

VERTICAL JUMP VS. SPRINT SPEED

Thesis: If a swimmer has a higher vertical jump, then they will have a faster 25 yard sprint time. I believe this as an overall general hypothesis but also within each individual. Meaning, if one repetition is a jump and a sprint, a swimmer's lowest jump should result in their slowest swim and vice versa.

Procedure:

- 1) Record an athlete's vertical jump height (inches) behind the block
- 2) 5 seconds rest
- 3) Sprint 25 yards on the whistle
- 4) Mark time at 15 yards and 25 yards
- 5) 2-4 minutes rest
- 6) Repeat steps 1-5

Results:

*note: The first table is week 1 where the swimmers were more "fresh". The second table is another week where the swimmers were more fatigued.

		1	15 yds	25 yds		2	15 yds	25 yds		3	15 yds	25 yds		4	15 yds	25 yds	
Swimmer		Vertical (in)	Sprint Time (sec)		Difference	Vertical (in)	Sprint Time (sec)		Difference	Vertical (in)	Sprint Time (sec)		Difference	Vertical (in)	Sprint Time (sec)		Difference
BOYS	1	20.3	6.06	10.63	4.57	20.8	6.06	10.5	4.44	20.9	6.03	10.56	4.53	21.4	6.06	10.47	4.41
	2	19.8	6.41	11.25	4.84	19.3	6.28	11.03	4.75								
	3	19.8	5.94	10.61	4.67	19.3	6.16	10.85	4.69	20.2	6.06	10.84	4.78	20	6.16	10.62	4.46
	4	21.9	6.28	11.1	4.82	23.5	6.34	11.26	4.92	24.9	6.31	11.11	4.8	25.2	6.26	11.09	4.83
	5	16.8	6.88	11.94	5.06	16.9	6.69	11.19	4.5	17.2	7	11.66	4.66	17.2	6.81	11.5	4.69
	6	21.1	5.69	10.15	4.46	23.3	5.78	9.85	4.07	22.5	5.78	10.12	4.34	23.2	6.18	10.7	4.52
	7	17.9	6.59	11.58	4.99	17.9	6.31	11.44	5.13	18.5	6.63	11.59	4.96	19.5	6.59	11.53	4.94
	8	19.9	6.72	11.5	4.78	20.8	6.97	11.62	4.65	18.5	7.16	12.3	5.14	19.9	6.94	11.94	5
	9	14	7.19	12.43	5.24	13.8	7.21	12.02	4.81	16.9	7.72	13.29	5.57	13.1	7.72	13.14	5.42
	10	15.8	6.75	11.43	4.68	17.3	6.56	11.37	4.81	17.1	6.91	11.82	4.91	19.4	7.1	11.52	4.42
GIRLS	11	13.4	7.59	12.85	5.26	12.4	7.34	12.39	5.05	12.4	7.91	13.26	5.35	12.5	7.44	12.87	5.43
	12	16.2	7.28	12.28	5	17.8	7.53	12.59	5.06	17.1	7.21	12.6	5.39	17.5	7.25	12.33	5.08

		1	15 yds	25 yds		2	15 yds	25 yds		3	15 yds	25 yds	
Swimmer		Vertical (in)	Sprint Time (sec)		Difference	Vertical (in)	Sprint Time (sec)		Difference	Vertical (in)	Sprint Time (sec)		Difference
BOYS	1	18.8	7.54	12.76	5.22	18	7.54	12.79	5.25	17.6	7.46	12.61	5.15
	2	13.8	7.69	12.76	5.07	14.8	7.93	13.44	5.51	16.8	8.09	13.49	5.4
	3	18.9	6.67	11.21	4.54	19.9	6.54	11.15	4.61	23.1	6.64	11.23	4.59
	4	18.3	7.61	12.85	5.24	19.5	7.51	12.48	4.97	19.7	7.67	12.42	4.75
	5	22.2	5.87	10.34	4.47	21.9	6.05	10.41	4.36	21.6	6.16	10.54	4.38
	6	16	6.9	11.33	4.43	15.8	6.73	11.5	4.77	16	6.73	11.2	4.47
	7	18.3	6.84	11.6	4.76	18.2	6.61	11.61	5	18.4	6.83	11.73	4.9
GIRLS	8	13.7	7.76	13.35	5.59	14.5	7.89	13.89	6	14.2	7.88	13.81	5.93
	9	16.2	7.17	12.07	4.9	17.7	7.19	12.16	4.97	17.6	7.2	12.22	5.02
	10	15.7	8.23	13.55	5.32	13	8.22	14.02	5.8	11.8	8.35	14.62	6.27

Higher vertical jump was strongly associated with faster sprint times **across swimmers**. Since sprint time is lower-is-better, the useful direction is **negative r**.

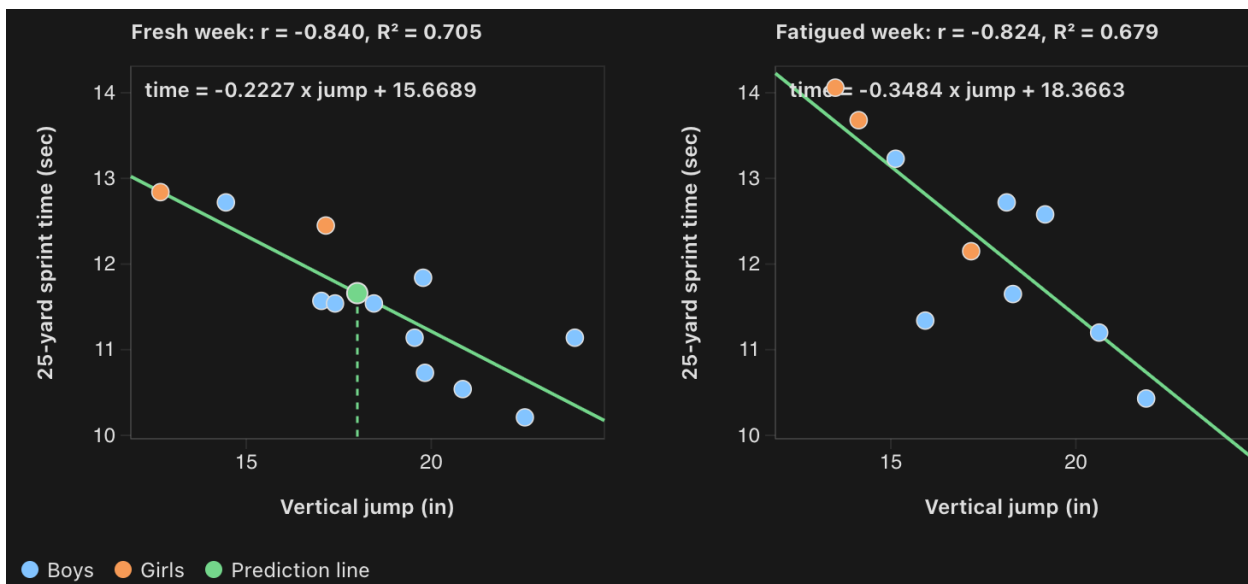
Data Set	Vertical vs 15 yd	Vertical vs 25 yd	Vertical vs 15-25 Difference
Week 1, swimmer averages	$r = -0.860$	$r = -0.840$	$r = -0.731$
Week 2, swimmer averages	$r = -0.804$	$r = -0.824$	$r = -0.811$

The biggest takeaway: swimmers with higher vertical jumps tended to be faster to both 15 yards and 25 yards.

Week 1 showed a very strong relationship with 15-yard and 25-yard times, with a stronger emphasis on the first 15-yards. This makes sense because this is the most explosive part of their swim.

Week 2 also showed strong relationships, and the 15-25 difference correlation got stronger. That suggests vertical power may also relate to how well swimmers maintain speed after the start when fatigued.

Another thing to note is that the person with the highest jump did not swim the fastest. The highest average vertical jump was 23.9 in but his swim time was 11.14 sec. The fastest swim was 9.85 sec. That is a useful finding because jump power helps, but technique, streamline, breakout, and stroke efficiency still matter a lot.



This graph shows the relationship on averages. It creates two equations one for a fresh sample and one for a fatigued sample. If you insert vertical jump height, then you will know 25-yard sprint time.

R² means how much of the variation in sprint time is explained by vertical jump in the prediction line.

So if:

$$R^2 = 0.705$$

That means about 70.5% of the differences in 25-yard sprint times in that data set are explained by differences in vertical jump.

Within Each Swimmer

“When the same swimmer jumps higher on a rep, do they go faster on that rep?”

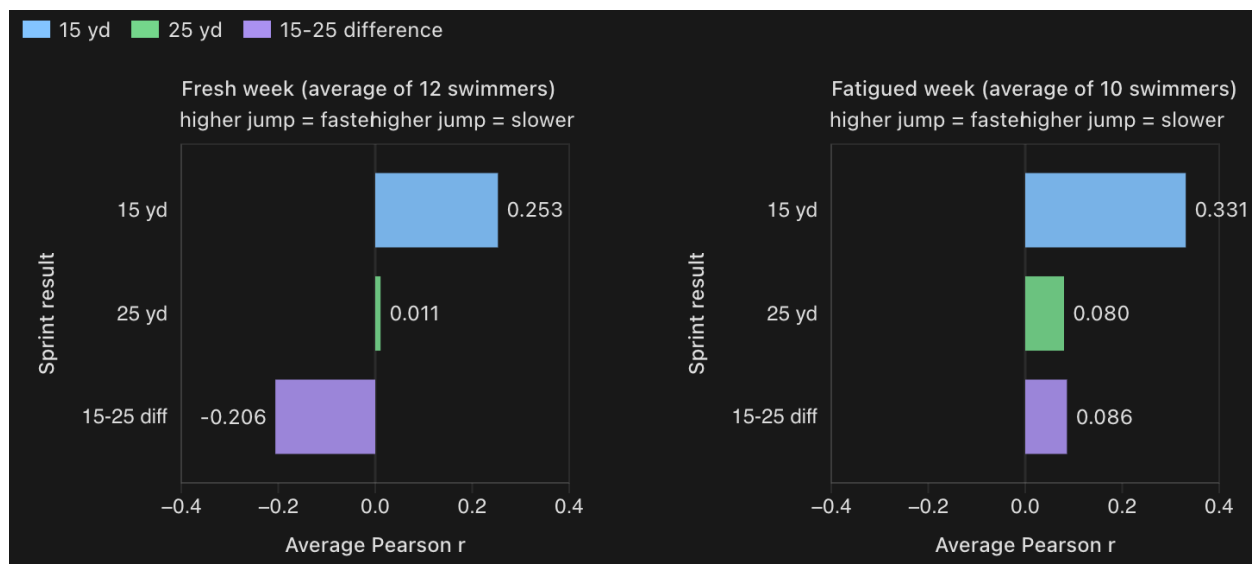
The answer is: **not consistently.**

Within-Swimmer Correlation	15 yd	25 yd	15-25 Difference
Week 1	$r = +0.284$	$r = +0.088$	$r = -0.135$
Week 2	$r = +0.196$	$r = -0.169$	$r = -0.302$

So across swimmers, vertical jump is a strong predictor of speed. But within an individual swimmer's reps, a higher jump did not reliably mean a faster 25-yard time.

That likely means vertical jump is better as a general power profile marker than as a rep-to-rep predictor. Also, each swimmer only had 3-4 reps, so individual swimmer r values can swing hard and should be treated carefully.

The only other thing I would like to note is that the last 10-yards of the rep began to see more of a relationship especially when fatigued. It would be beneficial to do this study but with a longer swim distance. I believe this would find that nervous system activation shows how prepared a swimmer is for a race.



This is averaging the individual swimmer r values. It shows that, on average, the within-swimmer relationship is weak and mostly near zero, even though the overall group relationship was strong.

MAIN TAKEAWAY:

Swimmers with a higher vertical jump are most likely going to swim faster, however this is not the only factor because swim related skills play a big role as well. So a swimmer who is trying to swim a faster 25 or 50 or even 100 yard event, should focus on exercises to increase their vertical.