

DEPTH CHARGE

how weights and jumps help your swimming speed

by Jon Cree

Personal bests

It seems like a bizarre marriage: improving swimming times by movements carried out on land, with virtually no crossover – but the margins are so narrow that every base should be covered!

At last year's FINA World Swimming Championships held in Shanghai, the difference between 2nd and 6th place in the men's 50-metre freestyle final was split by 0.09 seconds. Thus any improvement in performance clearly has the potential to put you on the podium. It's all down to the start – or more specifically, the dive.

As you mean to go on ...

Research suggests that the 15-metre start time (the maximum distance before breaking the surface in a race) can affect total race performance by as much as 30% in the 50-metre sprint (see Table 1) [1]. As you might expect, this percentage decreases for longer races, but there is no denying it – the better the dive, the better the time.

This having been established, a large number of biomechanical research papers produced over the years have documented every movement and type of start –

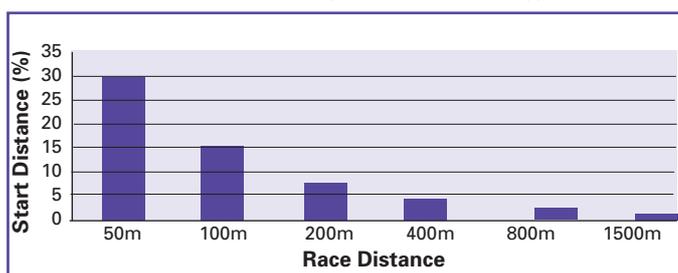


Table 1: Proportion of start distance to total race distance

as outlined below. Nevertheless, they generally come to the same conclusion: the further the dive and the better the entry angle, the shorter the time to 15 metres.

Best foot forward

There are two main types of start universally used within the sport where strokes on your front are involved. These are the grab start and the track start. The major difference between them is the foot placement on the block, as seen in Figures 1 and 2. This foot placement has been shown to have a significant impact on how well the athlete starts.



Figure 1: Grab start

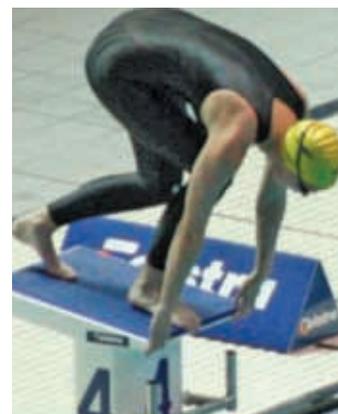


Figure 2: Track start

Source: Steve Buckley/www.pullbuoy.co.uk

On track to win

The majority of research papers have established what happens within the dive by using a force plate under the feet on the dive block and a high-speed camera from a side view [2]. This allows the researchers to measure the amount and direction of force (vertical and horizontal) that the athlete applies to the block and also the reaction times, change in joint angles and water-entry angle via the camera.

The results showed the track start to be more effective, allowing the athletes to dive further with greater entry speed and steeper entry angle [3]. In addition, the new design in the adjustable rear-foot position seen at the 2012 Olympics will further widen the gap between the two starts. Entry angle is important: the more of you that goes through the same hole, the less aquatic resistance has to be overcome – and the faster you go.

How weights can help

One of the reasons athletes were able to dive further, with greater speed, is that they applied more force to the block. Research in 2011 on a group of 11 international sprint swimmers demonstrated that start time to 15 metres correlated significantly with the athlete’s 1 repetition maximum (1 RM), jump height, peak and relative power [4]. It was concluded that, to improve the swim start, the athlete should incorporate strength and power exercises in their programme.

The main issue with weights, as with many sports, is the possibility of gaining too much lean muscle mass. This can be particularly detrimental to a swimmer’s performance due to the need to be as streamlined as possible. However, if you follow the correct guidelines, this should never be an issue.

Interestingly, a 6-week intervention of plyometrics to a group of adolescent swimmers in 2011 also reported positive results for the swim start and turn times, although not for kicking propulsion [5]. Unfortunately, no other research has been done in swimming with this specific remit – although reviewing the broader evidence gives a clear indication that plyometrics can have a positive impact on jump height [6].

Building a routine

The major components for increasing muscle mass are low rest periods with 10–12 repetitions of 70–85% repetition maximum, around 3–6 sets of an exercise and 3–4 sessions per week [7]. Keep clear of these parameters, and you will avoid bulking up.

Long rest periods and low reps are the key here, and mastery of these eight key lifts and jumps is necessary (more information from [7] and [8], respectively, both excellent resources):

- | | |
|---------------|-----------------|
| Back squat | Jump to box |
| Front squat | Jump and stick |
| Deadlift | Jump for height |
| Bent-over row | Drop land |

It is advisable to introduce weights and jumps slowly and to bear in mind that correct technique is crucial.

Once good technique is achieved, it is possible to increase first weight and then distance. You are strongly

advised to complete this with the guidance of a qualified strength and conditioning coach, before attempting it unsupervised.

Example programme

Below is an example programme based around a 2-day routine; however, a single day may be more achievable to start with for beginners, or to suit time constraints. If so, use Exercises 1 and 2 from each day only. If both days are used, 48 hours’ recovery between sessions is advisable.

Day 1: weights					
		Weight	Repetitions	Sets	Rest
Exercise 1	Front squat	60% 1 RM	8–12	3–6	3–5 minutes
Exercise 2	Full deadlift	60% 1 RM	8–12	3–6	3–5 minutes
Exercise 3	Bent-over row	60% 1 RM	8–12	3–6	3–5 minutes
Exercise 4	Stiff-leg deadlift	60% 1 RM	8–12	3–6	3–5 minutes

Day 2: plyometrics					
		Repetitions	Sets	Rest	
Exercise 1	Jump to box	5–10	2–5	2–3 minutes	
Exercise 2	Jump and stick	5–10	2–5	2–3 minutes	
Exercise 3	Jump for height	5–10	2–5	2–3 minutes	
Exercise 4	Drop land	5–10	2–5	2–3 minutes	

Once your programme is established, and key lifts and jumps have been mastered, progressions can include increases in weight, sets, jump distance and height. It is also advisable to progress to the Olympic lifts, in particular the Clean.

References

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