**Exploring the Ratio of Dumbbell Press to Flat Bench Press**

**Many weightlifters wish to track the ratio between the weight they use for flat dumbbell press compared to barbell bench press.**

A **dumbbell** is a short bar with equal weight on both sides designed to be held in the lifter's hands. Flat dumbbell press is when the lifter lies on a flat bench with their arms positioned at roughly 45-degree angles, lifts two equal sized dumbbells, brings them back to the chest, and then keeps going.

A **barbell** is similar in shape to a dumbbell, but is a longer, much heavier bar where multiple weighted plates can be placed on either side. Barbell bench press is when the lifter lies on a bench with the barbell positioned at their chest, lifts the barbell, and then brings it back down.

Say Melissa is able to flat dumbbell press two 30 lbs dumbbells. The total amount she can flat dumbbell press is 60 lbs (one dumbbell for each arm). On flat bench press, she can lift 75 lbs. Her ratio would be calculated by dividing flat dumbbell press by barbell bench press (60/75) which equals 0.8, meaning that Melissa can lift two dumbbells up to 80% as heavy as she can bench press the barbell.

A screenshot of a calculator

Description automatically generatedThe goal of the ratio is to compare how much someone is lifting two dumbbells versus how much they are able to lift the weighted barbell. You obtain the ratio by multiplying the weight of one dumbbell by 2 (to account for the two weights that the person would hold) and dividing that weight by the amount someone is able to barbell bench press.

**The data is sourced from a self-reported Reddit open forum[[1]](#footnote-1). Users provided their weight for both a flat dumbbell press and a barbell bench press, and it was compiled by another user into the corresponding weight ratio. It is important to note that as this is a self-reported open forum, biases may be introduced that wouldn't otherwise be present.**

Below is a dataset with observations from 18 weightlifters and their corresponding ratio, as well as summary statistics and a dot plot.

A graph with numbers and dots

Description automatically generated with medium confidence

A screenshot of a cell phone

Description automatically generated

**1.** Based on the dot plot and the data table, what could be a concern regarding the spread of the data, and what is a possible solution.

The dot plot shows that there is a lot of missing data resulting from a small sample size. From the data we have, not knowing the spread / what distribution the data follows could be a concern. While we can guess that the data follows a normal distribution, we can’t confirm it with this small of a sample size. Because of the small sample size, getting a full picture of the actual spread of the data is difficult as not everything is being explained. The solution would be to gather more data points from a more diverse audience to get a better idea of the distribution and if the data is actually skewed or not.

**2.** What potential problems could arise from the way the data was collected?

Since the data was based on self-reporting and from an online open forum such as Reddit, we can’t guarantee that the data is 100% correct or reflective of the entire population. When self-reporting, there is bound to be bias and noise in the data. People who are looking at this reddit thread are already involved in the weightlifting community and part of the target audience. They might have higher ratios compared to the average person. This could lead to skewed data and inhibit us from seeing the whole picture.

**3.** Create a 95% confidence interval for the mean ratio between flat dumbbell press and barbell bench press.

Between 0.6822360 and 0.7690974

**4.**  Considering your answer in question 2, do you believe that the population mean presented in this confidence interval is reliable? What audience would it apply to? Explain your answer.

Answers vary. A sample answer could mimic something like:

I don’t believe this population mean to be reliable. The sample size is too small and there is too much bias in data collection to be able to provide a reasonable, reliable estimate for the population mean. As of right now, this would apply to people who regularly do these exercises and work out, as the people who self-reported their data probably lean more towards that audience. If there was a larger sample size, I believe the population mean presented in the confidence interval would be more reliable and could apply to a larger audience.

**5.** We’ve seen that Melissa has a ratio of 0.8. Now, she has a goal to become more “balanced” and have more of an average ratio. What should she do in order to achieve this? Explain both in terms of the ratio and the exercises involved.

Melissa would need to decrease her ratio. She can become more balanced by getting better at barbell bench press (increasing denominator of ratio) so that it is closer to the amount she can flat dumbbell press (the numerator) and thus making the ratio smaller.

**6**. Suppose you wish to further investigate the strength ratio; how would you go about finding more concrete results and how would that make the data more useful? Be specific.

To get more useful data you would need to increase the sample size and the number of observations you would have. This could include going to the gym and certain times throughout the day and surveying the people who are working out. You could also sit outside of the dining hall and ask people who walk in. This would ensure you are increasing the sample size. This would make the data more useful because the large sample size would reduce the margin of error and increase the reliability and power of the test that you’re performing, thus making it more applicable and more useful.

1. Reddit Thread: <https://www.reddit.com/r/Fitness/comments/35q4i3/how_much_do_you_dumbbell_flat_bench_compared_to/> [↑](#footnote-ref-1)