

What makes an Olympic rower?

A study into the best body type for rowing.

1. Introduction

Due to the upcoming elimination of lightweight rowing in the Olympics, we wanted to see how much this would effect the rowing community especially Ireland lightweight rowers. We are all avid rowers and have had an interest in rowing and the performance of athletes for some time. We studied a variety of athletes of different heights and weights to see how much of an impact this had on their performance. We looked at world record times and top athletes around the world and saw that most of these athletes were tall and heavy. However, neither of us are tall or heavy like many successful international athletes, yet we are able to beat athletes taller and heavier than ourselves. As a result, we wanted to see what body type is the best fit for rowing. We sent out emails to top heavyweight and lightweight athletes and asked for ergo results to graph. In order to see what body type was fastest we tested athletes over 500m and 2000m and analyzed the results to find what body type was ideal for rowing. Unfortunately most athletes couldn't release results as they were on international and college squads so we tested athletes in our club and other local clubs, some of which have represented Ireland and are high achievers at national level.

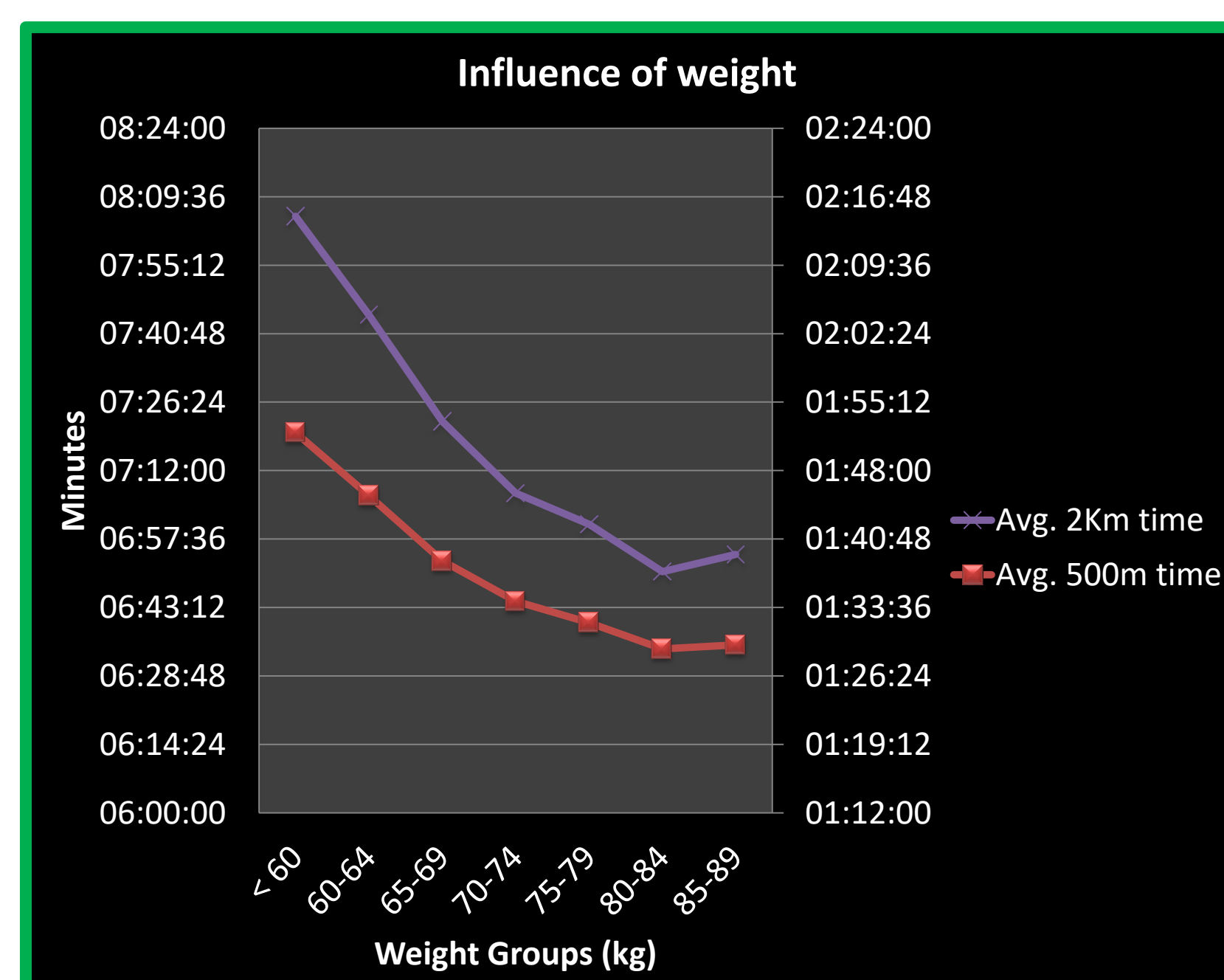
2. Method

1. We selected athletes to study and had a sample size of about 60 athletes all of which had racing experience and had a decent level of rowing technique.
2. After this we then took measurements of their weight, overall height, lower body length, upper body height and arm length. The first step we took was to remind our athletes of basic rowing technique. Each athlete ensured us that they would work to their highest possible intensity.
3. We then asked our athletes to complete a 500m sprint on a concept 2 ergometer and we recorded their times. We also asked them for their most recent 2000m time.
4. We then analysed our results and developed conclusions from our results.



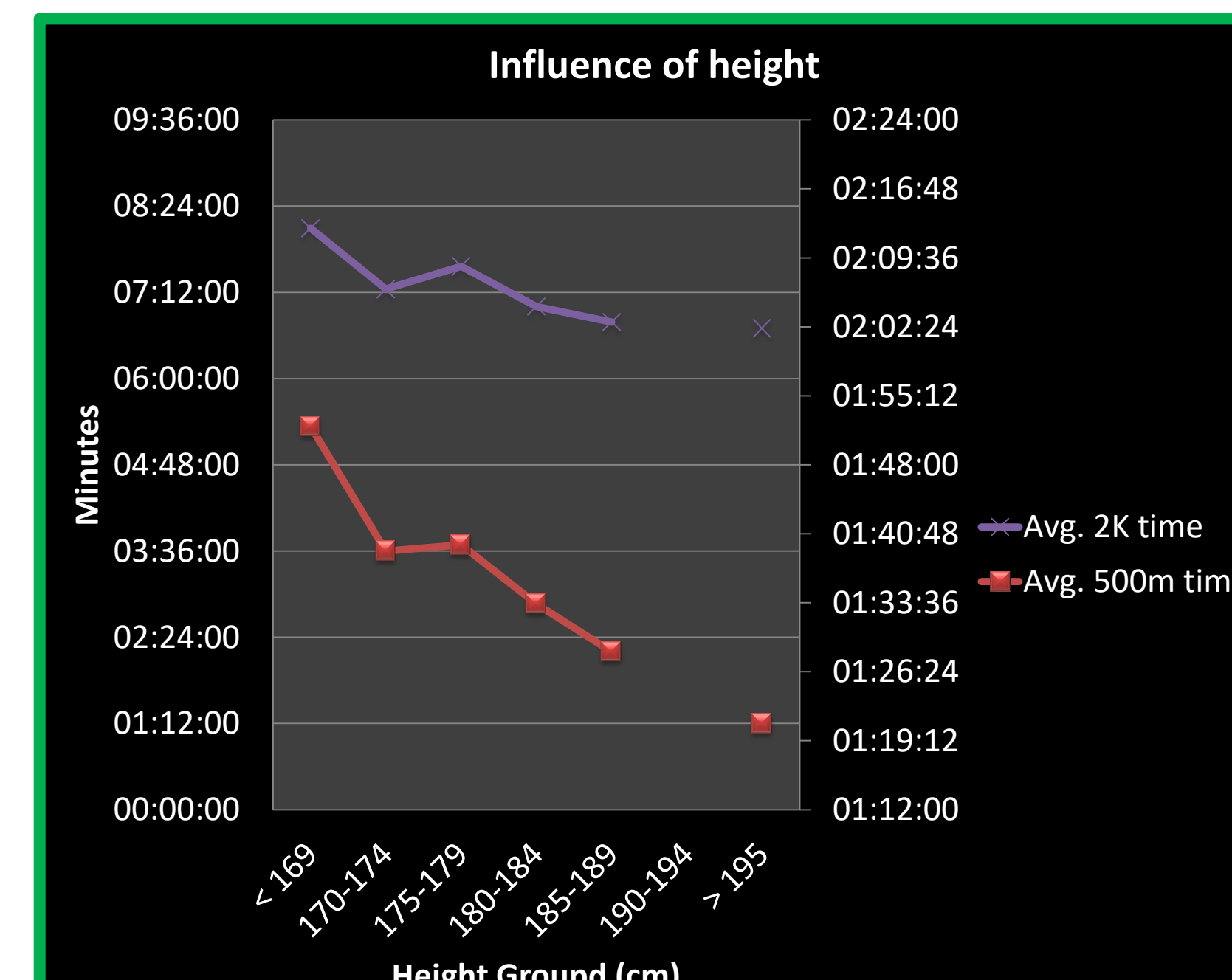
3. Weight

Once all of the data was collected we found the average time of the athletes performance in each group. We drew up a graph to represent each group's average performance over both 500m and 2000m. The results below show, as the athletes gets heavier their times decrease at a rapid rate up to the athletes in group 3 (70kg-74kg). From group 3 onward the times continue to decrease but at a much lower rate. The 500m average time and the 2km average times both decreased at similar rates as the athletes weight increased. From this we can conclude that weight has an effect on an athlete's performance but the advantage of being heavier decreases as the athletes get heavier.



Height

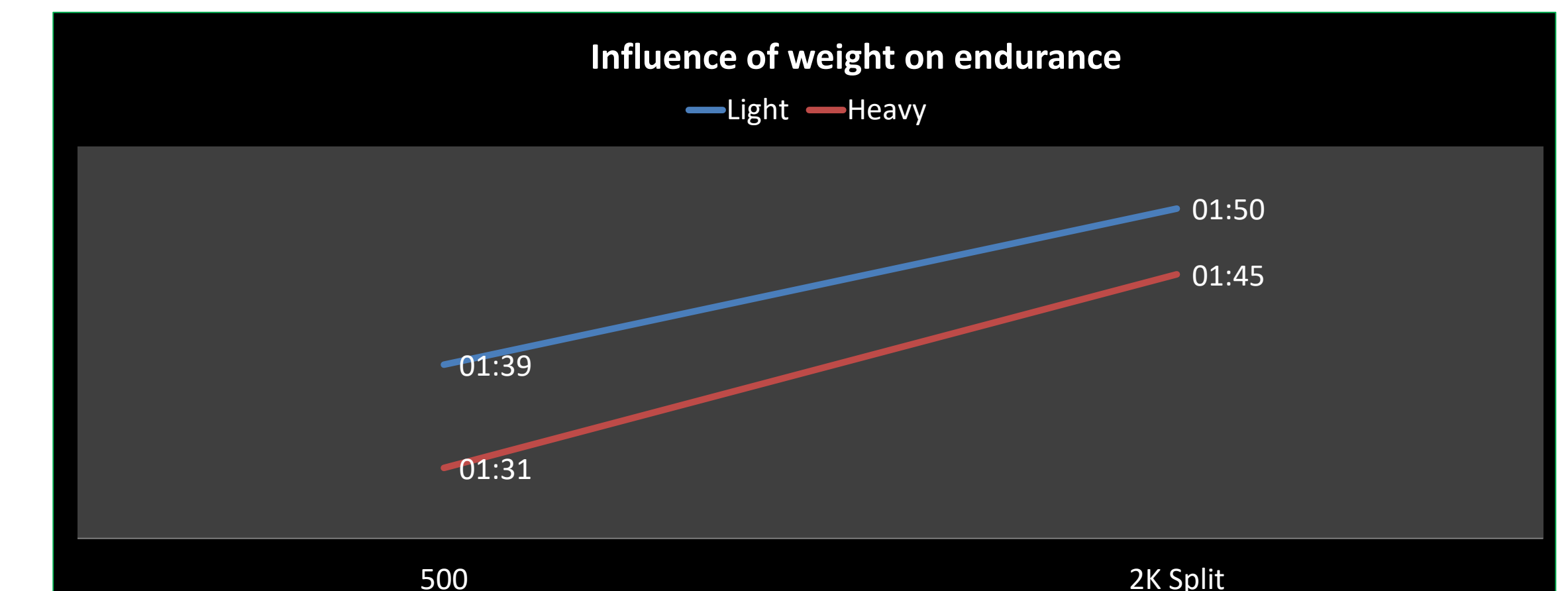
Similar to weight we arranged the athletes into groups based on their height. We found the average 500m and 2000m time of each group and displayed it on a graph. We found that the effect of height in relation to time decreased as the athletes got taller. Taller athletes performed better over the shorter distance but some shorter athletes were able to keep up with the taller athletes over the 2000m. Athletes who were over 180cm performed best. If athletes were underweight for their height the advantage of being tall can sometimes be eliminated. We saw this over the 2000m piece.



5. Endurance

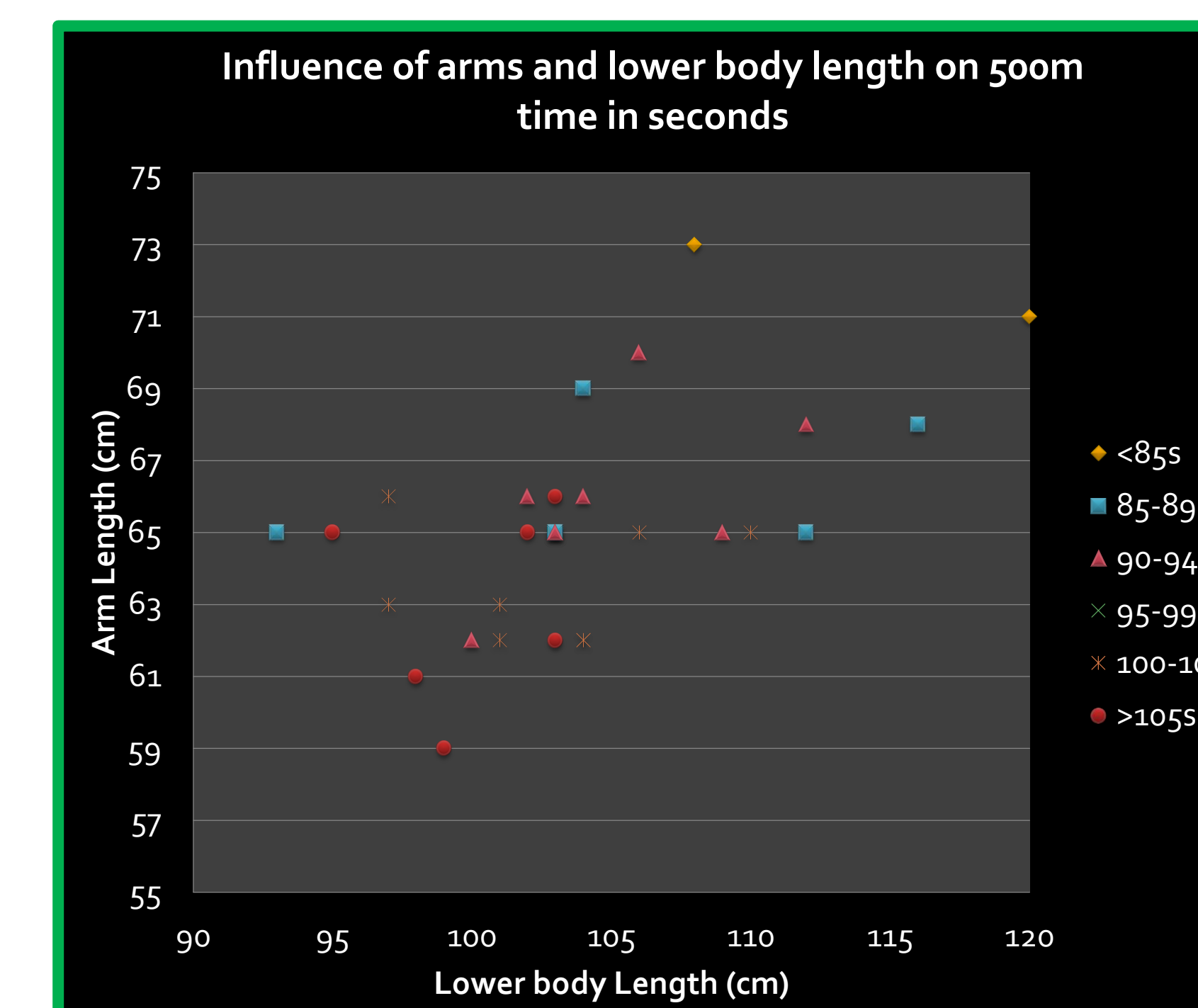
A 500m piece is an anaerobic piece where taller heavier athletes have a strong advantage over shorter lighter athletes. While a 2000m piece is an aerobic piece where taller heavier athletes have much less of an advantage over the shorter lighter athletes. In some cases the heavier athletes are disadvantaged. Heavier athletes don't have as good endurance as lighter athletes and sometimes struggle over long distances. Lighter athletes generally have a better VO₂ max than heavier athletes. This is similar to the difference in body shapes of runners. Sprinting is anaerobic fitness while marathon or long distance running is aerobic fitness. We studied our athletes under the categories lightweight and heavyweight set out by FISA. We found that although lightweight athletes had slower times than heavyweight athletes the difference in split (time per 500m) over 500m and 2000m was less when it came to the lightweight. Lightweight athletes were 12% slower over 2000m in comparison to 500m, while the heavyweight athletes were 16% slower.

Group	500	2K Split	% change
Light	01:39	01:50	12%
Heavy	01:31	01:45	16%



6. Arm and leg length

We measured the participants from the center of their shoulder to their middle knuckle to see if the length of their arm had an impact on their ability to row. What we thought was that if their arms were longer, then it could mean they could achieve additional meters per stroke in different parts of the stroke such as the catch (the initial drive) and coming into backstops (the end of the stroke).



7. Conclusion and Recommendations

From our analysis of the data we were able to conclude that lightweight athletes were not at a disadvantage over heavyweight athletes and even in some cases lightweight athletes were at an advantage because of their stronger Vo₂ max and better endurance. Living proof of this is New Zealand lightweight Rower and Henley Diamond Sculls winner Matthew Dunham. Matt won the Diamond Sculls which is a heavyweight event even though he is a lightweight athlete. He later placed 2nd in the world championships to Irelands Gary O'Donovan.

Although German rower Lars Hartig, who competed in the London Olympics decided to change to heavyweight rowing simply because he was struggling to make the weight in order to compete. Lars now competes in heavyweight rowing. This proves that there isn't much of a difference in pace between the two categories.

Another example of this is Irish athletes Shane O' Driscoll and Mark O'Donovan who own the lightweight pair in the 2017 world championships. This is not an Olympic Event so they might decide to enter the heavyweight pair event. The initial presumption might be that they wouldn't be fast enough simply because they weigh less than heavyweight world championship winner Giuseppe Vincio and Matteo Lodo from Italy. The Irish pair were only 16 seconds off the winning time and would have been in the top 6 fastest time in the category.

As a recommendation we could suggest that lightweight athletes can enter heavyweight events and continue to compete at a high level. If we were to continue the project we would like to see how athletes in each category would perform over a 5000m course.

