
Data Fest Presentation

An Analysis For 2017-2018 Season Canada Football players

By - YunFei Luo, Qisen Luan, Peichao Du, Yi Cao, Yanjie Chen

Relation between scales in wellness

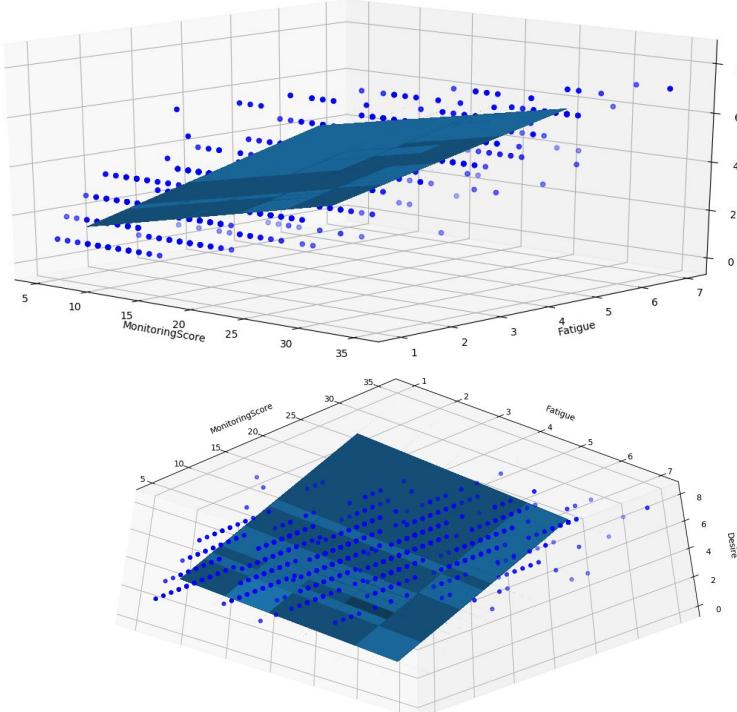
The linear function is: $5.259523149524663 + 2.2654350958608274*(x_1) + 1.4043558811162953*(x_2)$

MAE: 5.394927344587832

MSE: 5.787080404523567

Predict monitoring score without knowing all the five scales.

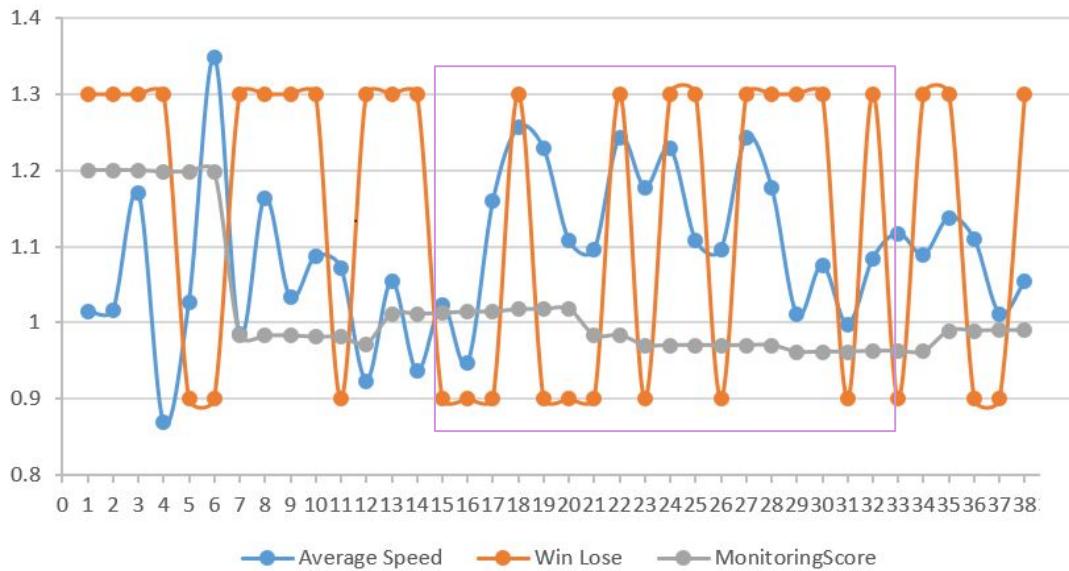
	PlayerID	Fatigue	Soreness	Desire	Irritability	SleepHours	SleepQuality	MonitoringScore	USG
PlayerID	1.000000	0.014598	-0.023021	0.147680	-0.017140	0.145862	0.056373	0.052164	0.231833
Fatigue	0.014598	1.000000	0.519904	0.580195	0.481475	0.185780	0.525361	0.846338	-0.057746
Soreness	-0.023021	0.519904	1.000000	0.425858	0.329233	0.024464	0.281776	0.694283	-0.055170
Desire	0.147680	0.580195	0.425858	1.000000	0.451112	0.067461	0.311769	0.745488	0.058046
Irritability	-0.017140	0.481475	0.329233	0.451112	1.000000	0.088848	0.402843	0.688553	-0.026415
SleepHours	0.145862	0.185780	0.024464	0.067461	0.088848	1.000000	0.281798	0.184492	0.021657
SleepQuality	0.056373	0.525361	0.281776	0.311769	0.402843	0.281798	1.000000	0.710016	0.005358
MonitoringScore	0.052164	0.846338	0.694283	0.745488	0.688553	0.184492	0.710016	1.000000	-0.020129
USG	0.231833	-0.057746	-0.055170	0.058046	-0.026415	0.021657	0.005358	-0.020129	1.000000



Data and Graph

- Higher average speed => better game result
- Monitoring Score => future average speed in game

W/L Related to Average Speed and Monitoring Scores



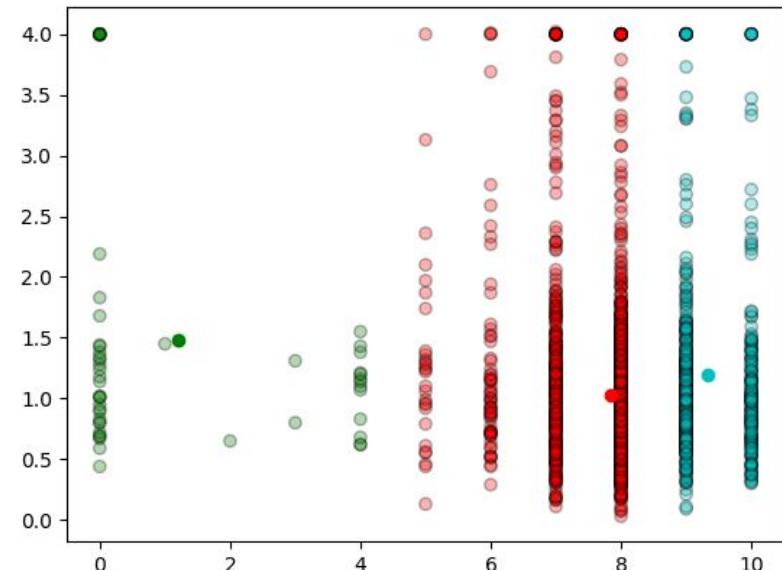
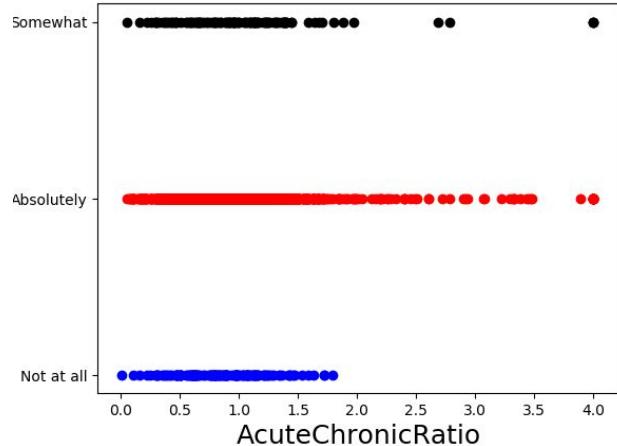
clustering-RPE and other aspects

Ratio of absolutely best out of myself (objectiveRating, Acute/Chronic ratio)

99.315% with center at (9.34, 1.192)

78.797% with center at (7.835, 1.207)

66.667% with center at (1.196, 1.484)



RPE-session type

Ratio of different session type: center(RPE, objectiveRating, focusRating)

Mobility/Recovery 98.587% with center at (3.595, 8.112, 8.204)

Speed 92.53% with center at (3.595, 8.112, 8.204)

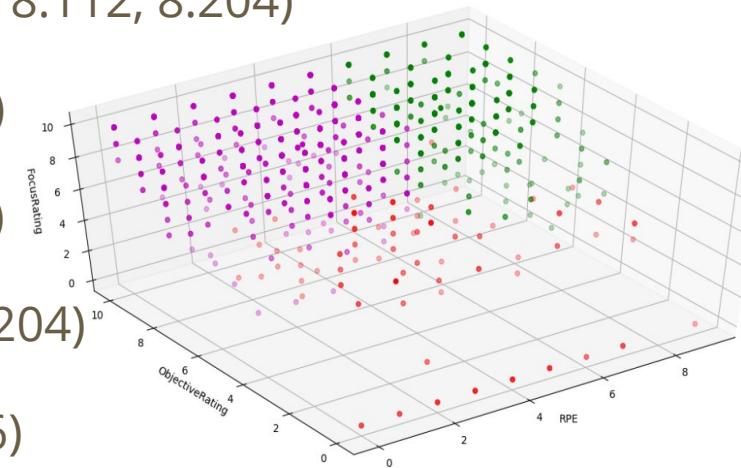
Skills 87.735% with center at (3.595, 8.112, 8.204)

Strength 78.942% with center at (3.595, 8.112, 8.204)

Games 44.924% with center at (7.149, 7.998, 8.26)

Conditioning 40.104% with center at (7.149, 7.998, 8.26)

Not much sessions with center at (3.594, 2.678, 5.049) which is good...



How Can You Measure Fatigue?

Trust Your Athletes!

•••

Team A-Super-NOVA

Audrey Bertin, Arielle Dror, Clara Rosenberg, Kara Van Allen
Smith College

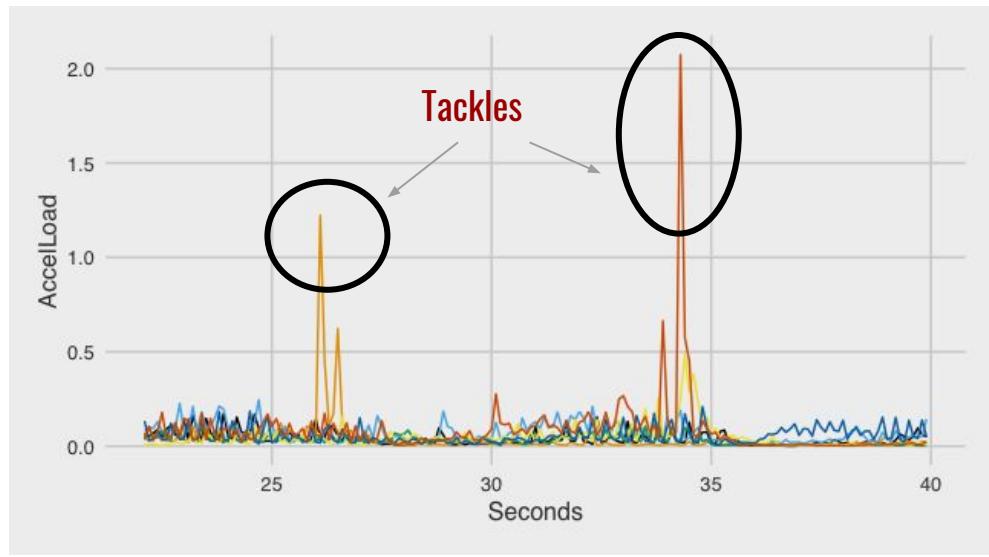


Is A Self-Reported Fatigue Score Really So Bad?

- Main argument against: **too subjective**
- **The Reality:** consistent with objective data (when averaged for the team)
 - 77% of variation in fatigue explained by objective wellness predictors: hours of sleep, USG, pain, illness, menstruation, nutrition (13% on the individual level)
 - 95% explained when other self-reported wellness predictors included: soreness, irritability, motivation, sleep quality (56% on the individual level)

How Are Performance & Weather Related To Fatigue Score?

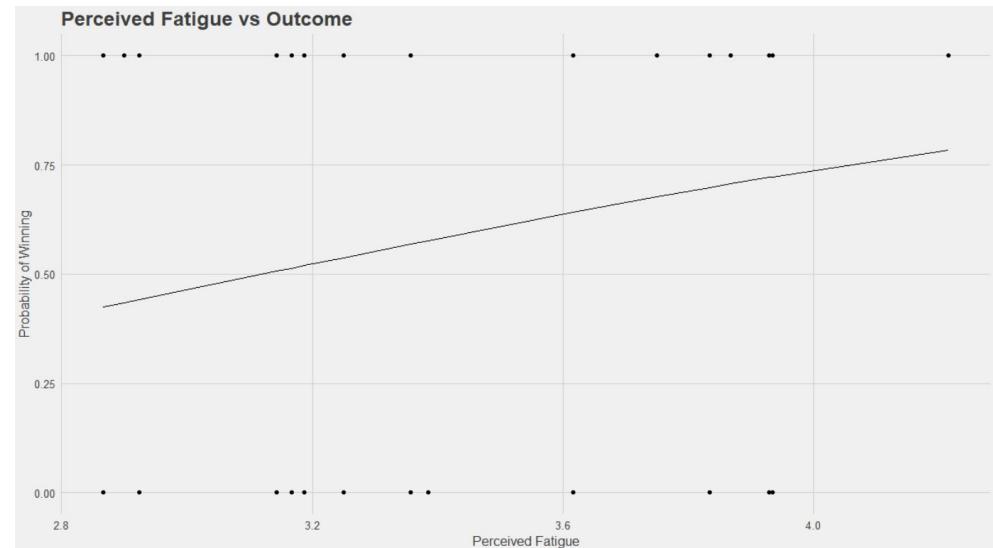
- Statistically significant predictors:
 - Contact (+)
 - Avg x-acceleration / “agility” (-)
 - Contact:avg speed / “action” (-)
 - Number of games played previously in tournament (-)
 - Humidity (-)
 - Precipitation (+)



<https://bit.ly/2JPPjQD>

Fatigue Score As A Predictor Of Winning

- Logistic model with mean subjective fatigue score (“freshness”) of team as only predictor and outcome (W/L) as response
 - Odds Ratio = 3.26
 - Likely relationship
 - The less fatigued the team is overall (corresponding w/ higher fatigue score), the greater chance of winning



Conclusions and Implications

- Focus on a new way of measuring fatigue is misplaced
- To address fatigue beyond wellness factors, look at: player speed, player agility, & consecutive games played
- Reflects larger trend of women's self-reported health being mistrusted
 - Team's head coach and analyst are both men
- Future: Player position, more objective health measures



EVALUATING CURRENT TRAINING DECISIONS BASED ON ATHLETES' SELF-REPORTS

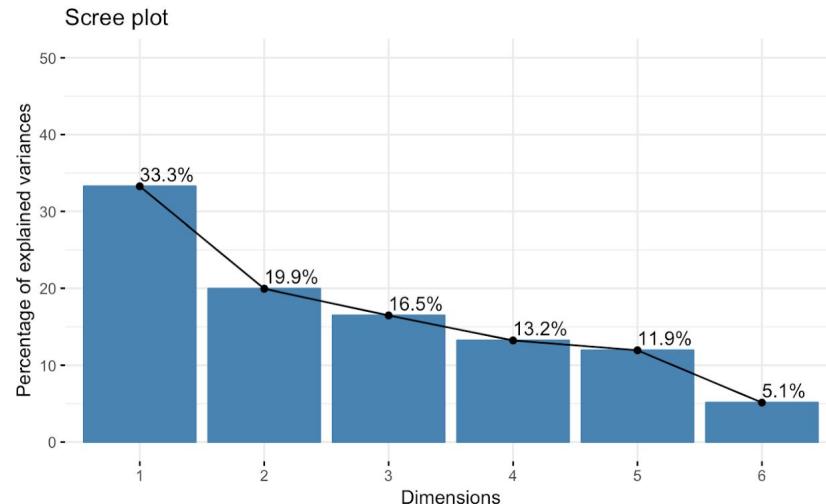
Fibonachos from Mount Holyoke College

GOALS / MOTIVATION:

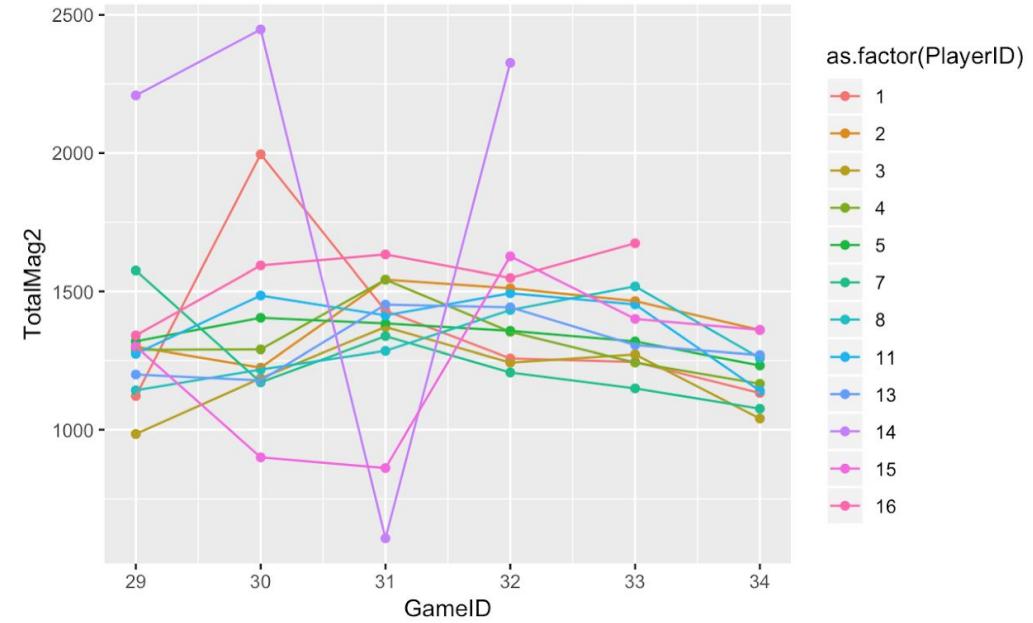
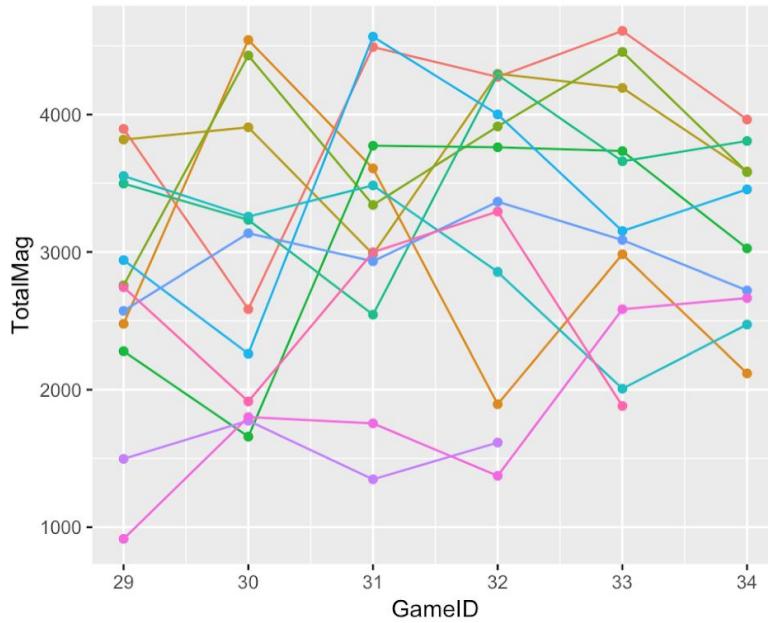
- Find the connection between wellness of each player with their performance in game and training workload

DATA PROCESSING

- Standardize levels of wellness index based on each individual using Z-score
- Quantify athletes' performance in games using Principal Component Analysis



Total movement magnitudes of each player in the Paris Tournament, using Dimension 1 (39% Speed, 22% AccelImpulse, 35% AccelLoad) and Dimension 2 (40% AccelY, 45% AccelZ)

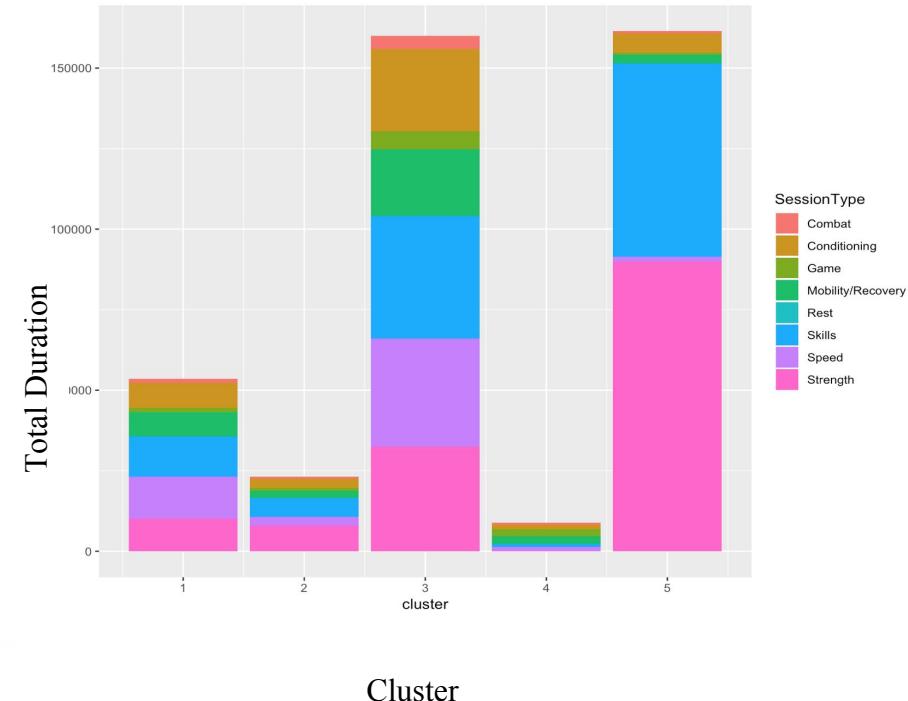
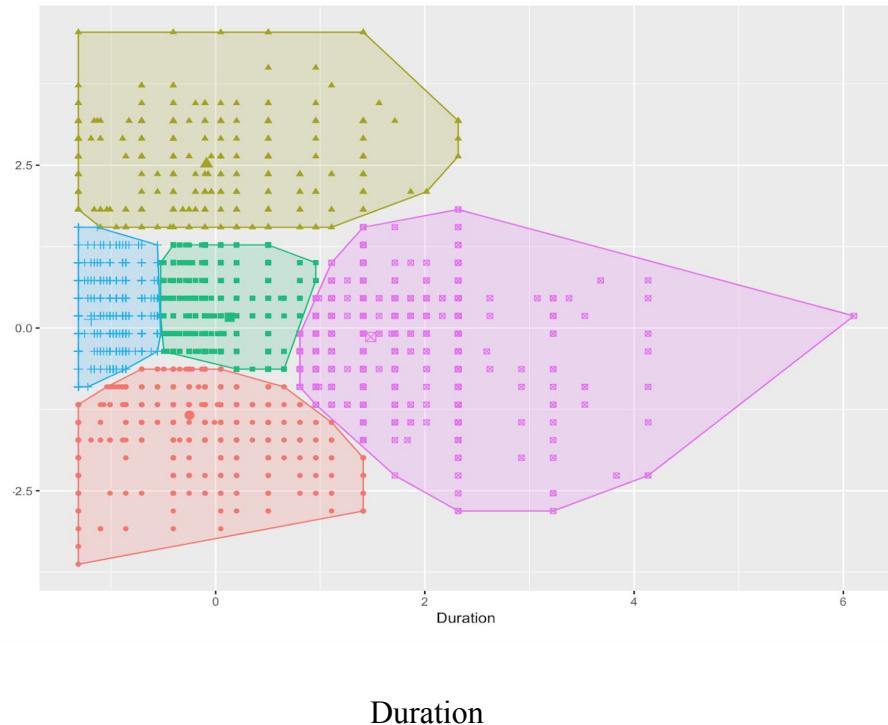


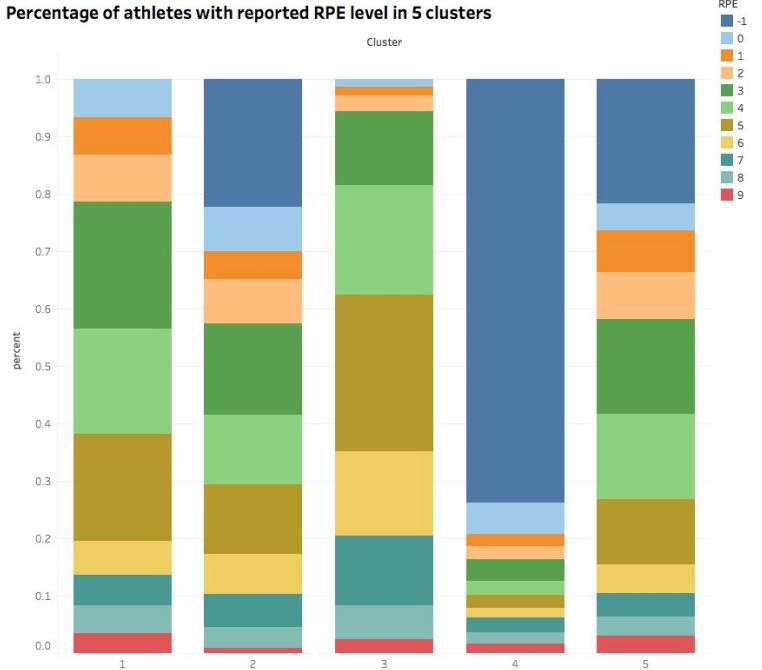
We find consistent moving patterns between some players in each of the match. For example, in the first Graph, Player 1, 5, 7, 16 move in consistent pattern together. This might imply about their roles or team strategy. In the second graph, we find most players have similar Y and Z axis movements. The magnitude slightly decrease by the end of the tournament.

DATA ANALYSIS

Find the connection between physical condition and training pattern using K-means clustering with k=5 chosen by the Elbow method.

Cluster plot





Evaluating athletes' RPE with current training pattern

Summary:

- 40-60% reported RPE 3-5 in cluster 1, 2, 3, 5. About half of the responses from the players finds the training moderate to hard enough.
- Application: This might help coaches to use the Monitoring score from the survey to assign suitable training sessions and duration.

Limitations:

- Performance might be hard to quantify in 1 or 2 numbers.
- Evaluating athletes' RPE might not be an objective measurement. We could have used Acute Chronic Ratio if there were not many missing values.



Everybody Lies- Bankruptcy

Priscilla, Tony, Chang, Harry, Rafay

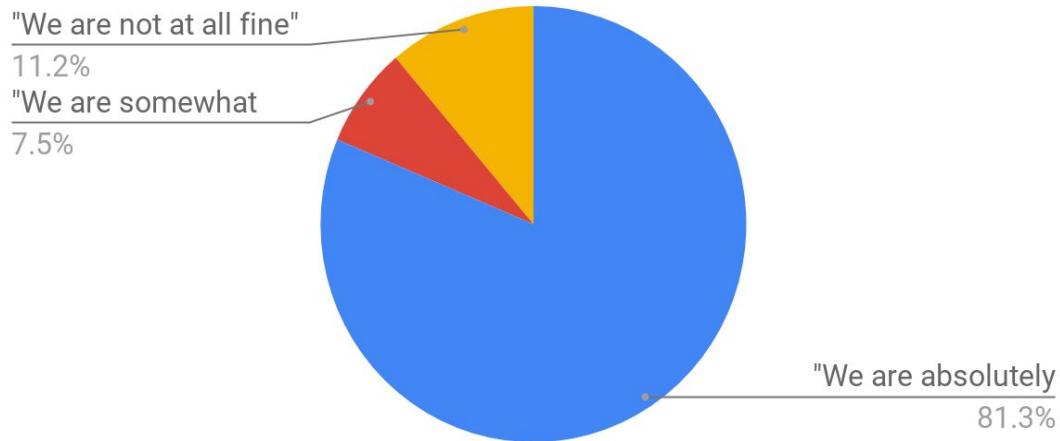
Motivation and hypothesis

- Self-reported data
- Increase/Decrease in training/gaming time
- Are players putting their health at risk by trying to look stronger?



Statistics of Players

Athletes with RPE higher than 5



Statistics

- 153 cases where players did not report RPE but said they're feeling "Absolutely Fine"
- When training sessions with unreported RPE were compared against reported RPE, their fatigueness was 12% higher.

Conclusions

Players more likely to report that they're doing fine

Players likely to go all the way

Higher exertion and power results in more fatigue

Higher exertion can also result in injuries

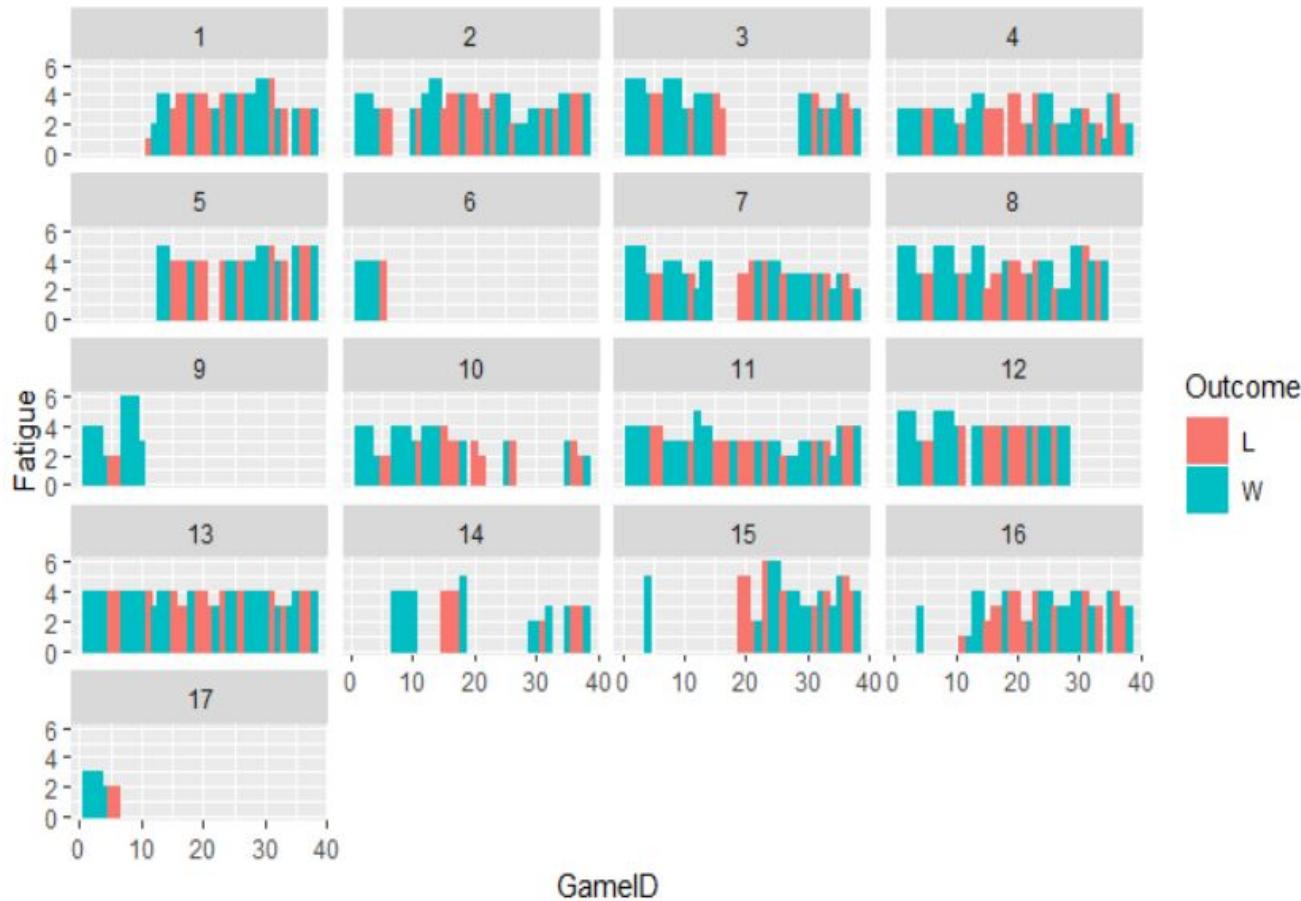
Exploratory Analysis of Player Fatigue and Performance in Canada 7s

Mean Team
Smith College

How do we measure fatigue?

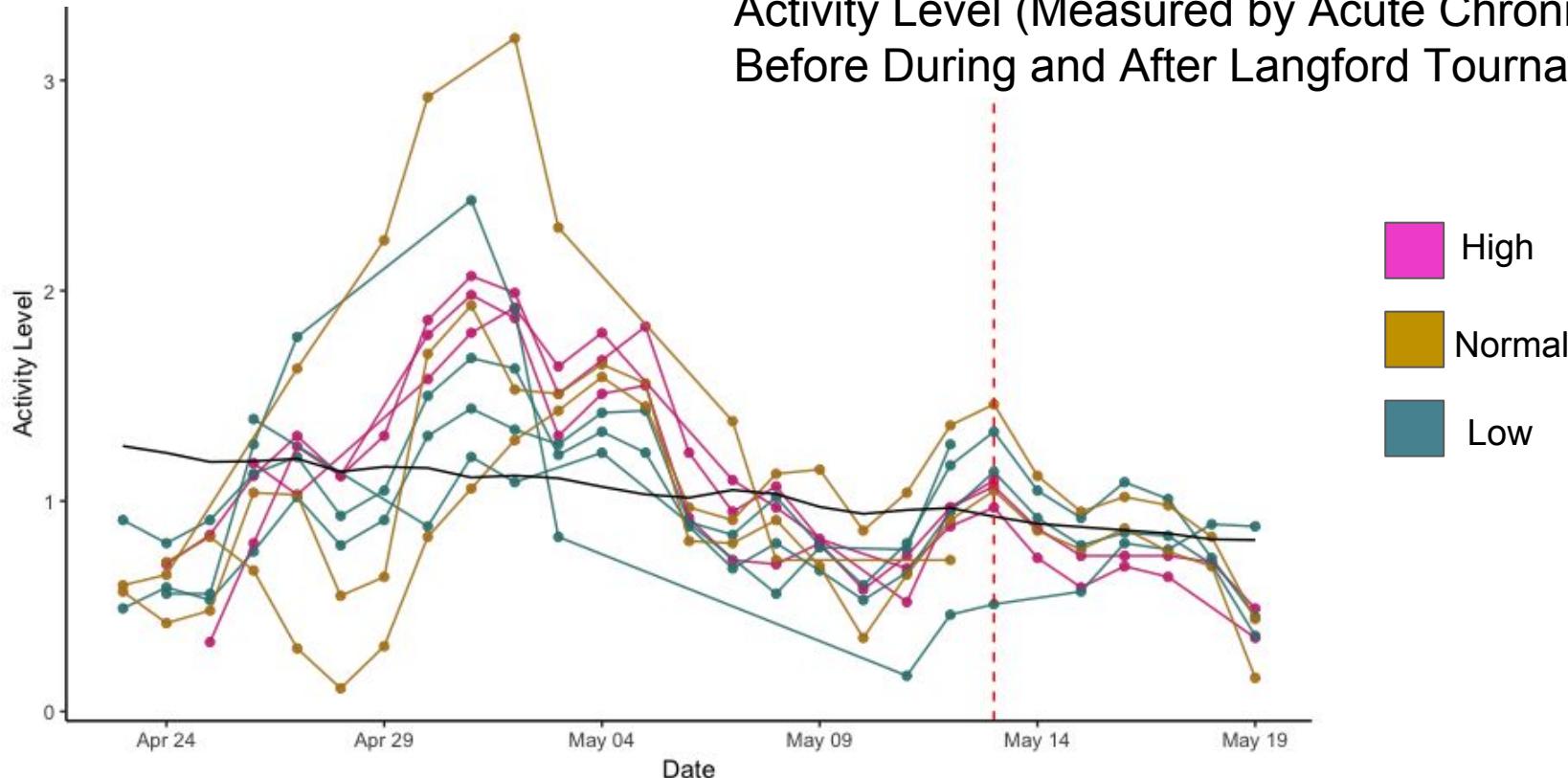
How do we measure performance?

How are the two related?

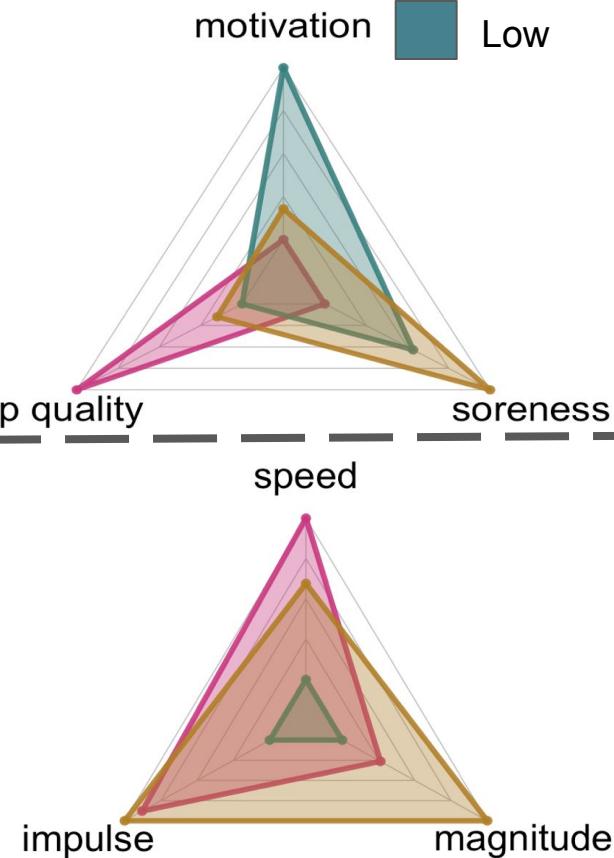
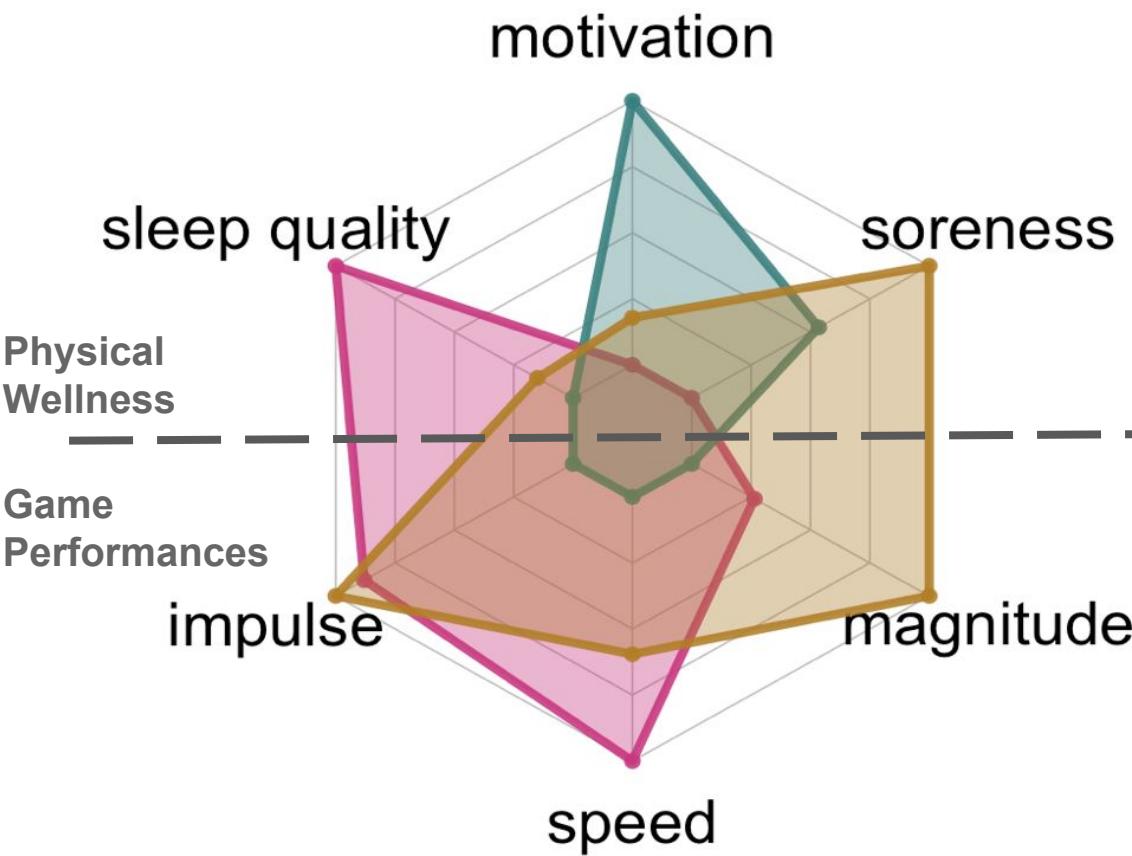


Player Comparison

Activity Level (Measured by Acute Chronic Ratio)
Before During and After Langford Tournament



How do different types of players do?



Discussion





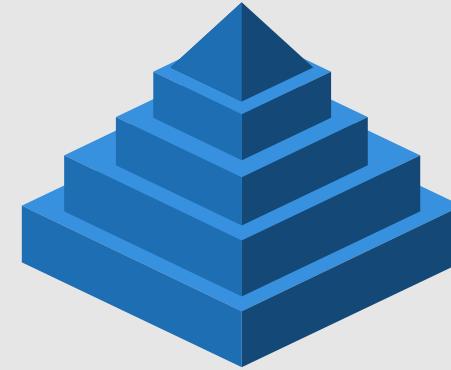
ASA|DATAFEST 2019

01 | Document Parsing

GoodGame
Daksh Jain & Yash Tyagi.



Due to large data set, we decided to focus on data from wellness.csv to form a expression for it from the self reported values.



02 | Cleaning

A major challenge was cleaning up the data. In `wellness.csv`, 5 columns had more than 50% of their values listed as NA. And quite a few of them were binary string or arbitrary variables which need to be scaled to some numeric value.

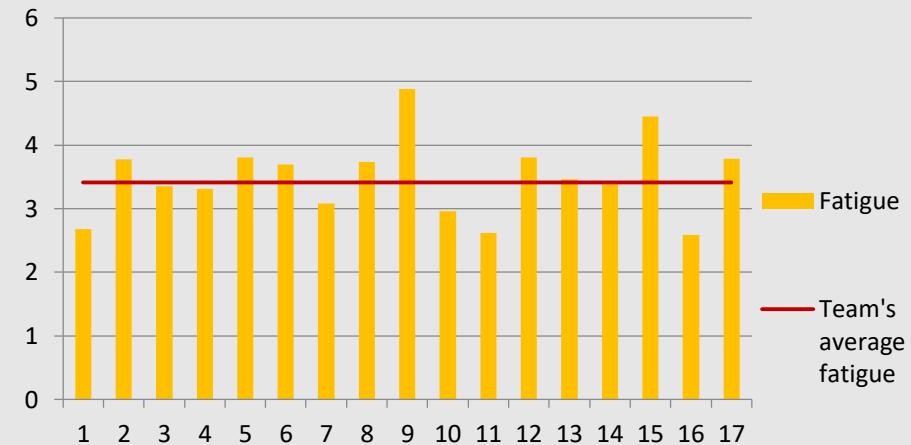
03 | Testing

We came up with an agreeable system to convert the variables to numeric values. Then we carried out testing to check their viability. And finally decide to sort the data by Player ID to process it further.

04 | Averages

From wellness.csv. We found individual averages and team average of all the players in the team. This gave an indication of the average condition of the players. Fatigue levels can be seen on the right.

Average fatigue levels by PlayerID



05 | Further exploration

After averaging we decided to create a comprehensive equation to predict fatigue levels based on the provided data points.



Correlogram							
	Fatigue	Soreness	Desire	Irritability	SleepHours	SleepQuality	MonitoringScore
Fatigue	1						
Soreness	0.5199	1					
Desire	0.5802	0.4259	1				
Irritability	0.4815	0.3292	0.4511	1			
SleepHours	0.1858	0.0245	0.0675	0.0888	1		
SleepQuality	0.5254	0.2818	0.3118	0.4028	0.2818	1	
MonitoringScore	0.8463	0.6943	0.7455	0.6886	0.1845	0.71	1

06 | Correlation

We made a correlogram which included all the variables in the wellness.csv. And based on their correlation with fatigue we decided to regress the latter against them.* (The above shows the variables we decided on to use.)

* Data with more values available on request.

07 | Regression

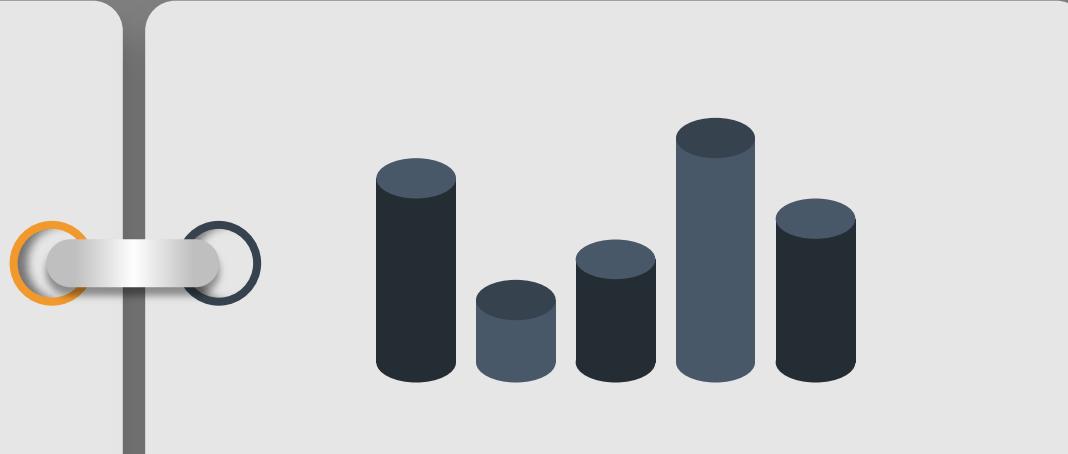
Various regression models were run and tested. Most of them very close to each other however we ultimately selected one with the following variables: Soreness, Desire, Irritability, SleepQuality and MonitoringScore. *

*Data available on request.

Fatigue	Coef.
Soreness	-1
Desire	-1
Irritability	-1
SleepQuality	-1
MonitoringScore	1
_constant	2.71E-13

08 | Quantification

Therefore, fatigue can be quantified as:

$$\text{Fatigue} = \text{MonitoringScore} - \text{Soreness} - \text{Desire} - \text{Irritability} - \text{SleepQuality}$$


Analysis of Performance in Women's Rugby



Git 'R Done
DataFest 2019

Rugby Sevens

- 7 players on the field per team
- 7 minutes per half
- “Participants need to be incredibly fit and have plenty of speed, skill and stamina”

(World Rugby)



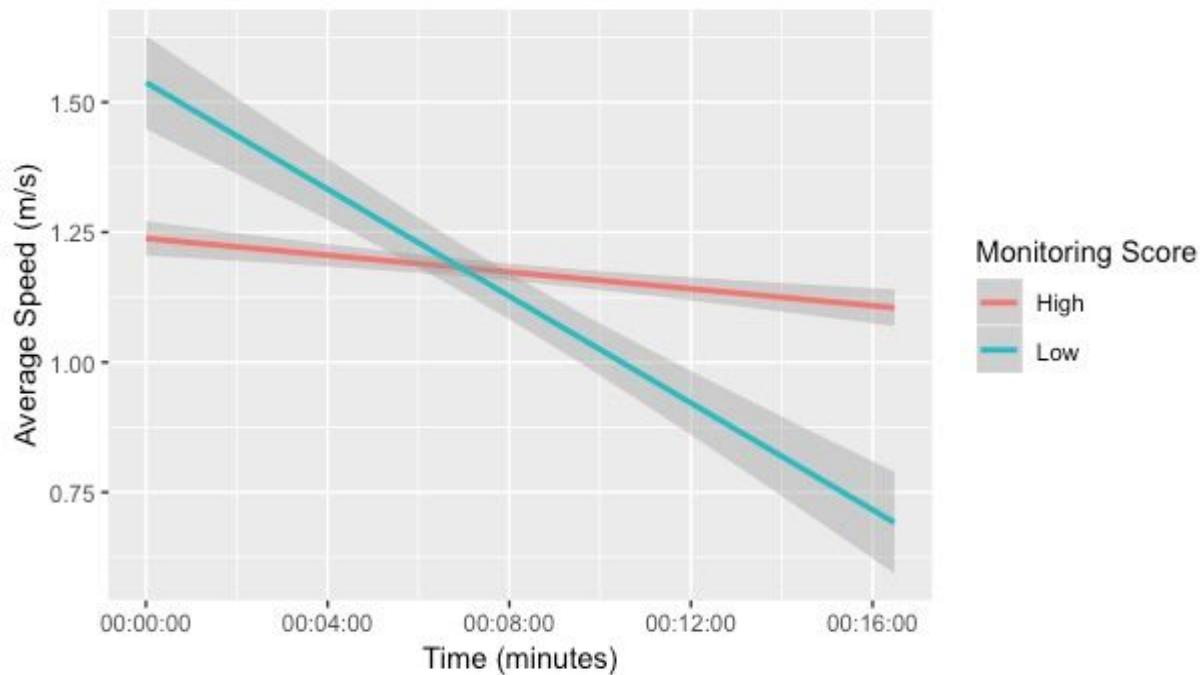
Source: CBC Sports

Our Question

- How do players' average speeds change over time in a game?
- How do ratings of players' overall wellness (fatigue, soreness, desire, and irritability) affect their average speed?

Data Visualization

Does Monitoring Score Affect Average Speed Over Time?



Caveats and Future Directions

- Residual analysis showed that model is good, but not great
- Could facet over each player for more individualized data
- Data reliability?
- Increase stamina/endurance training
- Team-building activities
- More consistent recording
- Performance is affected by their perception of wellness

Presented by
Team Unofficial Intelligence

How to Prepare for a Season

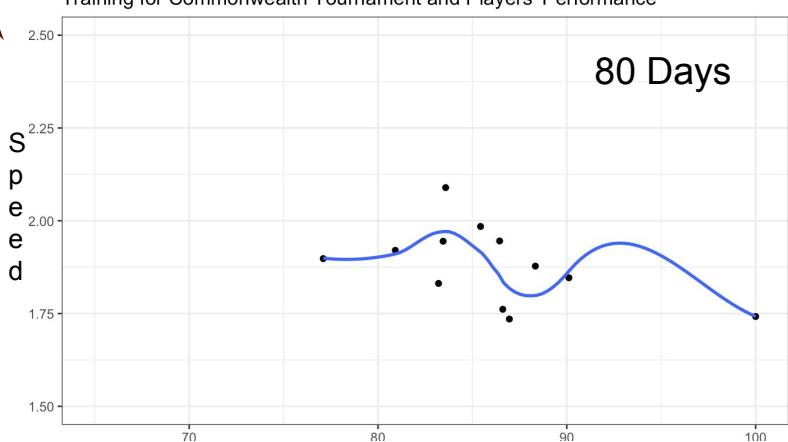
Yifan Ma / Nichole Yao / Yanwan Zhu
Rachel Yan / Kelly Shen / Elaine Ye



Effect of In-season Training on Speed



Training for Commonwealth Tournament and Players' Performance



S
p
e
e
d

2.50
2.25
2.00
1.75
1.50

70

80

90

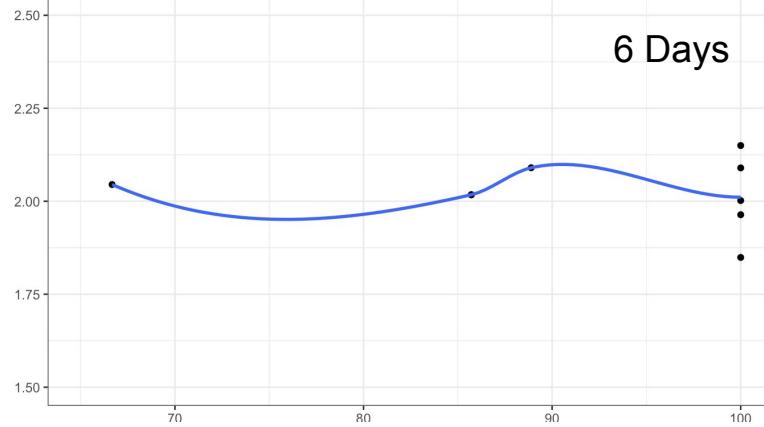
100

TM
GBY
IADA



6 Days

Training for Kitakyushu Tournament and Players' Performance



S
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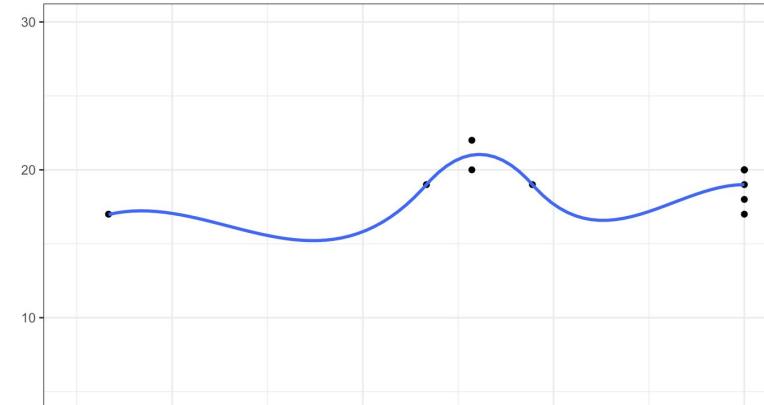
30
20
10

70

80

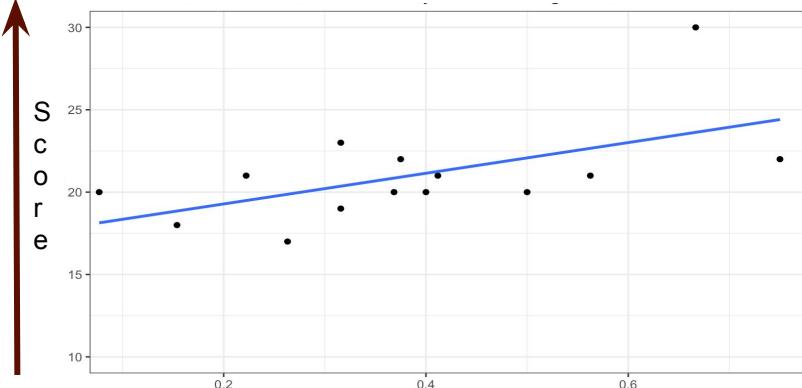
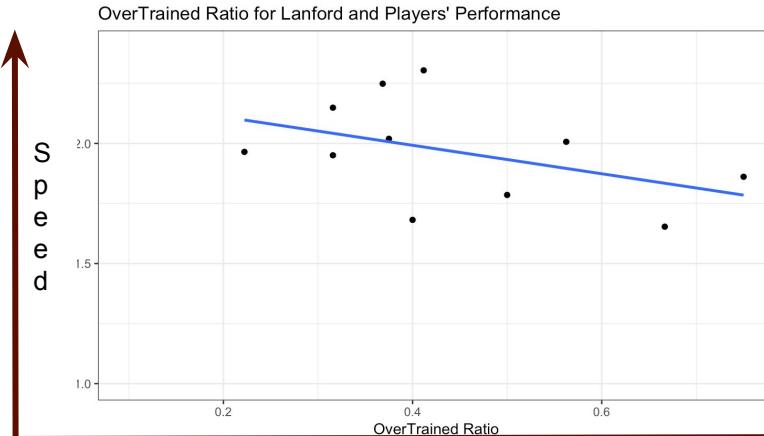
90

100

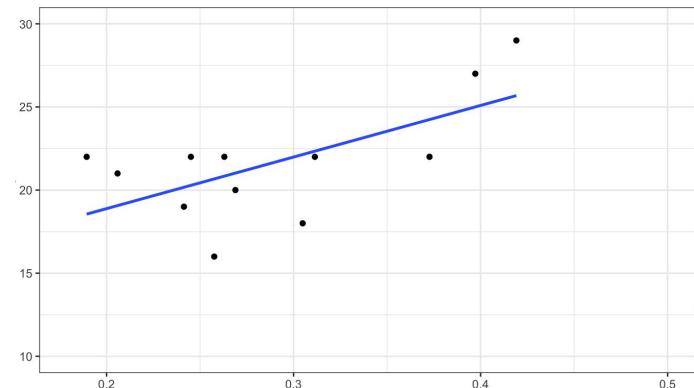
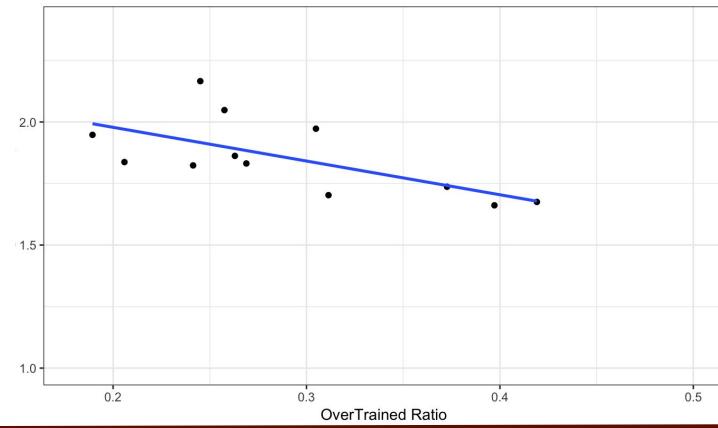


Effects of Overtraining on Player's Wellness / Speed

In-season Training from 4.23 to 5.11 & from 6.10 to 7.20



OverTrained Ratio for World Cup and Players' Performance



Conclusions

- Full time training may not lead to better performance (measured by speed).
- Training full time in-season does not lead to increase in wellness (measured by monitoring score).
- Be cautious about deciding training intensity while preparing in between tournaments
 - Intense training → Players feeling good
 - Intense training ~~X~~ performing well



Bonus Scene: The Hidden Figure, PLAYER 17

