



NBA Insights: **How Teams Use Data** **to Enhance Player Performance**



KITMAN LABS

Kitman Labs works with a number of basketball teams at the professional and collegiate level. In this article we summarise some of our latest findings, focusing on 2 areas:

1. The Assessment and enhancement of performance, and
2. The assessment and mitigation of injury risk.

MEASURES OF PERFORMANCE

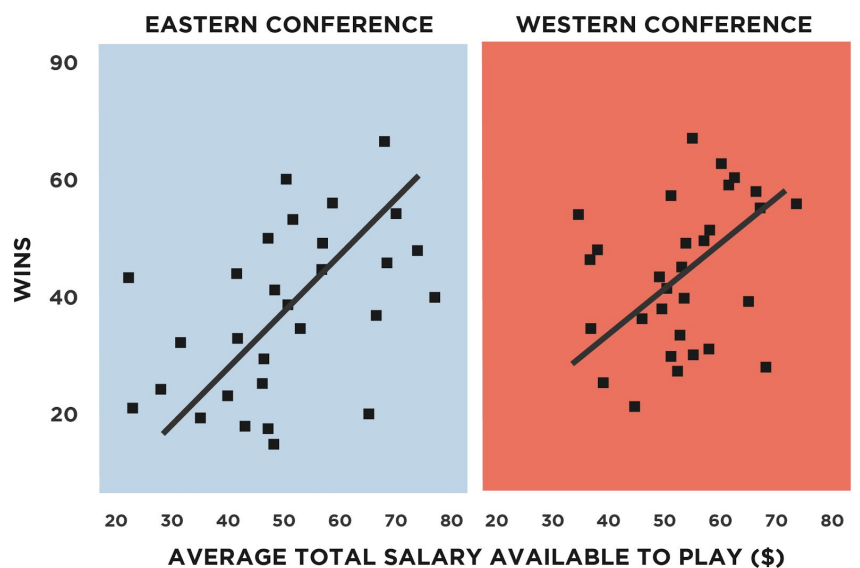
What do we mean by performance?. In the NBA, to guarantee a playoff place, teams need to win 49 games in season in the Western and 43 in the Eastern Conference.

In this graph we use salary as a measure of player quality, and we only include the salary for players who were available (not injured) to play during each game.

Unsurprisingly, there is a strong correlation between the quality of the players available on each team's roster and the number of wins which the teams achieve each season.



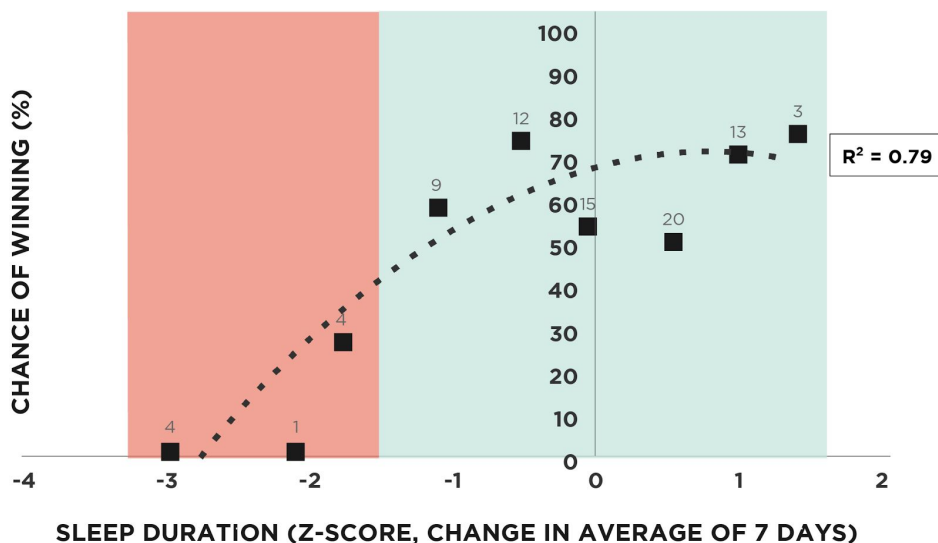
Clearly, this is not a perfect relationship - statistically, over the last 5 seasons, player quality (measured in this way) appears to account for around 30% of the variation in the number of wins a team achieves.



WHAT ELSE CORRELATES WITH WINS?

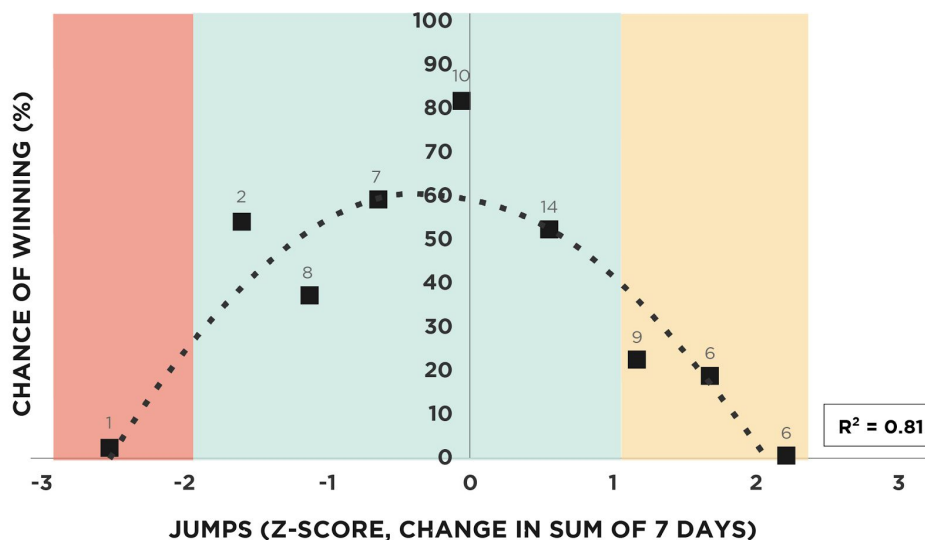
Below are examples of some metrics from Kitman Labs' basketball data set which have all been collected by S&C, ATs or sports scientist from professional or collegiate players across multiple seasons.

The graph shows how change in sleep duration impacts on performance for one team. If an individual sleeps far less than their average the night before a game, they have an increased risk of performing poorly (red zone). If an athlete sleeps either the same amount, or more than normal, there is a higher chance that they will perform well (green zone).



There are a host of other subjective metrics which are also related to performance, in addition to a number of objective variables.

At the right we can see the relationship between the number of jumps that a player performs in the 7 days prior to a game and their in-game performance. A large decrease in the number of jumps relates to an increased risk of poor performance (red zone). Although this is only data for one team, we can hypothesise that this is related to undertraining

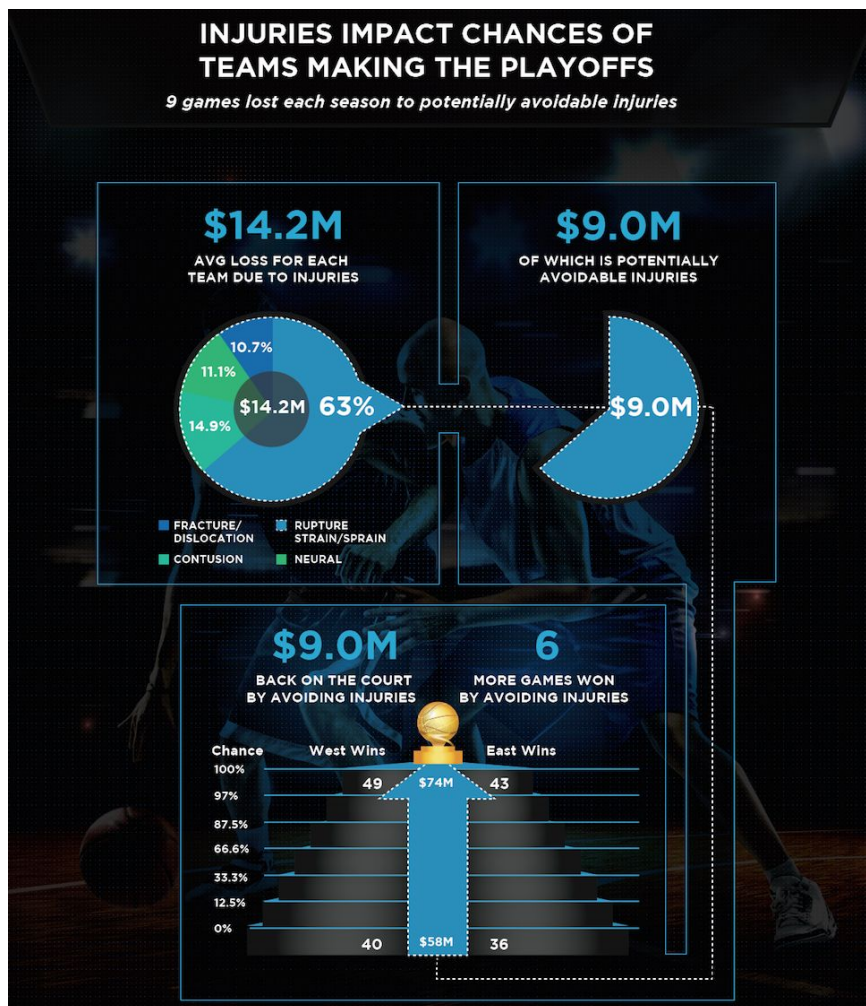


either technical or physical skills components. It appears that players need to maintain frequency of jumping in order to maintain optimal performance, but we can also see an increased chance of poor performance if the player does more jumps than they are typically used to (orange zone), potentially due to fatigue leading into performance. As such, we want

our players to remain within the green zone in order to continue to develop their technical, tactical and physical qualities without compromising performance in the short term.

These are just 2 examples of metrics from Kitman Labs' basketball data set. On a day-to-day basis, these thresholds or alarms are used to help either make decisions, or communicate to decision makers with objective information as opposed to subjective thought. In reality, **all** metrics collected by a team are analysed in relation to performance. This includes injuries, specifically absence through injury.

We have already seen that teams who have a higher amount of their quality players available across the course of an NBA season are more likely to reach the playoffs, but what is the actual impact of injuries on performance?



Click [here](#) to see our full report on how injuries impact on chance of reaching the playoffs in the NBA.

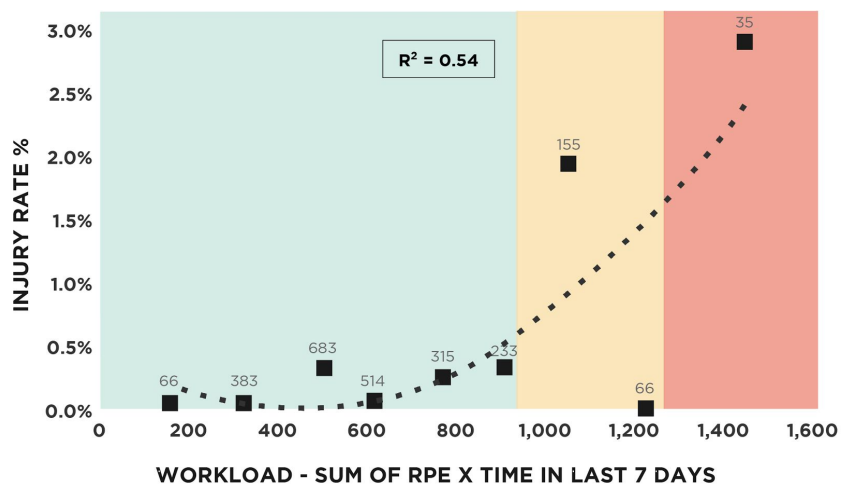
We can see that injuries have a huge impact on performance in the NBA - 12% of each team's wins needed to make the playoffs is determined by health alone! What's more, it appears that 63% of injuries across the course of a season are potentially avoidable! As such, each team is giving-up 6 wins on average to potentially avoidable injuries each season. Put simply, this is the difference between reaching the playoffs and not.

So what can we do to mitigate injury risk? In exactly the same way which we link all metrics to performance, we can also link all metrics to injuries.

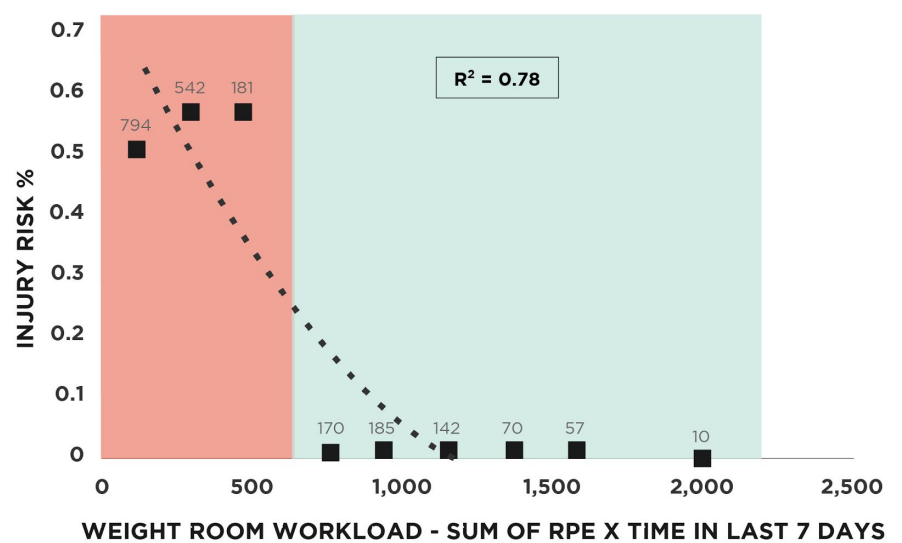
SO, WHICH METRICS CORRELATE WITH INJURY?

There is a large amount of research available at present on workload and injury. In these two graphs we can see how the relationship between workload in the last 7 days, measured using rate of perceived exertion (RPE) multiplied by time is related to injury risk during one season for one team.

This graph shows that a high average workload increases injury risk (red zone), however it also appears that those athletes who have a *low* workload in the weight room over the last 7 days are also more likely to get injured (below).



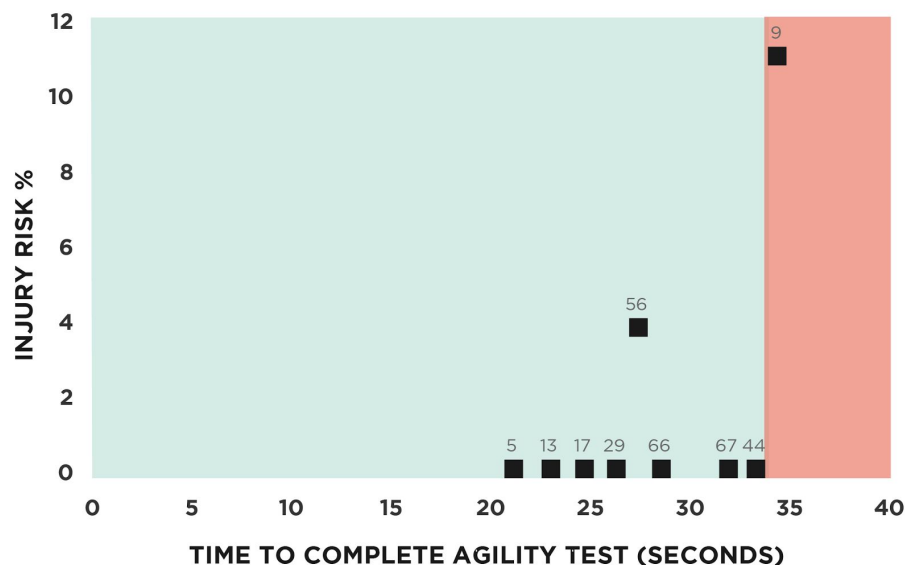
Based on this chart, we can hypothesise that weight training has a protective effect on a player's chance of getting injured, but too much total training has a negative effect (i.e. injury risk is increased) potentially due to fatigue.



So far we have only looked at transient metrics - i.e. ones which change on a daily (sometimes hourly or minute by minute) basis. In addition to this, we can also look at more stable metrics such as previous injury, age, strength qualities or in the below example, agility.

Athletes who are less agile (take longer to complete the agility test) are more likely to get injured.

Although fatigue can mask agility, this allows us to benchmark our athletes based on their agility score, in addition to any other stable metrics, in order to focus our attention on improving players who are at increased risk of injury.



The long term plan for any player in the red zone should include training centered around increasing agility. Conversely, we can save player and coach time by avoiding needless training with players who are already at an acceptable risk (green zone).

By analysing metrics in this way, for the first time ever...

- Strength coaches are able to demonstrate which training methods have the largest impact on performance,
- Medical staff are able to have clarity over when an athlete is ready to take the next step in rehabilitation or return to play,
- Sports scientists are able to go to a decision maker and say (for example), “Coach, 4 out of 5 times a player has been in this situation in the past they have got injured.”

The action is still in the decision maker’s hands, but now this can be made of objective fact as opposed to subjective opinion.

You can request a copy of a full Performance and Injury Report at science@kitmanlabs.com