

Participation Of Elite Swimmers From USA Swimming's All-Time Top 100 Times Listing

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Up until 1996, USA Swimming annually published an all-time Top 100 times list based on the reported Top 16 times from each year. In other words, all of the Top 16 times were ranked with the fastest 100 times listed in this annual report.

The analysis of the all-time Top 100 at different ages may provide valuable information about the long-term progression of elite level swimmers. There is constant debate in the swimming community about high-level performances at a young age in swimming. We still do not know if early high-level performances may limit a swimmer's progression later in their career. Many famous swimmers came from vastly different training programs. Unfortunately, coaches and scientists have speculated about the advantages of low-level or high-level performances at a young age based on a few examples of elite level swimmers. Some elite level swimmers were already ranked in the Top-100 as a 10-under, while other elite level swimmers only reached the Top 100 at age 18. Which strategy is better? The lack of scientific investigations on long-term performance progression only increases speculation on this topic.

In order to understand the progression of elite swimmers during competition, we analyzed USA Swimming's All-Time Top 100 age group times by girls and boys. All-Time Top 100 age group times are divided into five groups according to the age of the swimmer: 10-under, 11-12, 13-14, 15-16, and 17-18. For the purpose of this study, we considered elite level swimmers the group of All-Time Top 100 at age 17-18¹. The purpose for our investigation of the all time Top-100 was to try to answer the following questions:

1. How many elite level swimmers at age 17-18 achieved All-Time Top 100 at younger ages?
2. Are there differences between males and females?
3. Did elite level ranked swimmers change their events during long-term training?

The investigation was done using the last All-Time Top 100, which were published by USA Swimming in 1996. Therefore, this investigation did not include the elite swimmers from the last six years. The following swimming events were analyzed: 100, 200, and 500 yards freestyle; 100 and 200 yards backstroke; 100 and 200 yards breaststroke; 100 and 200 yards butterfly; and the 200 yard individual medley.

Analysis of Female Top 100 Athletes

All-Time Top 100 in freestyle events for females is presented in Figure 1. Data presented for age groups include elite swimmers from Top 100 at age 17-18 in all events. It means that if an elite swimmer from Top 100 at age 17-18 was ranked in other Top 100 events she would be included. For example, if a swimmer was ranked in the Top 100 for the 100 freestyle in the 17-18 age group and was not listed in the Top 100 for 100 freestyle as a 10-under, but was ranked in the 100 breaststroke she would be included. The 500 freestyle event wasn't included in Top 100 at age 10 and under.

1. It could be argued that "elite level" swimmers could be older than ages 17-18, but USA Swimming does not rank older athletes by ages. This could be especially true in male swimmers.

The data shows that the number of participants in freestyle events for females increases gradually from age 10-under until the age of 15-16 years. As was expected, the older the elite swimmer is the more likely they will be ranked in the Top 100. However, there were a relatively small number of 17-18 year-old swimmers from the Top 100 who were also ranked as a 10-under. For example, only nine swimmers at age 10 and under were listed at age 17-18 in 100 freestyle. Seventeen swimmers at age 10 and under were listed at age 17-18 in 200 freestyle. If you look at the chart in Table 1 you will also see that the numbers decrease if you take out the number of 10-under athletes who were ranked in other events. The number of elite swimmers slowly increases with each age group in all freestyle distances. Surprisingly, there were still a low number of elite swimmers at age 15-16: 51 swimmers in 100 freestyle, 60 swimmers in 200 freestyle, and 53 swimmers in 500 freestyle events. Thus, about half of the elite swimmers in the Top 100 at age 17-18 were new swimmers who were never ranked in the Top 100 at any age. This statistic shows that most of the future elite swimmers swim under Top 100 times until age 15-16.

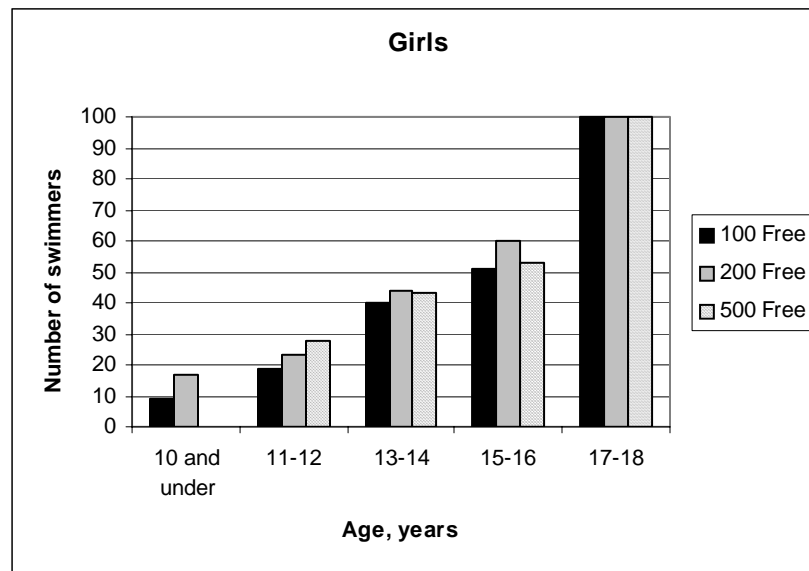


Figure 1. Participation for USA All-Time Top 100 in females' freestyle events

Similar tendencies occur in the stroke events as well. The low numbers of elite female swimmers are listed in backstroke, breaststroke, and fly events (see Figures 2 and 3). These numbers are even lower than in freestyle events and don't reach 50 at age 15-16. The numbers of elite female swimmers are between 43 in 200 fly and 49 in 200 breaststroke at Top 100 at age 15-16. Hence, most of the elite female swimmers at age 17-18 first made their appearance in the Top 100 at that age. The 1996 All-Time Top 100 list was before 200's in backstroke, breaststroke, and butterfly were recognized for Top 16 consideration.

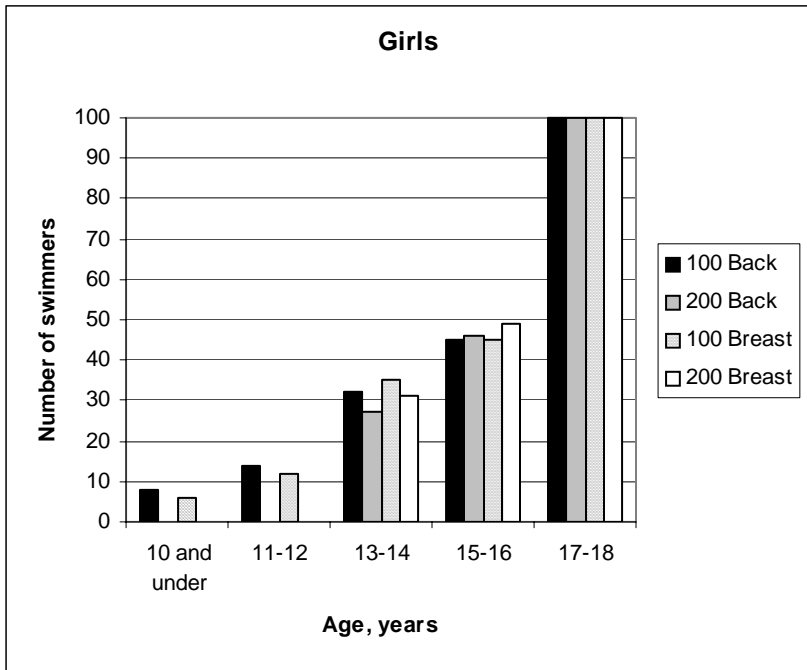


Figure 2. Participation for USA All-Time Top 100 in females' backstroke and breaststroke events

Fifty-eight 15-16 year-old girls elite level swimmers were listed in the 200 IM (see Figure 3). These numbers are higher than in other events.



Figure 3. Participation for USA All-Time Top 100 in females' butterfly and IM events

Analysis of Male Top 100 Athletes

Participation for the USA Swimming All-Time Top 100 in male freestyle events is presented in Figure 4. As the data shows, participation of elite male swimmers is relatively low in each age group until the age of 17-18. As you can see from the chart in Table 2 almost 50% of the elite male swimmers made their first appearance in the Top 100 ranking at age 17-18. There is a small difference between elite female and male freestyle swimmers at age 11-12 and 13-14, where it appears that higher numbers of female freestyler's were ranked in the Top 100. Similar tendencies appear in other males' events (see Figures 5 and 6).

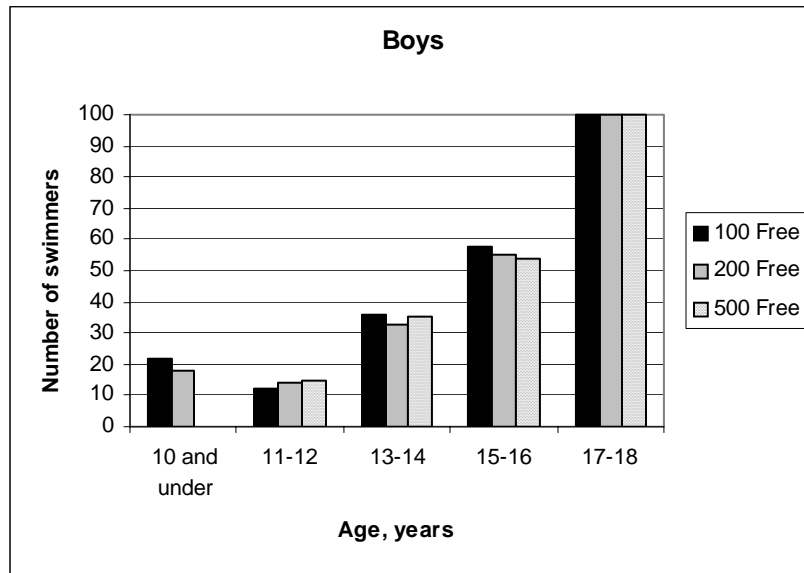


Figure 4. Participation for USA All-Time Top 100 in males' freestyle events

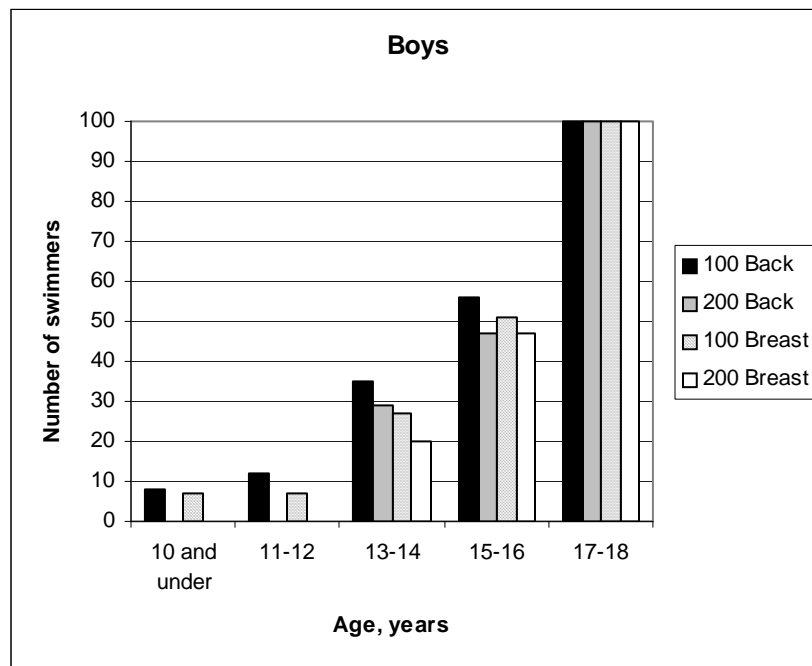


Figure 5. Participation for USA All-Time Top 100 in males' backstroke and breaststroke events

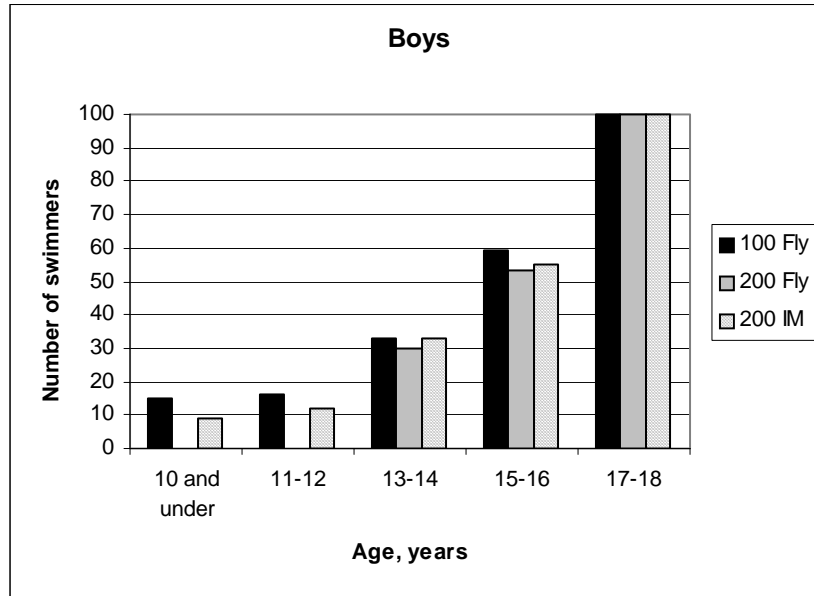


Figure 6. Participation for USA All-Time Top 100 in males' butterfly and IM events

It was investigated how many elite level swimmers change their events at Top 100's. With that goal in mind we analyzed participation of elite swimmers from age 17-18 in Top 100's at various ages in the same and other events. For example, how many elite swimmers from age 17-18 were listed in the same or other events at age 10 and under, 11-12, 13-14, and 15-16. The numbers for female swimmers are presented in Table 1.

It is better to look at these numbers relative to the total number of elite swimmers. At age 10 and under many elite female swimmers are listed in other events. As data shows, 51.6% of elite female swimmers are listed in other events at age 10 and under. This number decreases with age and reaches 26.6% and 24.9% at age 13-14 and 15-16, respectively. It shows that most of elite female swimmers select their event at age 13-14.

Participation of elite male swimmers in the same and other events is presented in Table 2. The analysis shows that 69.6% of elite male swimmers are listed in other events at age 10 and under. This number decreases with age and reaches 26.7% at age 15-16. The elite male swimmers select their events at age 15-16 or about 2 years later than elite female swimmers.

Table 1. Participation of female elite swimmers from the 17-18 age group in the Top 100 at various ages in the same and other events

Event	10 and under			11-12 year olds			13-14 year olds			15-16 year olds		
	Ranked in the same event	Ranked in another event	Total	Ranked in the same event	Ranked in another event	Total	Ranked in the same event	Ranked in another event	Total	Ranked in the same event	Ranked in another event	Total
100 Free	3	6	9	13	6	19	32	8	40	38	13	51
200 Free	8	9	17	11	12	23	30	14	44	36	24	60
500 Free				16	12	28	32	11	43	41	12	53
100 Back	2	6	8	10	4	14	22	10	32	37	8	45
200 Back							21	6	27	36	10	46
100 Breast	5	1	6	12	0	12	30	5	35	41	4	45
200 Breast							23	8	31	34	15	49
100 Fly	9	6	15	14	9	23	31	13	44	34	13	47
200 Fly							25	12	37	34	9	43
200 IM	3	4	7	12	11	23	25	11	36	42	16	58
Totals	30	32	62	88	54	142	271	98	369	373	124	497
	5%	5.3%	10.3%	12.6%	7.7%	20.3%	27.1%	9.8%	36.9%	37.3%	12.4%	49.7%

Table 2. Participation of male elite swimmers from the 17-18 age group in the Top 100s at various ages in the same and other events

Event	10 and under			11-12 year olds			13-14 year olds			15-16 year olds		
	Ranked in the same event	Ranked in another event	Total	Ranked in the same event	Ranked in another event	Total	Ranked in the same event	Ranked in another event	Total	Ranked in the same event	Ranked in another event	Total
100 Free	3	19	22	3	9	12	15	21	36	37	21	58
200 Free	7	11	18	6	8	14	16	17	33	41	14	55
500 Free				10	5	15	20	15	35	40	14	54
100 Back	2	6	8	3	9	12	21	14	35	42	14	56
200 Back							18	11	29	42	5	47
100 Breast	3	4	7	4	3	7	21	6	27	41	10	51
200 Breast							15	5	20	33	14	47
100 Fly	6	9	15	8	8	16	23	10	33	44	15	59
200 Fly							17	13	30	32	21	53
200 IM	3	6	9	5	7	12	18	15	33	40	15	55
Totals	24	55	79	39	49	88	184	127	311	392	143	535
%	4%	9.2%	13.2%	5.6%	7%	12.6%	18.4%	12.7%	31.1%	39.2%	14.3%	53.5%

Conclusions

What do these numbers mean for coaches and athletes? Based on a statistical analysis of elite level swimmers ranked in the Top 100 listing here are some conclusions for long-term career training:

1. A small number of elite swimmers from the Top 100 at age 17-18 were ranked in the Top 100 at a younger age. Typically, a little over 10 % were ranked as a 10-under, about the same figure as a 11-12 year old, a little over 30% as a 13-14 year old, and a little over 50% as a 15-16 year old. Similar numbers were found for female swimmer's, however, they have a little higher percentages in the 11-12 and 13-14 age groups.
2. The analysis shows that most of elite level swimmers were unknown at young ages. About a half of elite swimmers at Top 100 at age 17-18 are new swimmers, which never were listed at Top 100 at any age. This leads to conclusion that most of future elite swimmers swim slower than age group champions, especially at ages until 15-16 years.
3. Many participants ranked in the Top 100 as age groupers are not present in the Top 100 as they become an elite swimmer in the 17-18 age group. We speculate that the two reasons for losing these young Top 100 ranked champions may be related to their early biological maturation and/or an inappropriate training volume at a young age.
4. Elite level swimmers change their events during long-term training. This is especially true for young swimmers until the age of 13-14. Elite male swimmers tend to change their events until the age of 15-16.