



# Thank you for participating in the Rutgers RunLab & RU Strong Testing!!

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This document will summarize the results of your testing. Where it is possible, we will compare your test results to what has been published in the literature.

For many tests, we will use z-scores which tell you whether you are above or below the performance established in the literature. If your z-score is positive, you are doing better than the average person. If your z-score is negative, you are doing worse than the average person. If your z-score is 0 - congratulations, you are perfectly average!!

Most people's z-score will fall between -1 and 1. Z-scores between -2 and 2 are still considered normal.

## VO2 Max

### Measured with the Queens College Step Test

VO2 max is a measurement of the maximum amount of oxygen that an individual can use during exercise. VO2 max is an important indicator of cardiovascular health because it reflects the ability of the heart and lungs to deliver oxygen to the muscles. A higher VO2 max indicates greater cardiovascular fitness and a lower risk of cardiovascular disease.

VO2 max is also associated with other health benefits, such as improved muscle strength and endurance, decreased body fat, and better cognitive function. Therefore, regular exercise that increases VO2 max is an important part of a healthy lifestyle.

Based on the results of the Queens College Step Test, your estimated VO2 max is 50.85 milliliters of oxygen per kilogram per minute.

It is important to remember that this is an estimate from a submaximal exercise test. It is not as specific as what is done in an exercise physiology lab. This test is good for average individuals, but may overestimate your fitness if you are trained.

You can use the tables below to determine your fitness category based on your age and sex.

Typical VO<sub>2</sub> max for people born male measured in mL/kg/min:

Age	20–29	30–39	40–49	50–59	60–69	70–79
Superior	55.4	54	52.5	48.9	45.7	42.1
Excellent	51.1	48.3	46.4	43.4	39.5	36.7
Good	45.4	44	42.4	39.2	35.5	32.3
Fair	41.7	40.5	38.5	35.6	32.3	29.4
Poor	<41.7	<40.5	<38.5	<35.6	<32.3	<29.4

Typical VO<sub>2</sub> max for people born female measured in mL/kg/min:

Age	20–29	30–39	40–49	50–59	60–69	70–79
Superior	49.6	47.4	45.3	41.1	37.8	36.7
Excellent	43.9	42.4	39.7	36.7	33	30.9
Good	39.5	37.8	36.3	33	30	28.1
Fair	36.1	34.4	33	30.1	27.5	25.9
Poor	<36.1	<34.4	<33	<30.1	<27.5	<25.9

Tables taken from <https://www.healthline.com/health/vo2-max#averages>

## Isometric Mid-Thigh Pull (IMTP)

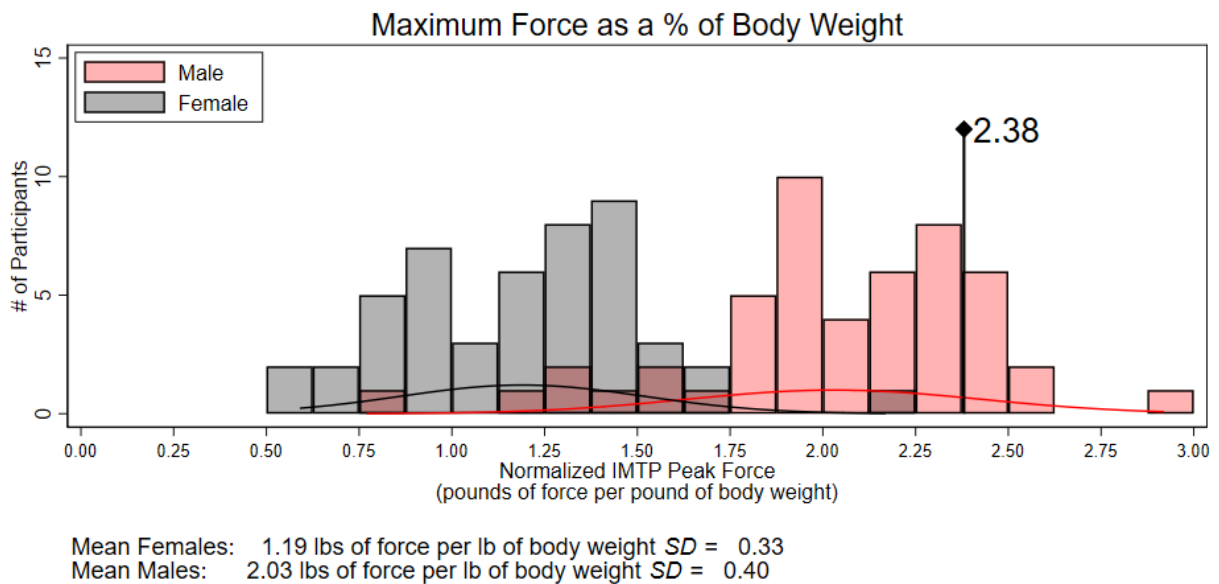
The IMTP is a measure of total body strength. Even though running is an endurance sport, we still think that total body strength is important because it gives us a sense of someone's overall capacity. Plus, a stronger individual will be using a lower percentage of their maximum for each stride.

Because we expect larger people to be stronger, we look at a raw IMTP value and also compare that to body weight. Based on the people that we have tested so far, here is what we consider to be normal:

Females: **1.19** pounds of force per pound of body weight (standard deviation **.33**).

Males: **2.03** pounds of force per pound of body weight (standard deviation **.4**).

Your performance: **328.51** total pounds of force or **2.38** pounds of force per pound of body weight.



## Grip Strength

Grip strength is a good overall measure of musculoskeletal wellness. People who are more active tend to have greater grip strength because they use their hands for more activities.

Similar to the IMTP, we expect larger people to generally be stronger. We look both the absolute grip strength and at grip strength compared to weight. Based on the people that we have tested so far, here is what we consider to be normal:

Females: **.98** pounds of grip force per pound of body weight (standard deviation **.25**).

Males: **.66** pounds of grip force per pound of body weight (standard deviation **.12**).

Your performance: **105** total pounds (**47.73** kilograms) or **.76** pounds of grip force per pound of body weight.

### Normal Grip Strength per Warden et al (2021)

Your grip strength z-score compared to people of similar age and sex is **.01**

### Average Grip Strength in kilograms

	Female	Male
0	0	0
18-29 years	27.7	45
30-39 years	28.2	47.6
40-49 years	26.6	47.9
50-59 years	25.2	42.8
60-69 years	24.4	39.1
69 years or older	21.6	

### Broad Jump

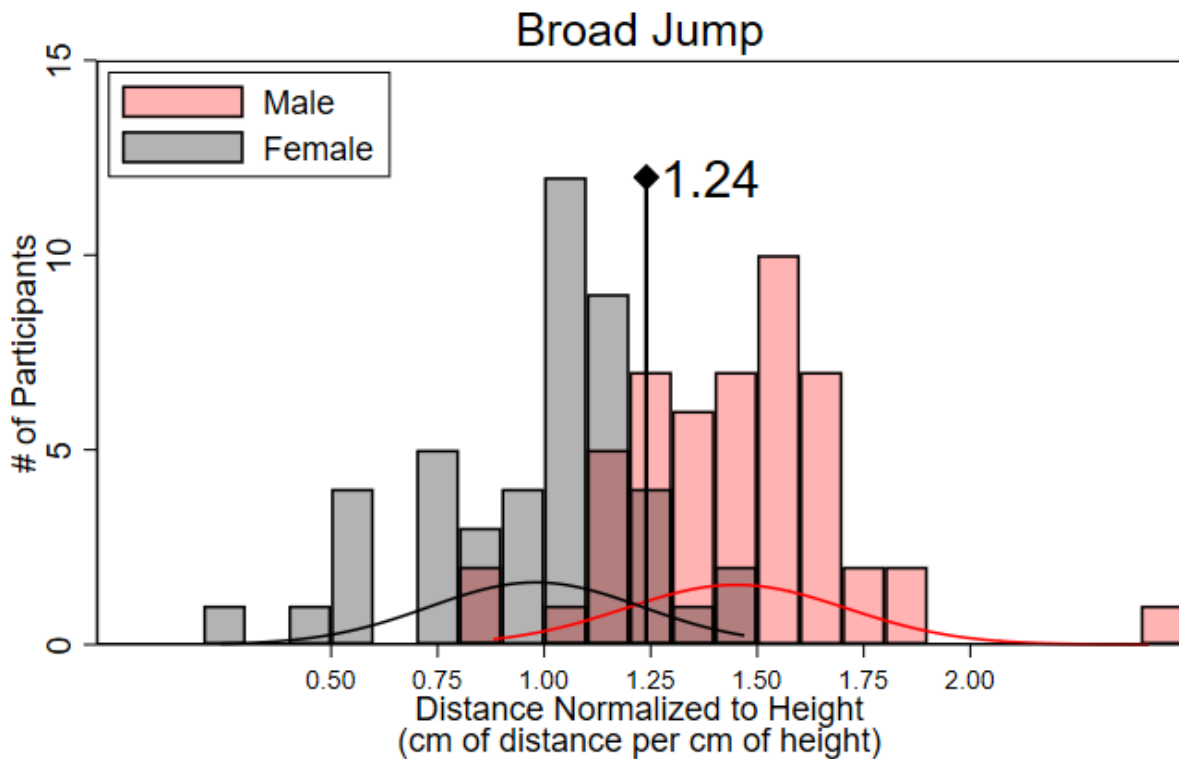
The broad jump is a measure of lower body power. By measuring how far you can jump horizontally, we can get a good sense of how much power you can produce. As you run, better lower body power will help you with acceleration and speed.

We expect taller people to generally jump farther, so we look both the absolute distance you can jump and at a value compared that to height. Based on the people that we have tested so far, here is what we consider to be

Females: **.98** centimeters jumped per cm of height (standard deviation **.25**).

Males: **1.45** centimeters jumped per cm of height (standard deviation **.26**).

Your performance: **180** total centimeters or **1.24** centimeters jumped per cm of height.



Mean Females: 0.98 cm of distance per cm of height  $SD = 0.25$   
 Mean Males: 1.45 cm of distance per cm of height  $SD = 0.26$

#### Normal Broad Jump Distances per McKay et al (2017)

Your broad jump z-score compared to people of similar age and sex is **.22**

#### Average Broad Jump Distance in centimeters

	Female	Male
20-59 years	122.7	172.3
60 years or older	55	89.9

#### Chair Rise Testing

##### Five Times Sit to Stand

The five times sit to stand is frequently used to assess overall functional performance of the lower extremity. It challenges lower extremity strength, coordination, and balance. Poor performance (slower times) can indicate functional deficits.

Based on the people that we have tested so far, here is what we consider to be normal:

Females: **7.18** seconds to complete 5 repetitions (standard deviation **1.74**).

Males: **5.88** seconds to complete 5 repetitions (standard deviation **1.21**).

Your performance: **8.51** seconds to complete 5 repetitions.

### Normal 5x Sit to Stand Performance per Warden et al (2021)

Your 5x sit to stand z-score compared to people of similar age and sex is **.24** per Warden et al. For this test a negative z-score indicates you are completing the test faster than the average person.

#### Average 5x Sit to Stand Times (seconds) per Warden et al

	Female	Male
0	0	0
18-29 years	8.5	8.3
30-39 years	8.9	8
40-49 years	9.2	8.8
50-59 years	10.1	9.3
60-69 years	9.5	9.7
69 years or older	10.6	

### 30 Second Chair Rise Test

The 30-second chair rise test assesses lower extremity endurance. The challenges are similar to the five times sit to stand, with the added component of fatigue.

Based on the people that we have tested so far, here is what we consider to be normal:

Females: **21.38** repetitions in 30 seconds (standard deviation **4.74**).

Males: **26.54** repetitions in 30 seconds (standard deviation **5.12**).

Your performance: **19** total repetitions.

### Normal 30 Second Chair Rise Performance per McKay et al (2017) and Warden et al (2021)

Your 30 second chair rise z-score compared to people of similar age and sex is **-.83** per McKay et al and is **.06** per Warden et al.

#### Average 30 Second Chair Rise Repetitions per McKay et al

	Female	Male
20-59 years	22.6	24.2

60 years or older	15.9	18.3
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Average 30 Second Chair Rise Repetitions per Warden et al

	Female	Male
0	0	0
18-29 years	17.5	18.1
30-39 years	16.5	18.7
40-49 years	16.3	16.7
50-59 years	15.9	16.3
60-69 years	14.6	15.7
69 years or older	14	