

Sports Analytics

Notes 01/24/23

Measurables and Judging Athleticism

The NFL Combine is an event before the NFL draft where college football players have their athleticism judged by NFL personnel. The players perform a variety of tests in a standardized setting, and their results on these tests can significantly affect their draft status. NFL teams are sometimes criticized for relying too much on these “measurables” when evaluating players. Today we look at how analytics can be combined with measurables to provide better assessments of players’ athletic ability.

The players are tested on the following:

1. The 40-yard dash: how many seconds it takes a player to run 40 yards starting from a standstill.
2. The vertical jump: how high a player can jump in inches.
3. The broad jump: how far a player can jump in inches.
4. The bench press: how many times a player can bench press 225 pounds.
5. The shuttle run.
6. The 3 cone drill.

The main idea we work with today is that a prospect’s height and weight should be taken into consideration when judging any of these tests: a 240-pound player who runs the 40-yard dash in 4.5 seconds is more impressive than a player who runs the same time at 175 pounds. We focus on height/weight adjustments for the 40-yard dash, the vertical jump, and the bench press.

1. Weight-Adjusted-40, also known as the *speed score*:

$$WA40 = 200 \times \frac{Weight}{(40time)^4}.$$

2. A weight-adjusted vertical jump is based on a regression analysis of past combine data. The regression formula below tells us the expected vertical jump for an average player at the given weight

$$Exp.Vert. = 46.38 - 0.0597 \times Weight.$$

We then subtract the prediction from a player's actual jump to judge their performance:

$$WAV = Vert. - (46.38 - 0.0597 \times Weight) .$$

3. A weight-and-height-adjusted bench press is based on a regression analysis of past combine data. The multiple regression formula below tells us the expected number of bench press reps for an average player at the given weight and height

$$17.401 + 0.1075 \times Weight - 0.3354 \times Height .$$

We then subtract the prediction from a player's actual bench press to judge their performance:

$$WHABP = BenchPress - (17.401 + 0.1075 \times Weight - 0.3354 \times Height) .$$

Class:

1. Using the NFL Combine data set posted on Moodle:
 - (a) Calculate the weight-adjusted 40 times for all prospects in the last three years.
 - (b) Rank prospects according to their 40-yard dash.
 - (c) Rank prospects according to their weight-adjusted 40.
 - (d) Discuss which measure seems to be better for evaluating players.
2. Using the NFL Combine data set posted on Moodle:
 - (a) Calculate the predicted vertical jumps for each prospect.
 - (b) Calculate each prospect's weight-adjusted vertical jump.
 - (c) Rank prospects according to their vertical jump.
 - (d) Rank prospects according to their weight-adjusted vertical jump.
 - (e) Discuss which measure seems to be better for evaluating players.
3. Using the NFL Combine data set posted on Moodle:
 - (a) Calculate the predicted bench press for each prospect.
 - (b) Calculate each prospect's weight-height-adjusted bench press.
 - (c) Rank prospects according to their bench press.
 - (d) Rank prospects according to their weight-height-adjusted bench press.
 - (e) Discuss which measure seems to be better for evaluating players.