

SPORTS SCIENCE AND INJURY PATTERN STUDY

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INTRODUCTION

- High school athletes account for an estimated 2 million injuries per year.
- 62% of sports-related injuries occur during practice
- Most sports injuries occur due to:
 - Lack of education and awareness about potential injury
 - Inappropriate or lack of equipment
 - Poorly conditioned athletes
- Apply STEAMS methodology to develop the appropriate training plan for athletes
- Use JMP tools such as clustering
- Modern 3D-motion techniques were introduced to help develop sports strength training curriculum.



3D-MOTION TECHNOLOGY

Sport-specific training programs built by experts
Developing a special figure skating SPARQ program particularly on focused on Agility/Power

- 1- resisted band pulls (forward and side)
- 2- plyometrics (jumping/explosive drills)
- 3- T-Test (agility drill)
- 4- agility ladder
- 5- lateral lunges
- 6- glute exercises

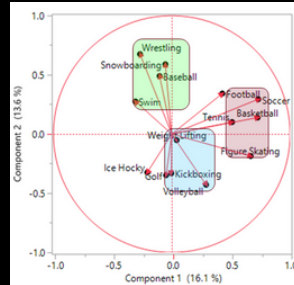
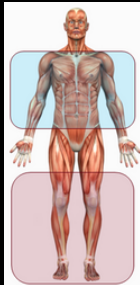
Core parameters in association with fatigue:

- thigh angles
- knee angles
- hip angles
- heel flattening on floor (moving weight away from toes or ball of foot)
- speed
- height increases (fatigue minimizes knee bend)

ANALYSIS

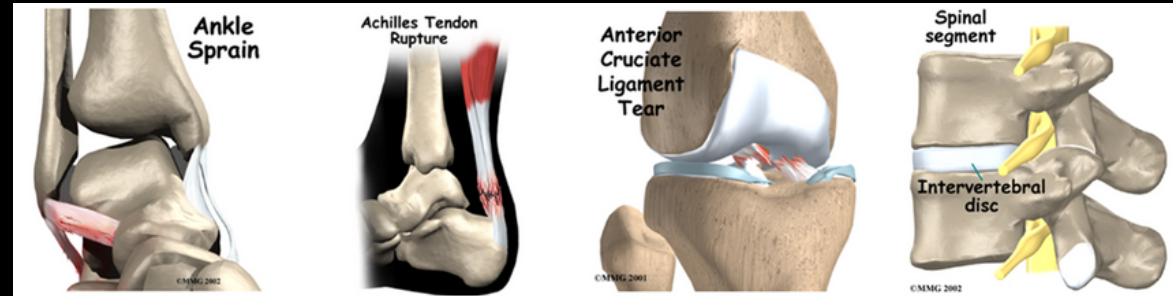
Clustering and PCA Plot

Cluster	Members	RSquare with Own Cluster	RSquare with Next Closest	1-RSquare Ratio
1	Basketball	0.596	0.061	0.43
1	Soccer	0.53	0.158	0.559
1	Tennis	0.262	0.083	0.805
1	Figure Skating	0.596	0.017	0.411
2	Swim	0.514	0.022	0.497
2	Snowboarding	0.398	0.047	0.632
2	Wrestling	0.673	0.02	0.334
3	Volleyball	0.414	0.029	0.603
3	Golf	0.717	0.026	0.29
3	Weight Lifting	0.328	0.003	0.674
4	Football	0.568	0.07	0.465
4	Ice Hockey	0.568	0.069	0.464
5	Baseball	0.384	0.061	0.443
5	Kickboxing	0.584	0.011	0.42

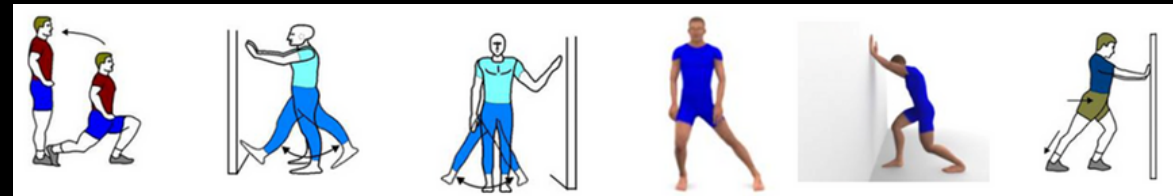


CONCLUSION

Correct treatment of an acute injury will minimize recovery time. Proper rehabilitation will prevent re-injury by developing and sustaining good posture and muscle, using a thorough stretching regime, and providing tips for figure skating exercises.



- General warm up: get the blood flowing to all parts of the body including the cardiovascular system.
- Dynamic stretching: the speed and intensity of your movement is increased gradually.
- Technical and speed warm up: short, high intensity, skating specific drills.



Histogram Injury Pattern Analysis within the 1st Cluster

