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**How Bodyweight Can Impact Overall Performance for Power Lifters**

**Have you ever stepped on the scale in your bathroom or at the gym and wondered, “But what is this number supposed to be?”** Most people want the number on that scale to be as small as possible, but what most people know (with a little research) is that fat weighs less than muscle. A growing portion of the population is getting into “functional fitness”. It’s not just about being skinny anymore; it’s about what your body can do. So how do you balance the scales – such as they are – so that you’re getting the most bang for your buck?

It is recommended before you start any exercise regimen that you consult your doctor to confirm that it is safe for you to do so. Additionally, if you ask your doctor what they think you should do, often they’ll tell you to perform roughly 30 minutes of moderate exercise three times a week.

The tools that doctors use to tell their patients how to see improvement physically haven’t changed since I was a child. **So how do the factors of bodyweight, age, and gender affect physical performance?** In this paper, I will show you by using data from powerlifting competitions. Something to remember about powerlifting events is that they consist of three events (not including weigh-ins):

* Back Squat
* Bench Press
* Deadlift

An athlete is given three attempts at each lift, and the best of those three are added together to create the “Total” score**. The purpose of the model created from my analysis could potentially serve as a tool for physicians when they are consulted by their patients who perform at powerlifting competitions.**

Logic dictates that the more muscle you have (i.e., the more you weigh) the more lift capability you will have. I used two months’ worth of data from lifting competitions in 2019 to complete my analysis. Bodyweight is the primary predictor I have used, with gender as a delineator. Ultimately, I fit an interaction model to the data to provide the best estimate.

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*Figure 1: Interaction Model*

Model: *lift capability* = 220.35 + 1.6\**bodyweight* + 81.69\**gender* + 1.56\*(*bodyweight*\**gender*)

Interaction models use dummy quantities for nominal categorical variables like gender. This results in two separate linear formulas as shown in *figure 1*. A way of simplifying the formulas for your gender would be as follows:

Men – *lift capability* = 302.04 + 3.16\**bodyweight*

Women – *lift capability* = 220.35 + 1.6\**bodyweight*

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*Figure 2: Regression Estimates*

**For each additional kilogram of bodyweight, we can expect to see an increase of approximately 3.16kg in a male athlete’s total lift capability and an increase of 1.6kg in a female athlete’s lift capability.**

The p-values for the estimated coefficients are all very close to zero, which indicates their statistical significance in the projection of lift capability. Approximately 69.7% of total variation in lift capability at powerlifting competitions can be explained by its relationship with an athlete’s bodyweight and gender. The good news is that age (20-50) did little to affect performance – so in theory you can sustain your overall output for several decades. It was for this reason that age was not included as a predictor variable in the model presented here.

One of the drawbacks to this model is due to the data from which it was derived. It is only accurate for professionally performing athletes and could not be used accurately for someone who is just starting to get into power lifting. As a comparison, I would call myself an amateur athlete (on and off for 6 years), and my personal metrics fall 400kg short of where I’m projected to be performing. Meanwhile, I’m typically in the top 5% for Virtual Ironman competitions. This model is very specific to lifting; applying it to other “functional fitness” disciplines like Ironman or CrossFit will likely fail to provide an accurate estimate.

In conclusion, a practicing physician or a professional coach could use this model as a benchmark to assess where their patient or athlete is currently standing – are they lifting as much as they should be according to this model and their current bodyweight? From there, they can investigate if it would be beneficial to put on more muscle to improve performance even more for the next competition.