**INTRODUCTION**

- This project aims to use strength training data from basketball and wrestling to create a single, holistic number (TSA Score) that encapsulates athletic performance and will be meaningful for various parties involved in the athletic training process.

**Objectives:**
- Find standardized scores for each athlete across a range of metrics.
- Scale and combine the scores into an ability score.
- Create visualizations to demonstrate differences among athletes.

**Research:**
- The strength metrics used were taken from the Hawkins Dynamics Data that athletes use in their training regimen.
- We also included athletic and speed metrics from recognized combine drills to look at different types of strength metrics.
- Our research included an analysis of which strength metrics create a holistic overview of TSA. These metrics look at multiple different aspects of individual athletic performance which are important to their sport.
- We built upon existing research concerning TSA scores to build our own unique TSA scores that we could use across various sports.

**T-SCORE/SPIDER GRAPH VISUALIZATION**

To control for comparison within the team members, we had to find averages for each athlete and to do this, we created T-score bar charts.

- **T-scores:**
  - Using these averages, we create bar charts from a negative to a positive T-score, where a 0 represents the team's mean.
  - From these bar charts, we are able to analyze which athletes excel the most and the athletes that are lacking for the metric.

- **Grouping:**
  - We obtained a multiple “buckets” that we used to compare similar types of athletes. These included weight class, height and minutes played, all ranging from low to high.
  - We found that bigger athletes tend to have a lower TSA score due to the fact that most of the metrics we use mainly account for agility, not strength.
  - We need to acknowledge this when interpreting the TSA for athletes but overall, a higher TSA score indicates a more athletic athlete.

- **Spider Graph:**
  - From the T-score bar charts, we can rank these T-scores for a certain metric for a given athlete scaled from 0-1.
  - The spider graph for each athlete is essentially a ranked score for each metric from the T-score averages in the bar charts.

**What is a TSA score?**
- A TSA score is a one holistic measure used to evaluate the overall athleticism of each of our athletes using their weight room data.

**Why use a TSA score?**
- TSA scores are effective because they allow us to achieve a complete understanding of many different factors that impact total athleticism.
- We can combine strength, speed, size, and endurance into one overall statistic for each of our athletes.
- One drawback of using a TSA score is that based off metrics chosen certain athletes will be favored. E.g. larger athletes will struggle in a TSA score largely based on speed metrics.

**How do we create a TSA score?**
- Using athletics weight room metrics, we can evaluate their overall athletic ability in comparison to other team members.
- To measure comparison within team members, we derived T-scores:
  - T-Scores: equal to number of standard deviation away from team average
  - Scaled T-Scores from 0-1 (0 - lowest average, 1 - best average)
  - TSA Score: Averaged scaled T-scores for all metrics for each individual athlete, scaled to 100

**Total Score of Athleticism (TSA)**

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**TSA Table**

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**References and Acknowledgements**

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- Jason Pulara: Managing Director – Strength and Conditioning
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**FURTHER AVENUES FOR EXPLORATION**

There are many different avenues that you could explore from this point in time. There is an incredible amount of data that lies within the training that goes on with Purdue Athletes, and it’s almost impossible for a small team like this to get to all of it. With this being said, here are a few possible avenues to explore.

- Explore the Hawkins’ data over a span of time. You could check to see if the training is effective, and when it’s most effective.
- Checking if it’s possible to correlate the TSA to in game performance, but this would be extremely difficult due to the number of confounding variables that affect sports.
- Explore how different exercises in the weight room correlate to changes in the Hawkins metrics or TSA Score.
- Creating a dashboard so you don’t have to create the TSA manually.
- Expanding the project to different sports. These obviously aren’t the only possible paths this project could take in the future, but they are great ideas in general.

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