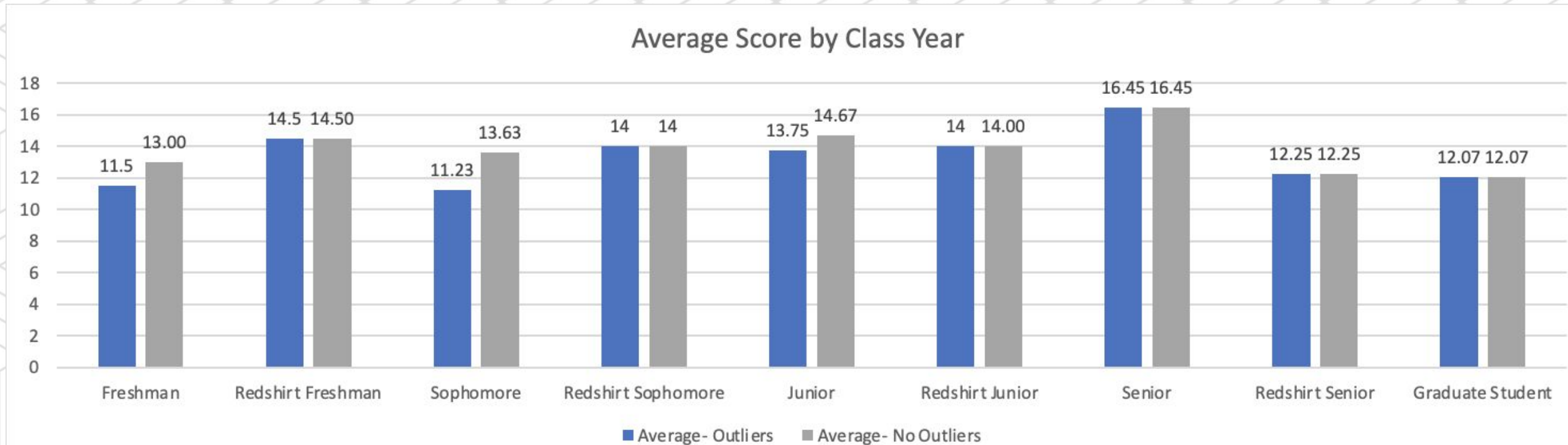
Average FMS Scores by Class Year



- ❑ No indication that the older players are the higher score the receive
- ❑ Highest average class year was Junior at 16.35
- ❑ Lowest average class year was Redshirt Senior at 13.90



Women's Basketball Results

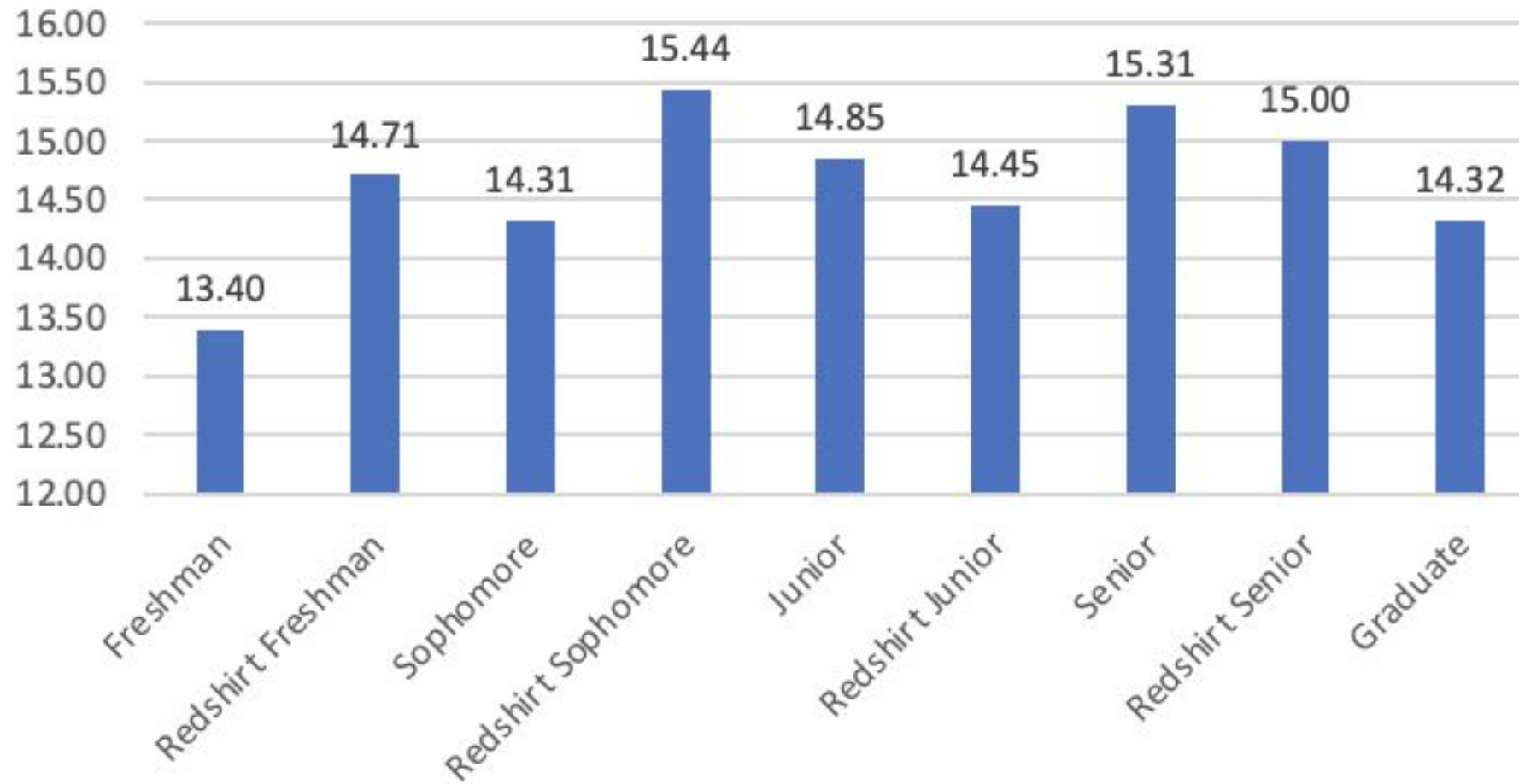


- ❑ No indication that the older players are the higher score the receive
- ❑ Lowest average class year was Sophomore at 11.23(with outliers) and Graduate Student at 12.07 (without outliers)
- ❑ Highest average class year was Senior at 16.45 (for both with and without outliers)



Overall Results

Average FMS Score by Class Year- All Sports



- The highest average class year was Redshirt Sophomore at 15.44
- The lowest average class year was Freshman at 13.40



Is there a difference in FMS scores by class year?

Yes, there are differences in average scores
by class year but it does not grow linearly.

The lowest average class was Freshman at
13.40 and the highest was Redshirt

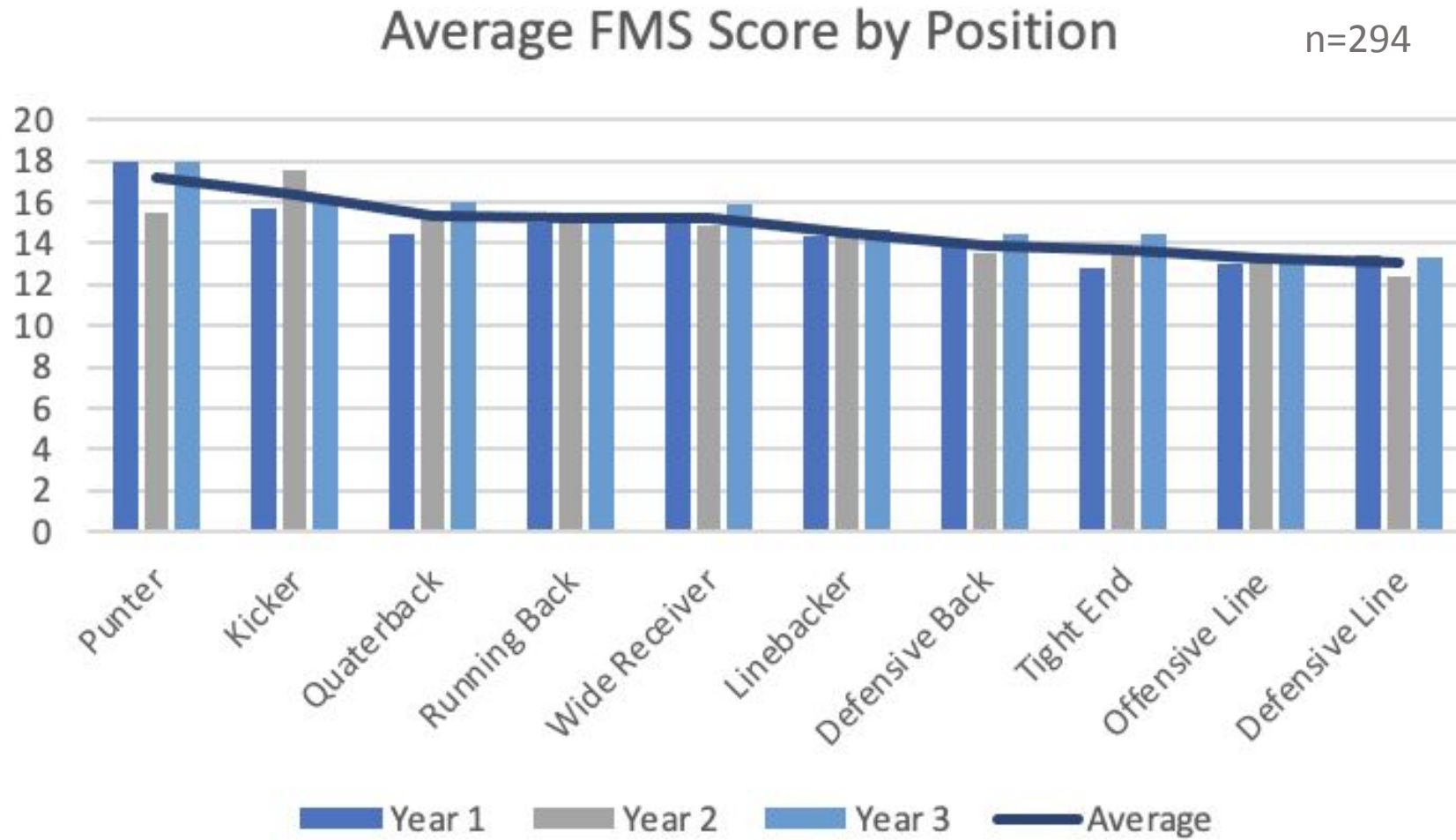
Sophomores at 15.44



Is there a difference in
FMS scores by
positions?



Football Results

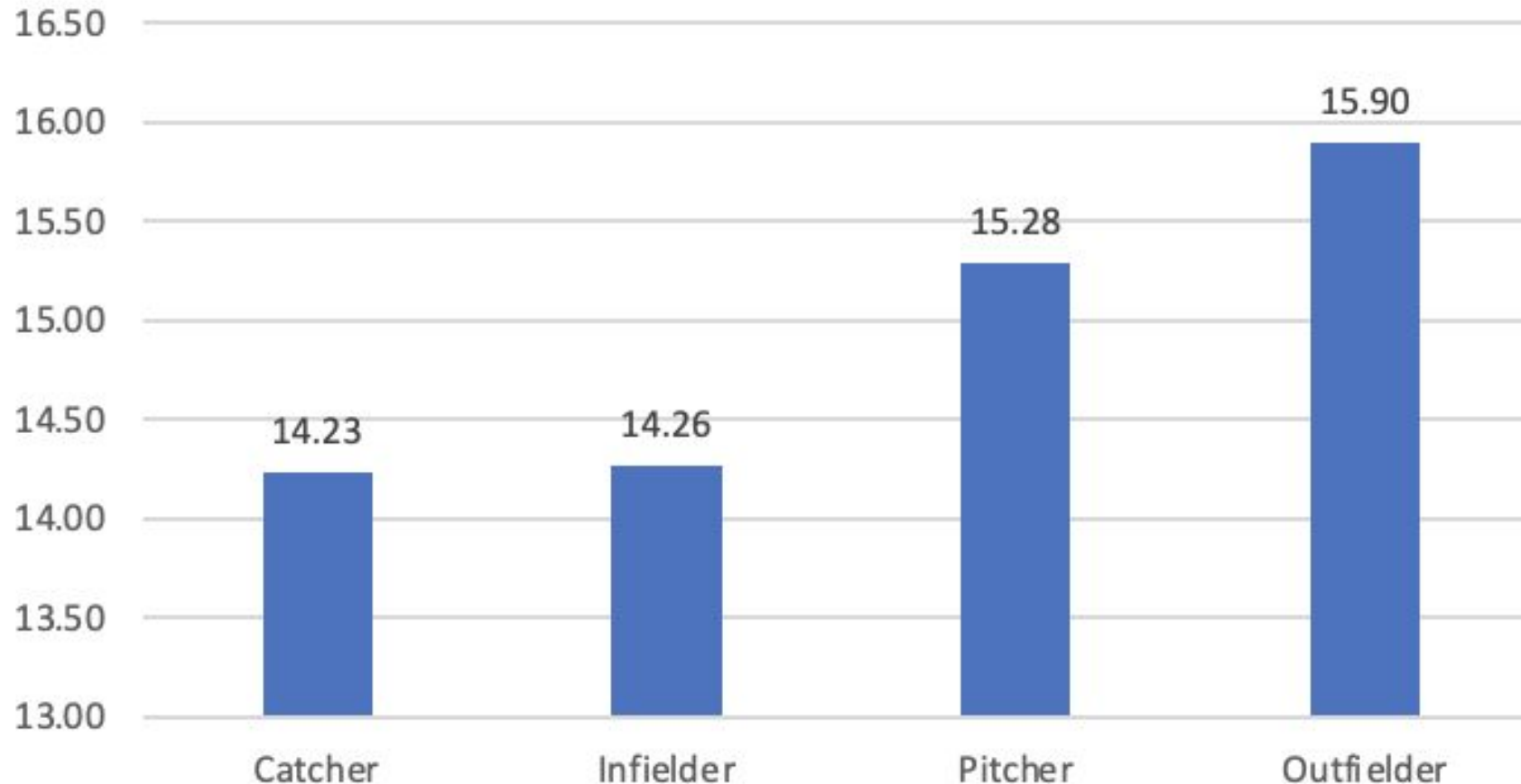


- There is an indication that there is a difference in score between positions
- Highest average positions were Punter and Kicker at 17.17 and 16.40
- Lowest average positions were the lineman at 13.03 (D) and 13.23 (O)



Baseball Results

Average FMS Score by Position



- There is an indication that there is a difference in score between positions
- Highest average position was Outfielder at 15.90
- Lowest average position was catcher at 14.23



Is there a difference in FMS scores by positions?

Yes, different positions in each sport garnered
different FMS scores

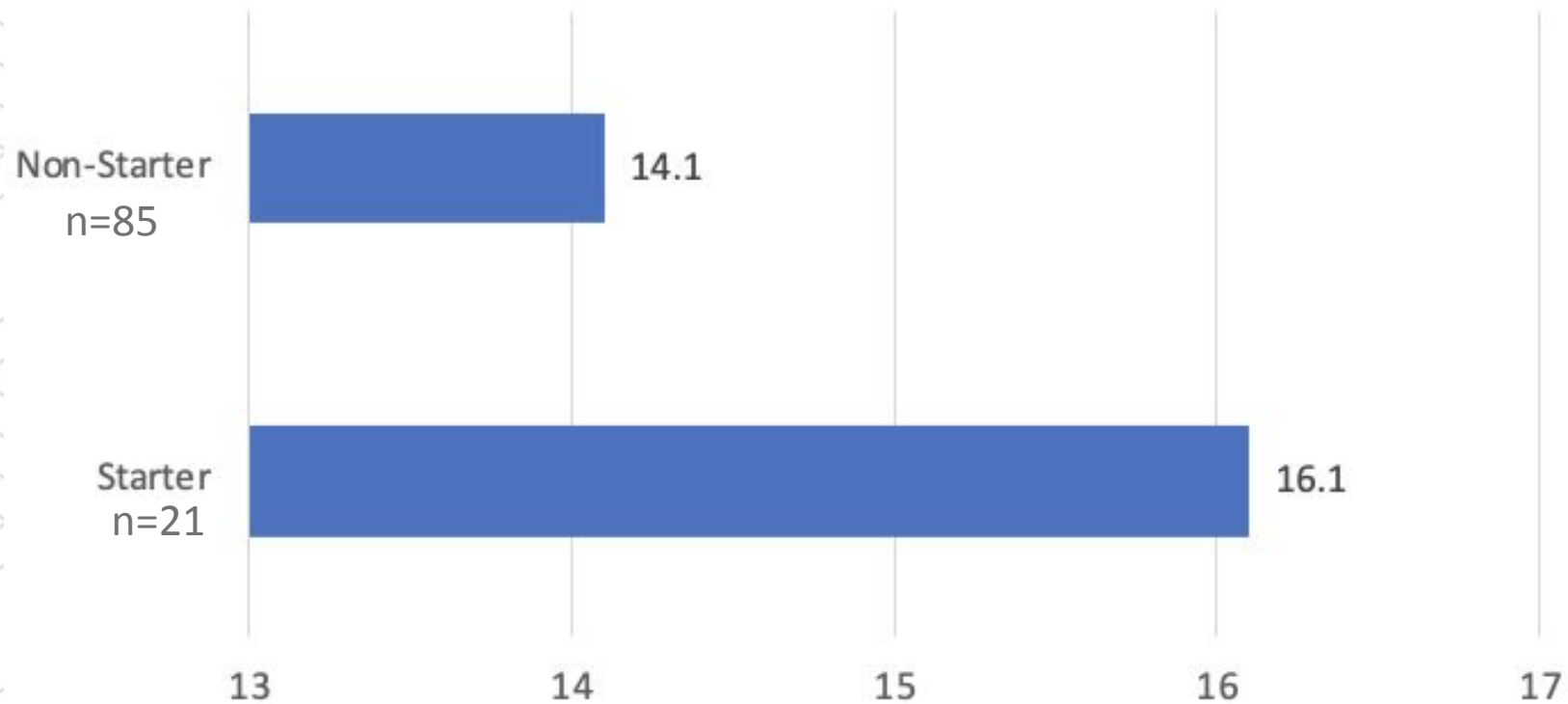


Is there a difference in
FMS scores by top
performing athletes?



Football Results

Average Score of Starters vs. Non-Starters
Football 2022



- There is an indication that there is a difference in score between starters and non-starters
- According to the t-test, this number is statistically significant



Is there a difference in FMS scores by top performing athletes?

Yes, looking at Football (starters vs. non-starters) and XC- Men (nationals vs. non-nationals), yes there was a difference. Football scored 16.1 versus 14.1 and XC- Men scored 15.7 and 14

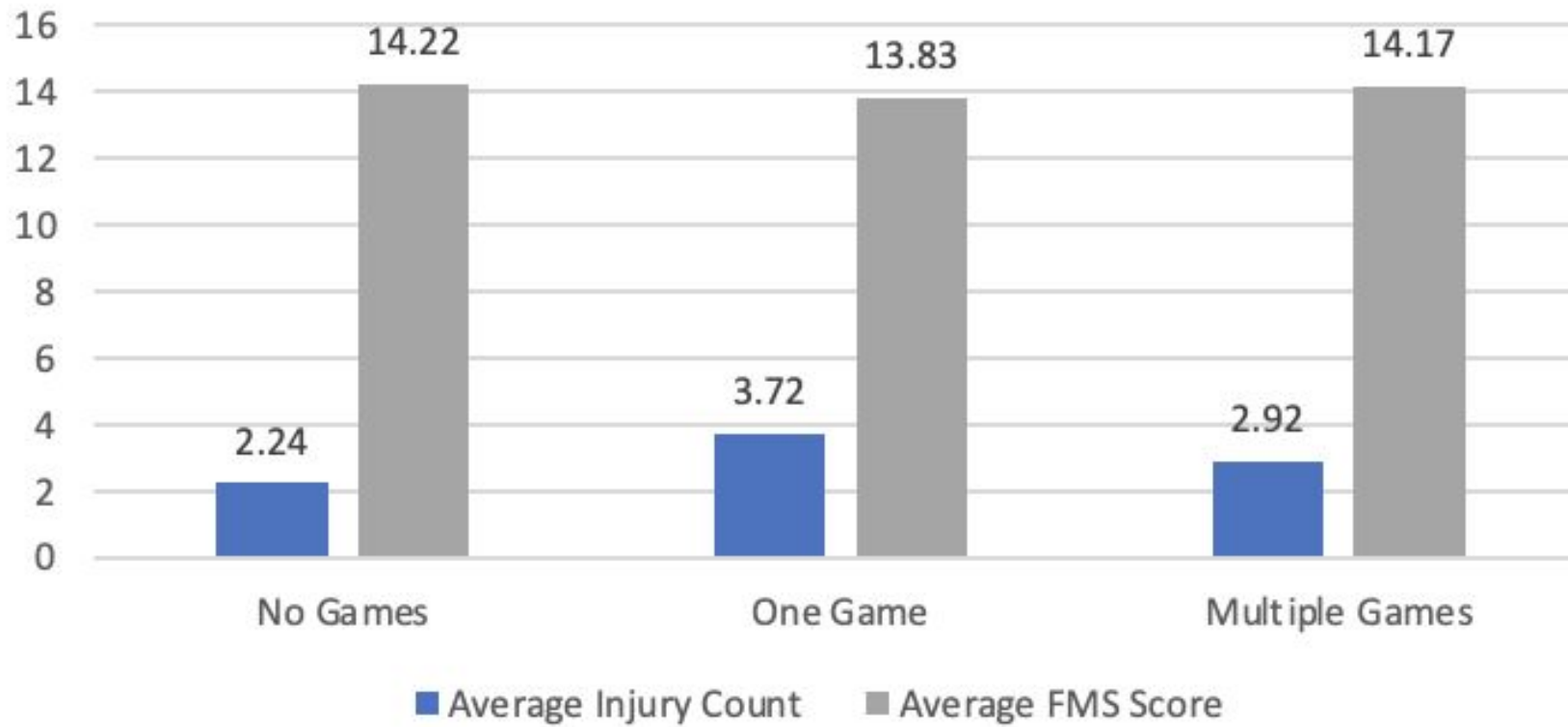


Do athletes that have
higher FMS scores get
injured less?



Football Results

Average Injury Count and FMS Scores Based on Games Missed

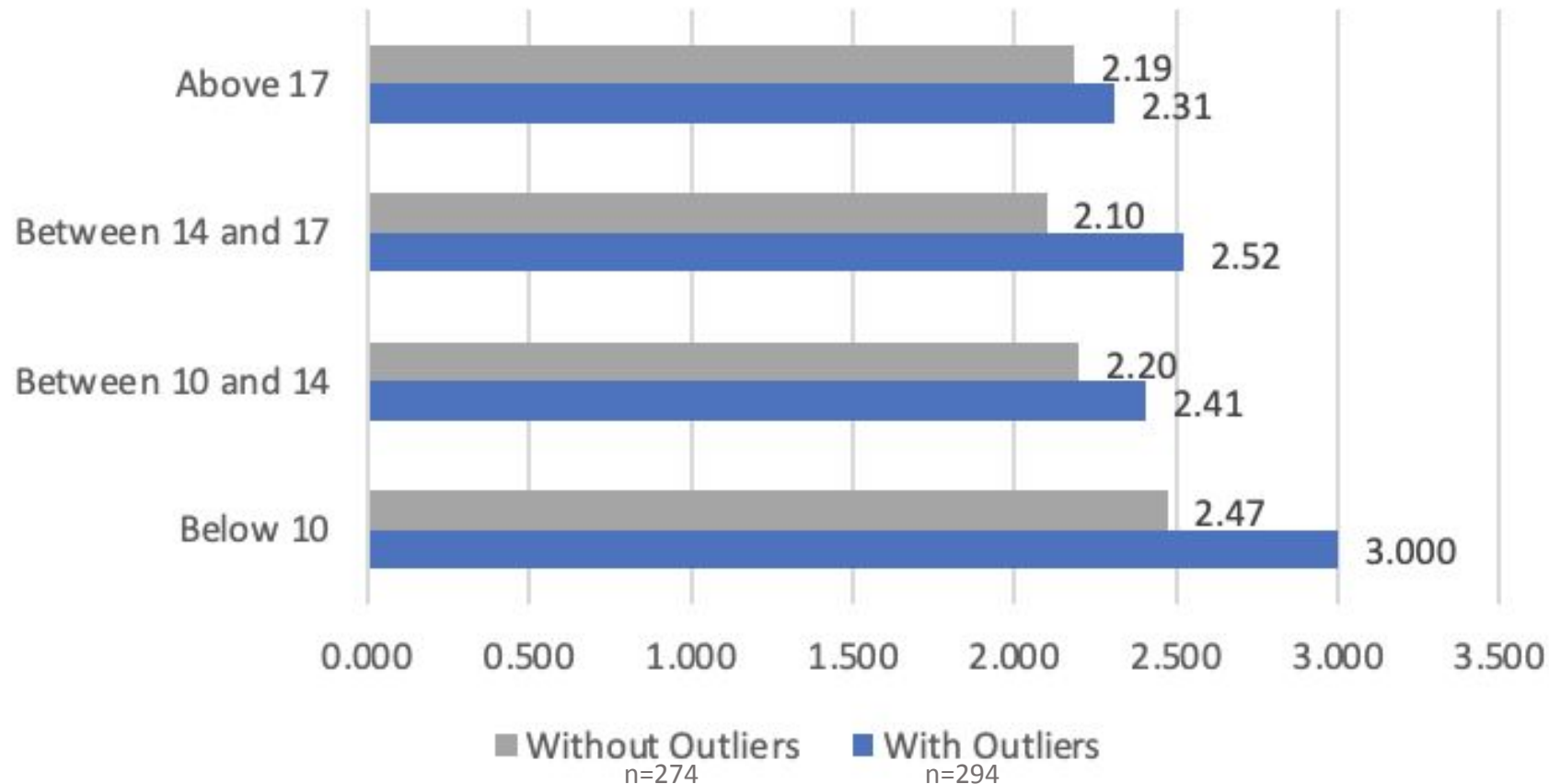


- Players that missed no games scored better on FMS and had less injuries than those that missed either one or multiple games
- Lower injury count for multiple games missed is because a major injury is only input as one injury record



Football Results

Average Injury Ratio Compared by Outliers

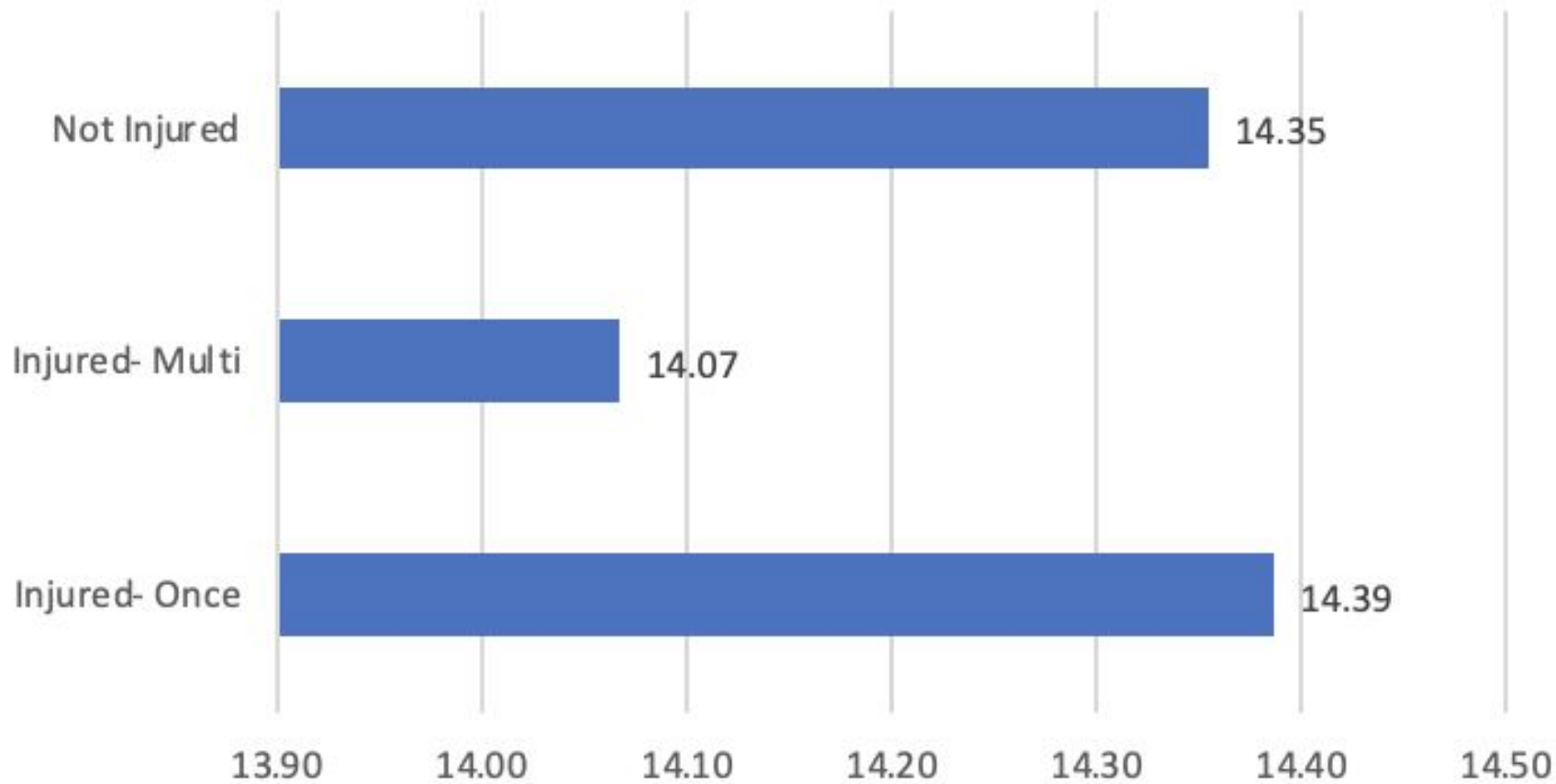


□ We can see that athletes that score higher tend to have less injuries, especially when outliers were removed concerning number of injuries



Football Results

Average FMS by Injury Rate

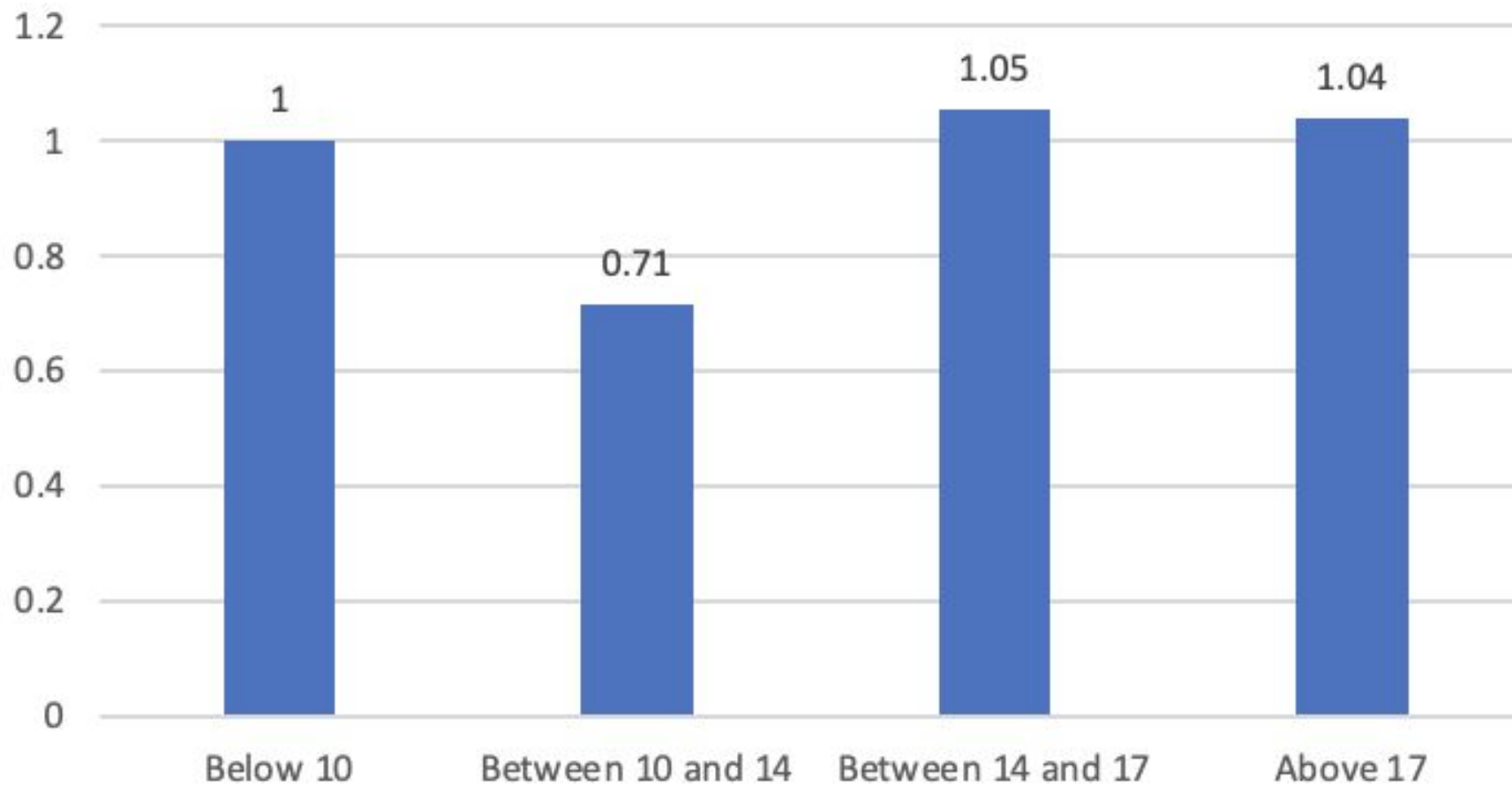


- We can see that there is a difference in FMS scores of football players who got hurt multiple times were lower than those injured once or not at all



Baseball Results

Average Injury Ration by FMS Scores

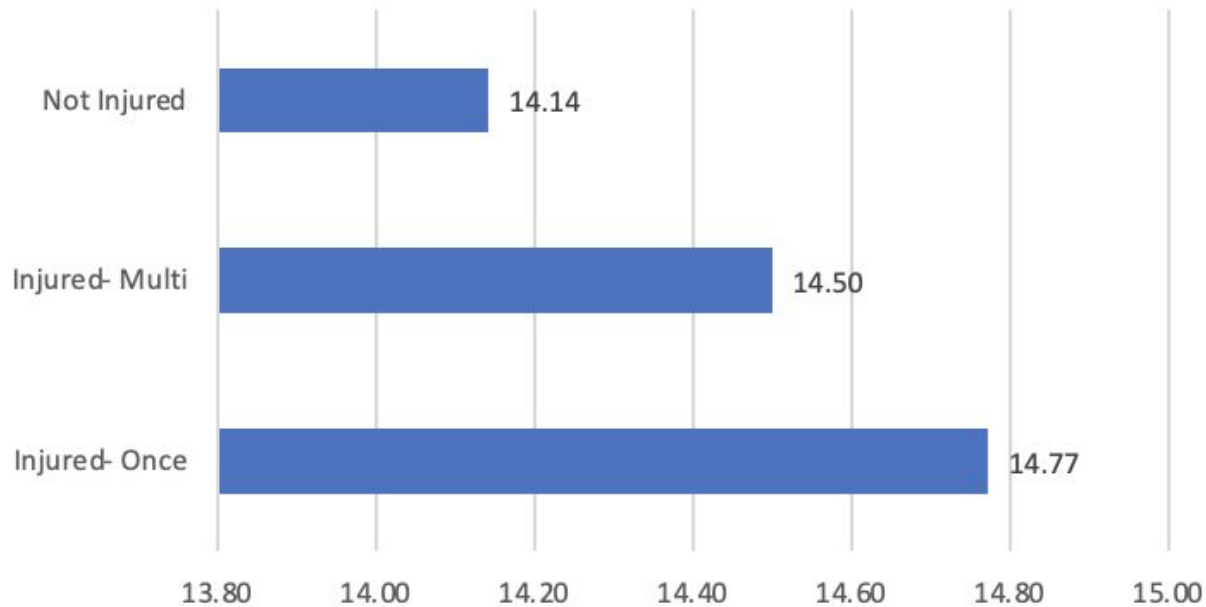


- There is no indication that injury ratios are lower the higher the FMS score is

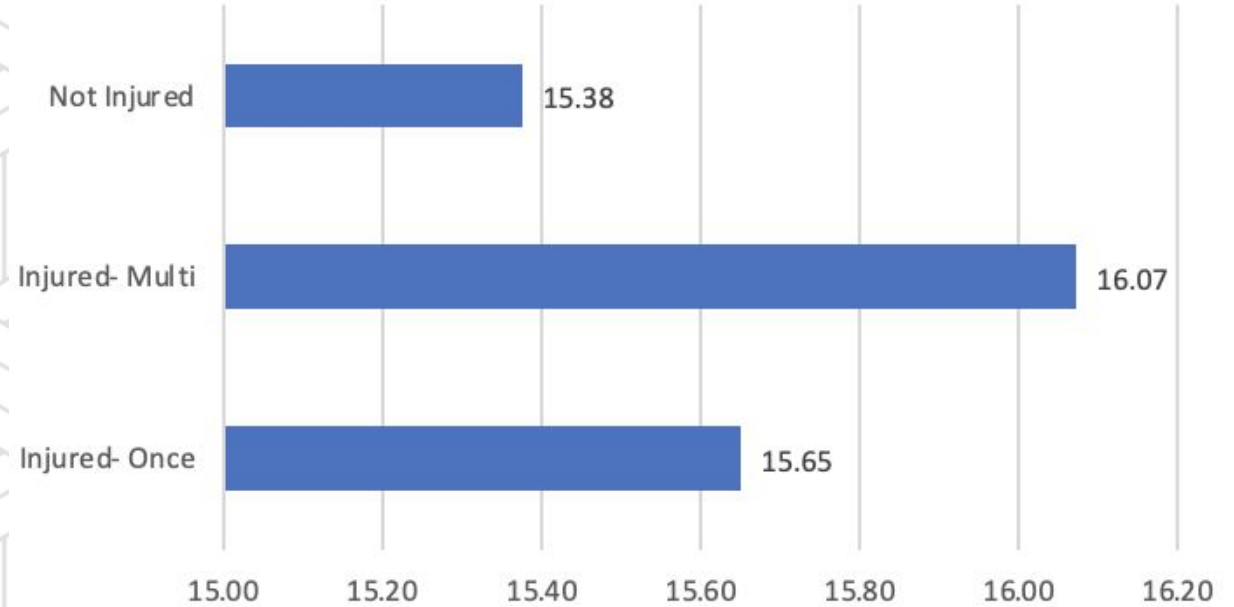


Baseball Results

Average Score by Injury Rate- 2021 Baseball



Average Score by Injury Rate- 2022 Baseball

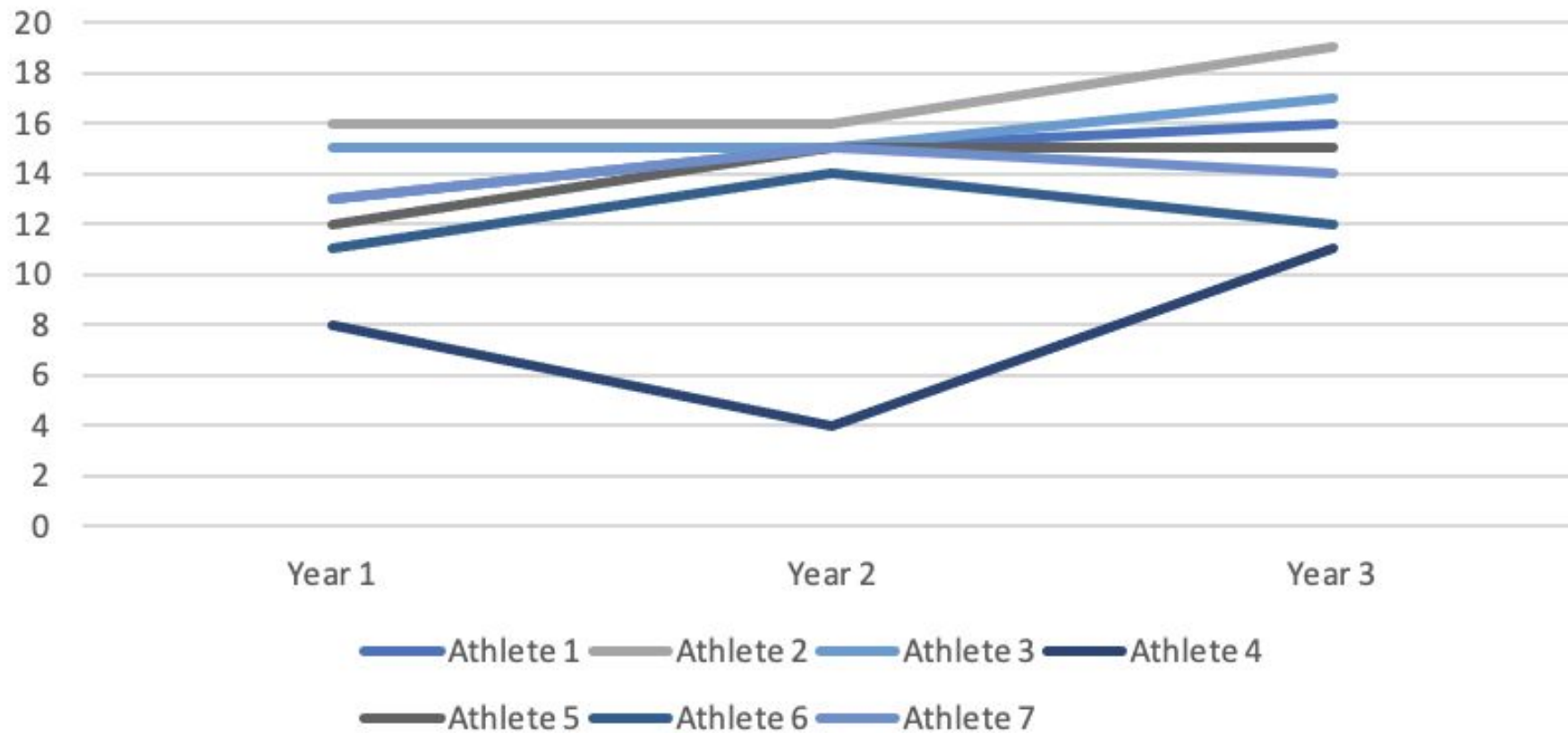


❑ There is no indication that FMS scores are higher when the athlete is not injured or only injured once



Women's Basketball Results

3+ Year Women's Basketball Players' FMS Scores

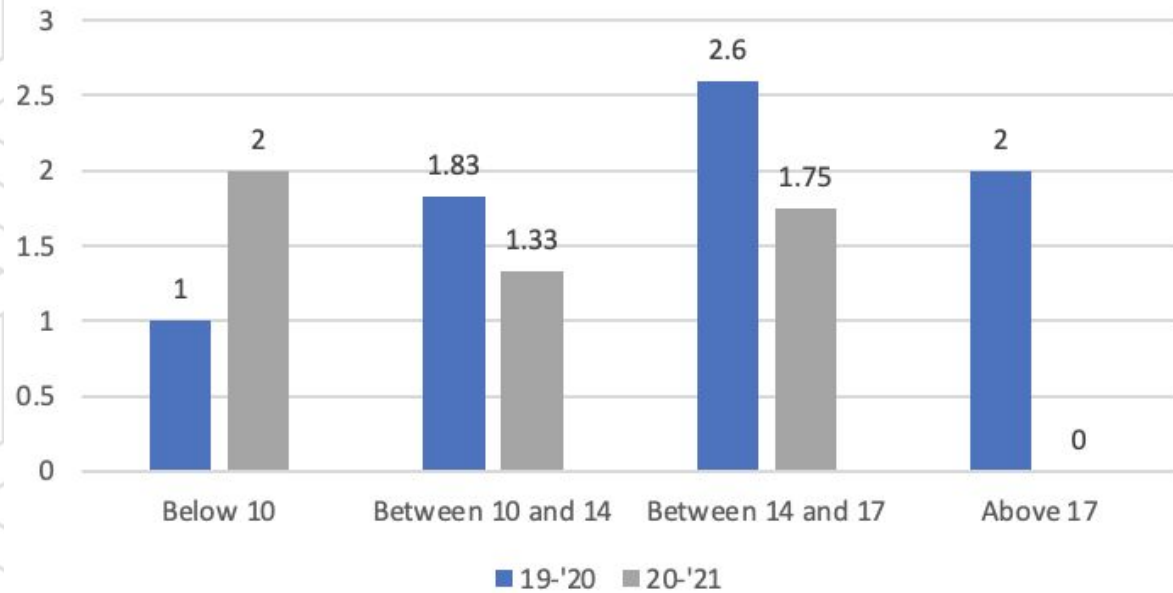


□ Athletes scores usually improved during their time at Butler

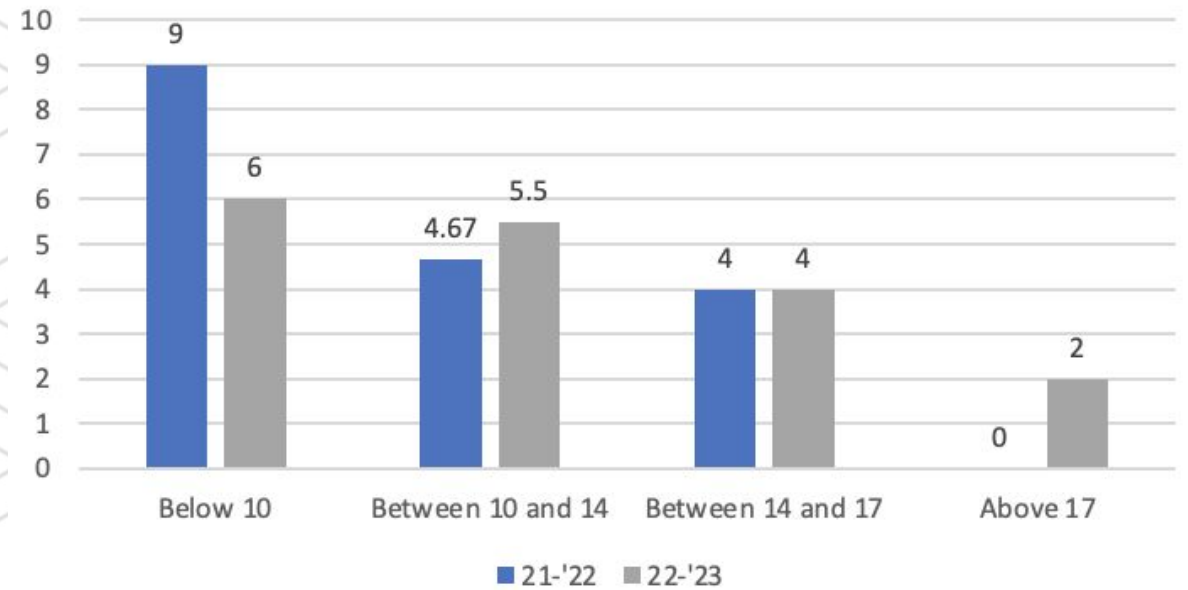


Women's Basketball Results

Injury Ratio for Women's Basketball '19-'21



Injury Ratio for Women's Basketball '21-'23

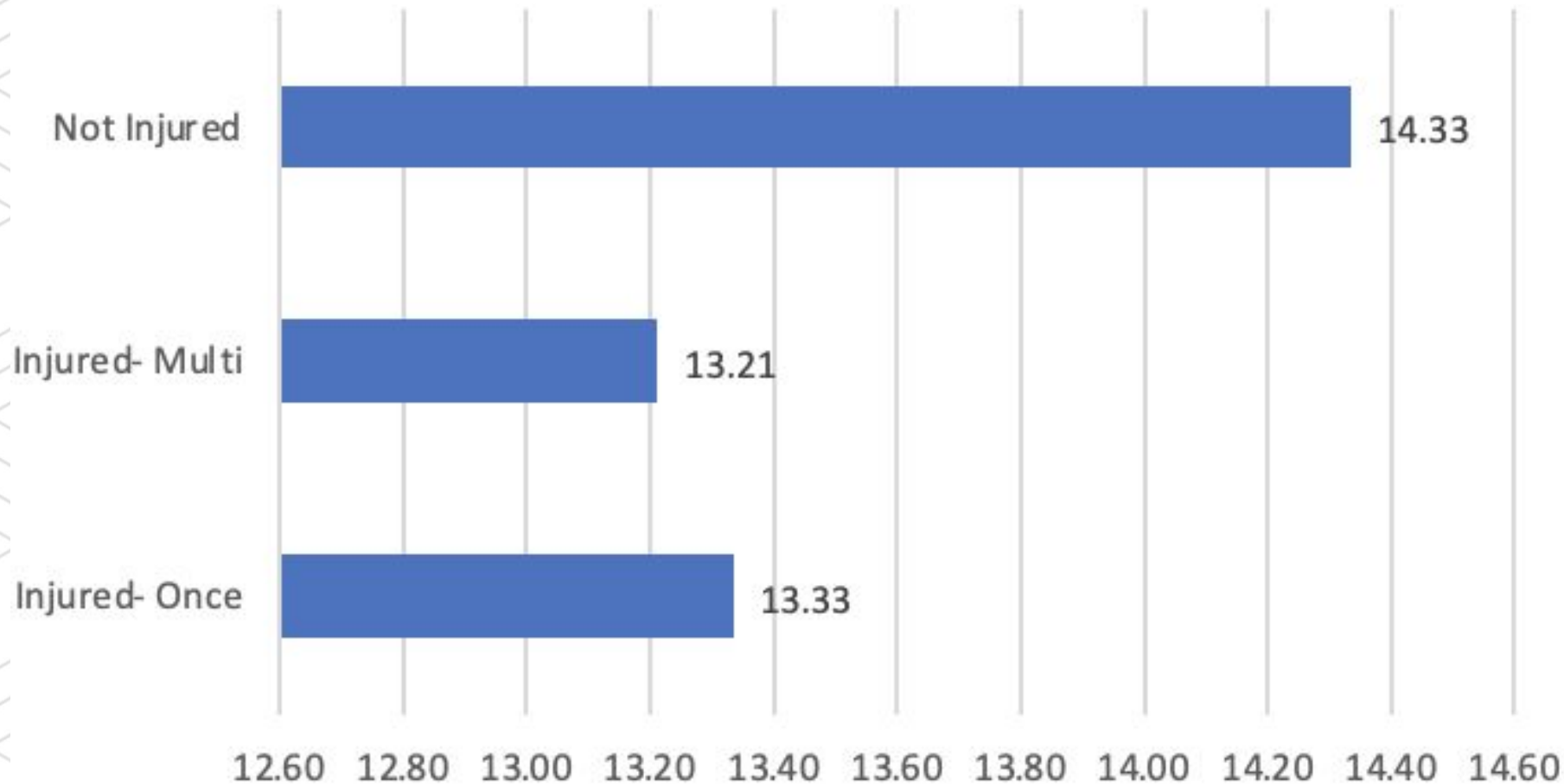


□ When more injuries occurred, the better the FMS score was, the injury ratio was less



Women's Basketball Results

Average by Injury Rate



□ There is an indication that players that don't get hurt have a higher FMS score



Overall Results

- ❑ Logistic Regression with gender and FMS as the independent variables and injury as the predictive variable
 - ❑ The R^2 for this test was .11 which indicates there is no relationship between the variables



Do athletes that have higher FMS scores get injured less?

Not conclusively do higher FMS scores get injured less. Only the last two seasons of Women's Basketball demonstrated that trend



Limitations

- ❑ Inconsistent days missing due to injury
- ❑ Some missing FMS scores

Recommendations

- ❑ Unified method of tracking FMS scores and injury time loss
- ❑ Butler specific style of FMS scoring
 - ❑ Creating a new scale ie. Not putting “strong/weak 2”



Special Thanks

- Ralph Reiff
- Greg Moore
- TJ Greenstone
- Cameron Razzano

