

Evaluating Proposed 2024 Age-Grade Standards Against 2020 Rankings

Alan Jones and Tom Bernhard

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Introduction

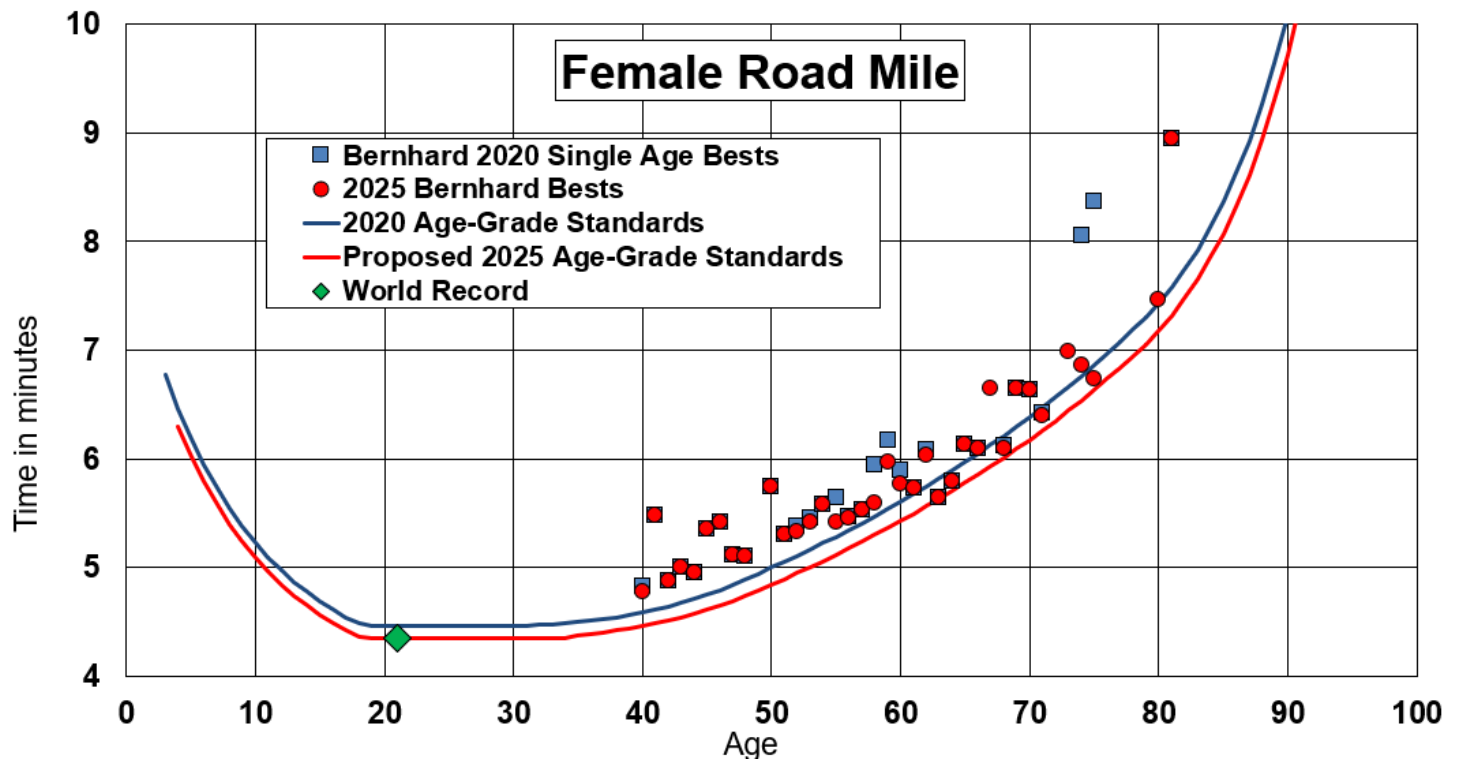
Alan Jones has produced the road-running age-grade standards every five years since 2005. They are based on the single-age bests. Since 2020, Tom Bernhard has been providing the single-age bests at each distance.

Using Tom's latest data, Alan created new standards for 2025. To evaluate them, he compared how both the 2020 and 2025 standards did against Tom's 2025 single-age bests.

This can be shown by looking at the graphs for the age grade standards for the distances 5 km, 10 km, Half Marathon, and Marathon. I'll refer to these distances at the "Calibration Distances" and the others as "Interpolation Distances."

The graphs show the 2020 standard (blue) and the proposed 2025 standard (red). Also, the single-age bests are shown for both 2020 (blue) and 2025 (red).

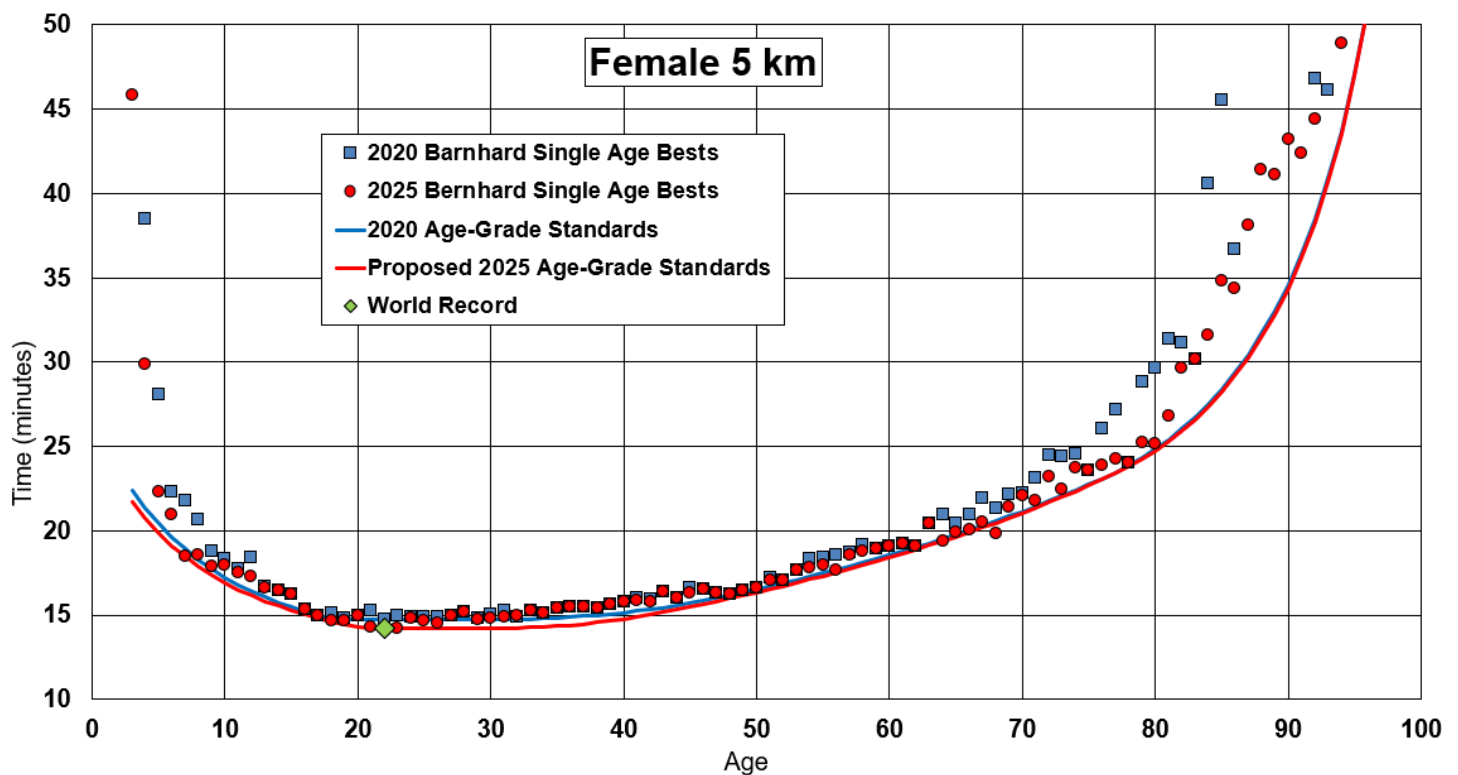
Female Road Mile



We only have data for masters and older runners.

The improvement in the Road Mile World Record had the effect of dragging all of the standards down. The improved performances in ages 60s and 70s were in line with this improvement.

Female 5 km



This chart indicate that the standards changed very little since 2020 except for ages 20 through about 50. These changes are mostly due to the female world record improving. In 2020 the world record was 14:44 and is 14:13 in 2025.

The time for a 68-year-old woman is below the line. We are considering this an outlier and are not including it when determining the new standard. We are not claiming anything about the course being short, or the age being wrong, or it being drug enhanced. We just say it is an outlier.

Another way to evaluate the changes from 2020 is to apply the 2025 age-bests against the 2020 standards. Those results are shown in the blue column in the table below. The red column shows the 2025 age-bests applied to the 2025

Age	Performance 2020 data vs 2015 standards	Performance 2020 data vs 2020 standards
1		
2		
3	48.8	47.4
4	71.3	69.3
5	91.5	89.1
6	93.5	91.2
7	102.4	100.0
8	98.4	96.2
9	99.1	97.0
10	96.1	94.3
11	96.1	94.4
12	95.0	93.4
13	96.8	95.3
14	95.7	94.4
15	95.3	94.2
16	99.4	98.3
17	99.8	98.9
18	100.9	99.7
19	100.7	98.7
20	98.4	95.7
21	102.9	99.5
22	103.6	100.0
23	103.6	100.0
24	99.5	96.1
25	100.6	97.0
26	101.7	98.2
27	98.6	95.1
28	97.1	93.7
29	100.1	96.6
30	99.3	95.8
31	99.1	95.7
32	98.8	95.3
33	96.8	93.5
34	98.0	94.7
35	96.3	93.2
36	96.0	92.9
37	96.3	93.4
38	97.4	94.5
39	96.2	93.5
40	95.9	93.4
41	96.0	93.7
42	97.1	95.0
43	94.1	92.4
44	97.3	95.7
45	96.2	94.8

45	96.2	94.8
46	95.7	94.5
47	98.4	97.2
48	99.7	98.5
49	99.3	98.1
50	99.3	98.2
51	98.0	96.9
52	99.3	98.2
53	96.9	95.9
54	97.2	96.2
55	97.5	96.5
56	100.1	99.1
57	96.6	95.7
58	96.5	95.6
59	96.7	95.9
60	97.4	96.5
61	97.7	96.9
62	99.6	98.9
63	94.2	93.5
64	100.7	100.0
65	99.1	98.5
66	99.8	99.2
67	98.9	98.3
68	103.7	103.1
69	97.5	97.0
70	95.9	95.5
71	98.3	97.9
72	93.7	93.4
73	98.3	98.0
74	94.4	94.1
75	96.5	96.3
76	96.5	96.4
77	96.6	96.5
78	99.4	99.2
79	96.5	96.2
80	98.6	98.3
81	94.7	94.3
82	87.7	87.3
83	88.6	88.2
84	86.9	86.5
85	81.4	80.9
86	85.3	84.8
87	79.7	79.3
88	76.4	75.9
89	80.4	79.9
90	80.1	79.6
91	85.9	85.4
92	86.6	86.1

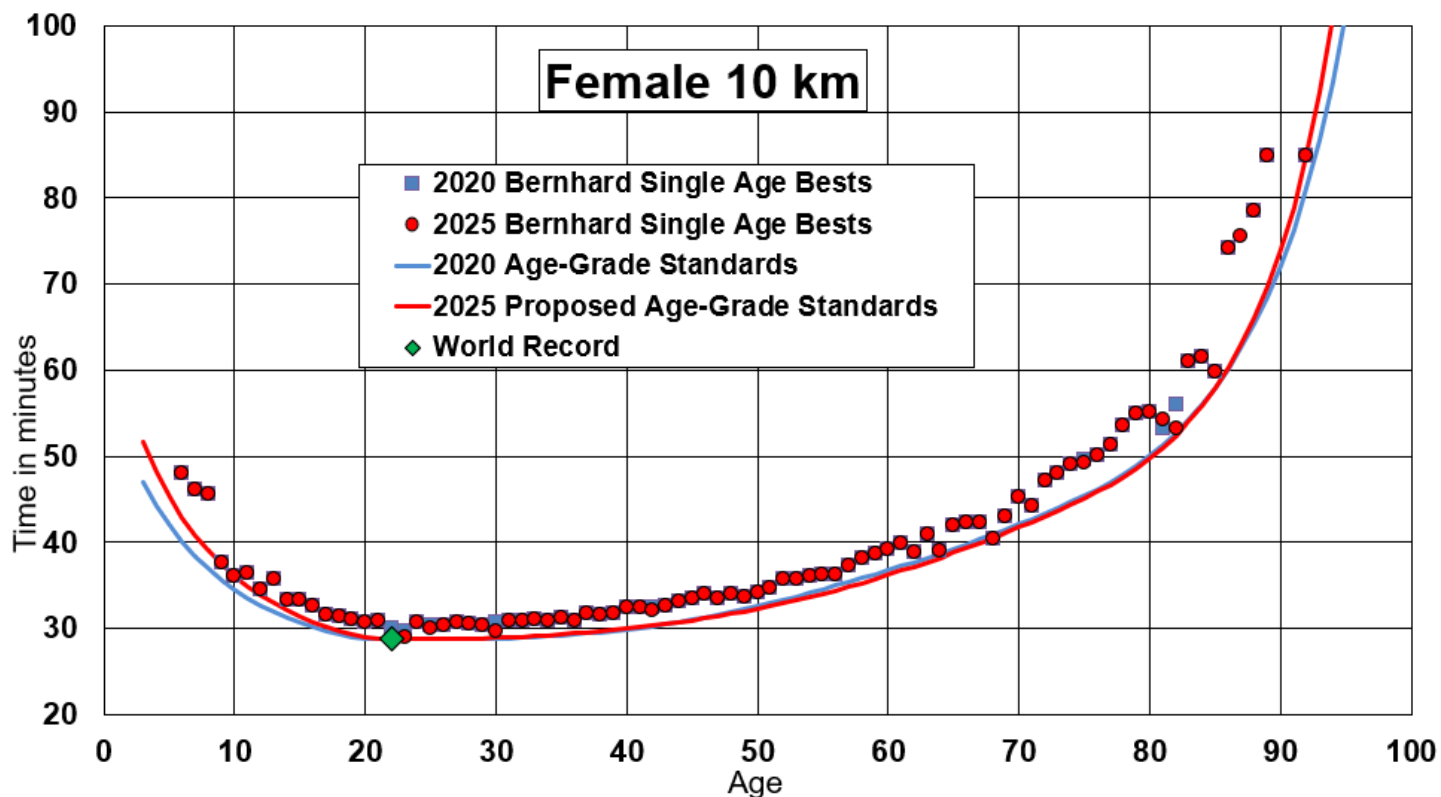
standards. Any number greater than 100 in the first column indicates that the 2020 standard for age is too soft when applied to the 2025 data.

Our goal is to keep all the numbers in the second column at or below 100. A secondary goal is to have as many ages at exactly 100 as possible.

Again, age 68 shows up as an outlier.

We did a good job fitting the data because there is a value of 100.0 at ages 7, 22, 23, and 64.

Female 10 km



Again, there is very little change between the 2020 standards and the proposed 2025 standards. The youth standards match the data better than they did. For the rest of the ages there is very little change.

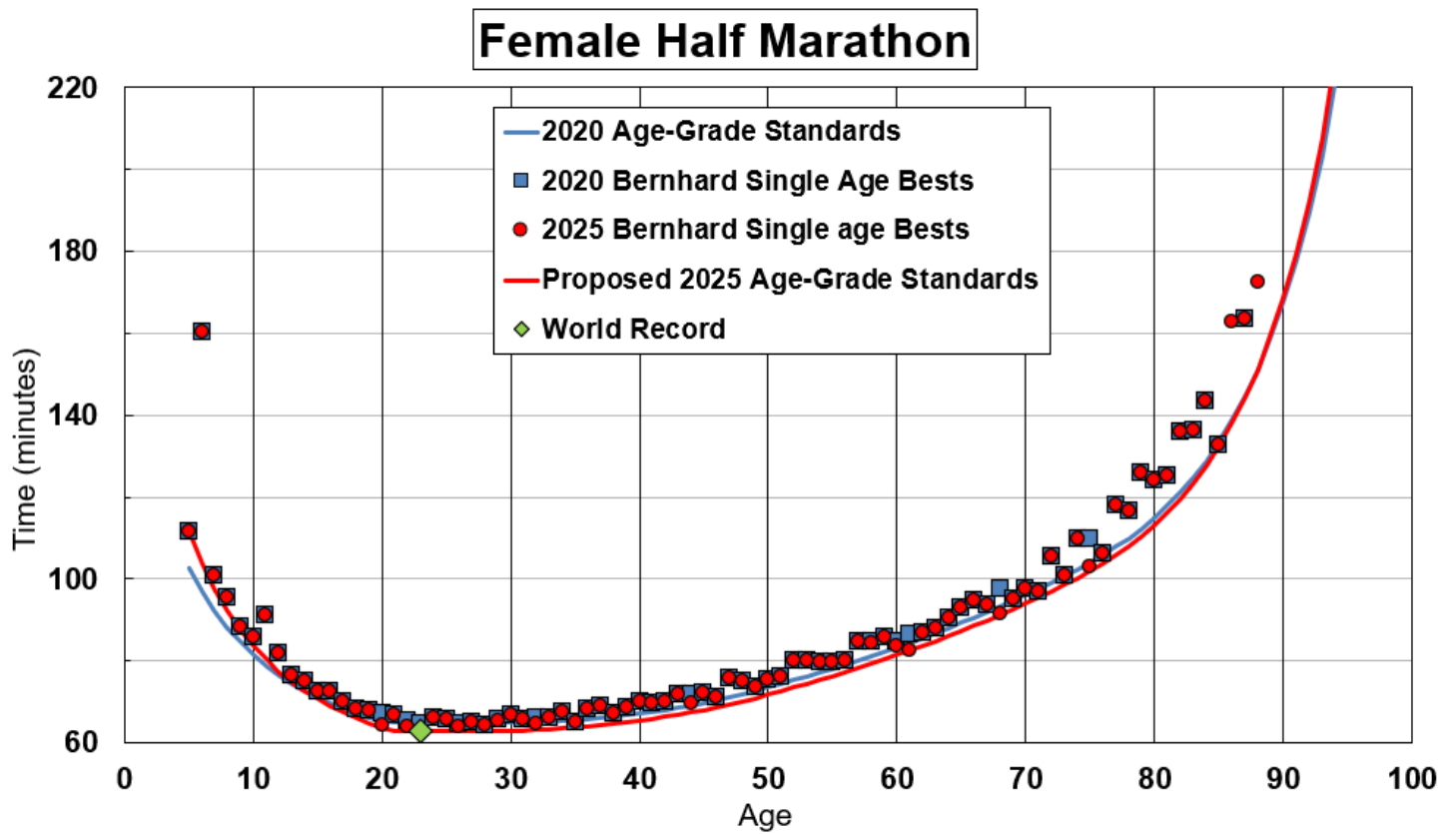
Age	Performance 2025 data vs 2020 standards	Performance 2025 data vs 2025 standards
1		
2		
3		
4		
5		
6	83.4	89.2
7	83.2	88.4
8	80.8	85.3
9	94.7	99.5
10	95.8	100.0
11	92.0	95.6
12	94.9	98.2
13	89.4	92.2
14	94.1	96.6
15	92.2	94.4
16	92.4	94.2
17	94.2	95.7
18	93.0	94.2
19	93.2	94.0
20	93.9	94.5
21	93.0	93.2
22	100.0	100.0
23	99.4	99.4
24	93.9	93.9
25	95.8	95.8
26	94.6	94.6
27	93.4	93.6
28	94.3	94.6
29	94.9	95.2
30	97.3	97.6
31	93.6	94.0
32	93.5	94.0
33	93.6	94.1
34	94.2	94.7
35	93.5	94.0
36	94.7	95.1
37	92.7	93.1
38	93.5	93.9
39	93.7	94.0
40	92.3	92.6
41	92.9	93.1
42	94.2	94.4
43	93.3	93.4
44	92.8	92.8
45	92.6	92.4

46	92.0	91.7
47	94.4	93.9
48	93.8	93.2
49	95.8	95.0
50	95.3	94.2
51	94.9	93.8
52	93.4	92.1
53	94.6	93.2
54	94.7	93.2
55	95.3	93.7
56	96.3	94.8
57	94.7	93.2
58	93.9	92.5
59	94.0	92.6
60	93.8	92.5
61	93.5	92.2
62	96.9	95.6
63	93.2	92.0
64	99.4	98.2
65	93.5	92.5
66	94.0	93.0
67	95.2	94.3
68	101.0	100.0
69	96.3	95.4
70	93.2	92.4
71	96.7	96.0
72	92.0	91.4
73	91.5	90.9
74	91.0	90.5
75	92.2	91.8
76	92.2	91.8
77	91.4	90.9
78	89.3	88.8
79	89.1	88.5
80	90.9	90.3
81	94.6	93.9
82	99.0	98.4
83	88.9	88.5
84	91.1	90.8
85	96.8	96.8
86	81.0	81.2
87	82.9	83.4
88	83.2	84.2
89	80.7	82.2
90	51.3	52.6

As with the 5 km distance, most of the changes are in the 20 to 30-year ages.

Again, we have been able to have a performance value of 100.0 at several distances.

Female Half Marathon



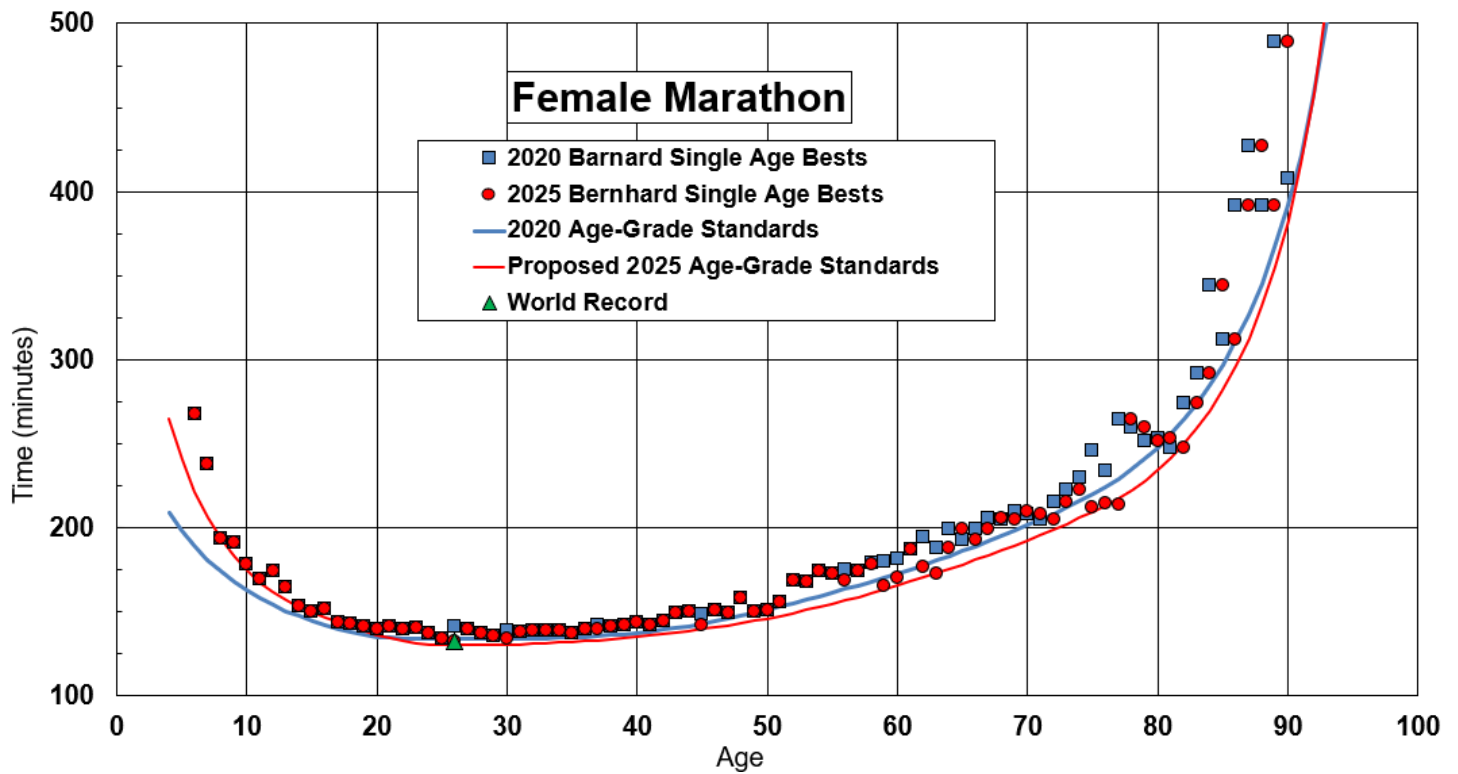
The Female Half Marathon standard has changes over a wide range of ages, mostly due to a change in the world record from 1:04:31 to 1:02:52.

Age	Performance 2025 data vs 2020 standards	Performance 2025 data vs 2025 standards
1		
2		
3		
4		
5	92.0	100.0
6	60.5	64.8
7	91.3	96.5
8	92.4	96.6
9	95.6	98.9
10	95.0	97.5
11	86.3	87.9
12	93.6	94.7
13	97.4	98.1
14	96.5	96.6
15	97.9	97.5
16	96.0	95.4
17	97.3	96.5
18	98.0	96.9
19	97.3	95.4
20	101.9	99.2
21	97.4	94.4
22	101.7	98.5
23	103.3	100.0
24	98.2	95.0
25	98.7	95.5
26	101.5	98.2
27	99.7	96.5
28	100.7	97.5
29	99.5	96.4
30	97.3	94.3
31	98.7	95.8
32	100.5	97.6
33	98.8	96.0
34	97.0	94.3
35	100.6	97.9
36	96.3	93.8
37	95.9	93.4
38	98.7	96.2
39	97.0	94.6
40	96.0	93.6
41	97.0	94.7
42	97.2	94.9
43	95.3	93.1
44	99.0	96.7
45	96.7	94.5

46	98.7	96.4
47	93.9	91.7
48	95.7	93.4
49	98.8	96.5
50	97.7	95.4
51	97.8	95.5
52	94.0	91.8
53	95.0	92.8
54	96.7	94.5
55	98.1	95.9
56	98.8	96.5
57	94.4	92.2
58	96.3	94.1
59	95.7	93.5
60	99.6	97.4
61	102.3	100.0
62	98.6	96.3
63	98.7	96.5
64	97.3	95.2
65	96.1	94.0
66	95.6	93.5
67	98.1	95.9
68	101.8	99.6
69	99.5	97.3
70	98.5	96.3
71	100.7	98.5
72	93.9	91.8
73	99.8	97.7
74	93.2	91.2
75	101.0	98.9
76	99.8	97.8
77	91.3	89.5
78	94.2	92.4
79	89.3	87.7
80	92.5	91.1
81	94.1	92.8
82	89.1	87.9
83	91.5	90.5
84	89.8	89.0
85	100.7	100.0
86		84.7
87	88.4	88.1
88		
89		
90		
91		
92		
93	70.2	71.7

This table shows the large number of changes needed.

Female Marathon



As with the Half Marathon, there were a lot of new single-age bests in the Marathon. There were no changes in the youth ages but we altered the standards to better fit the data.

Age	Performance 2025 data vs 2020 standards	Performance 2025 data vs 2025 standards
1		
2		
3		
4		
5		
6	70.6	82.7
7	76.0	86.6
8	89.9	100.0
9	87.8	95.9
10	91.3	98.1
11	93.2	99.0
12	88.4	92.9
13	91.6	95.6
14	96.1	99.8
15	96.5	99.8
16	93.5	96.5
17	97.2	100.0
18	96.5	98.8
19	96.5	98.1
20	96.9	97.7
21	95.3	95.2
22	95.9	94.8
23	95.6	93.7
24	97.8	95.2
25	100.0	97.0
26	101.7	98.5
27	96.3	93.3
28	97.6	94.7
29	99.0	96.1
30	100.2	97.5
31	97.4	94.8
32	96.8	94.4
33	96.8	94.6
34	97.0	95.0
35	98.2	96.3
36	96.9	95.1
37	97.3	95.5
38	96.2	94.5
39	96.1	94.4
40	95.7	94.0
41	97.2	95.5
42	96.5	94.7
43	93.8	92.0
44	94.4	92.5
45	100.8	98.5

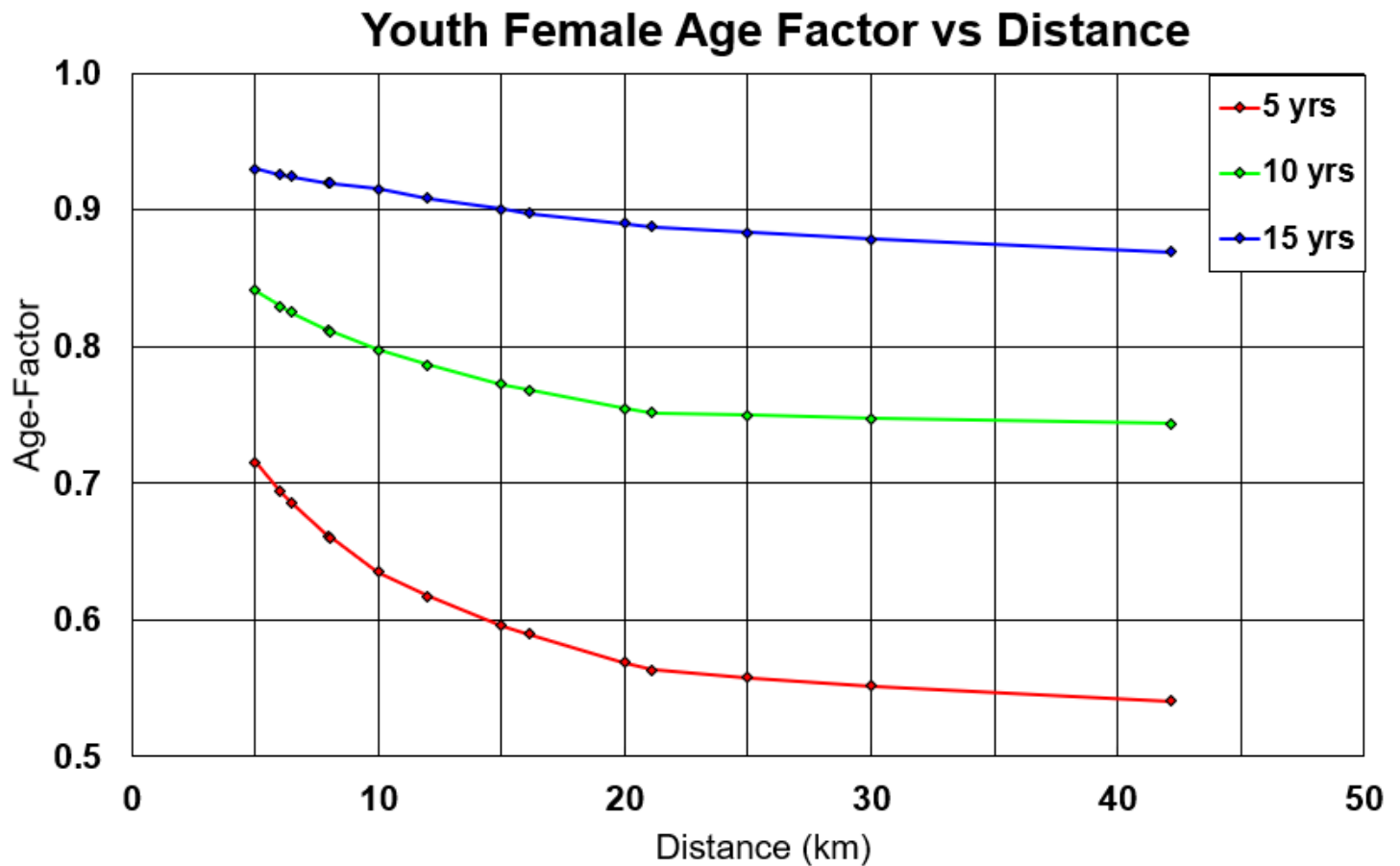
46	95.8	93.5
47	97.8	95.2
48	93.5	90.7
49	99.3	96.1
50	100.0	96.5
51	98.2	94.6
52	91.8	88.3
53	93.5	89.8
54	91.5	87.8
55	93.6	89.8
56	97.2	93.2
57	94.9	91.0
58	94.2	90.3
59	102.9	98.6
60	101.7	97.5
61	93.9	89.9
62	100.4	96.2
63	104.7	100.2
64	97.5	93.3
65	93.3	89.2
66	97.8	93.6
67	96.3	92.1
68	94.6	90.5
69	96.6	92.4
70	96.0	91.7
71	98.5	94.1
72	101.7	97.1
73	98.3	93.8
74	97.0	92.5
75	103.7	98.8
76	104.5	99.4
77	107.4	101.9
78	88.8	84.1
79	92.7	87.8
80	98.4	93.1
81	101.1	95.6
82	106.7	100.9
83	99.9	94.5
84	97.7	92.5
85	86.2	81.9
86	99.6	94.9
87	83.4	79.8
88	80.9	77.7
89	93.6	90.6
90	80.0	78.1
91		
92	77.0	77.1

In the Female Marathon, a large number of age standards needed to be changes. We are declaring the ages 63, 77, and 82 performances outliers.

Evaluating the Interpolation

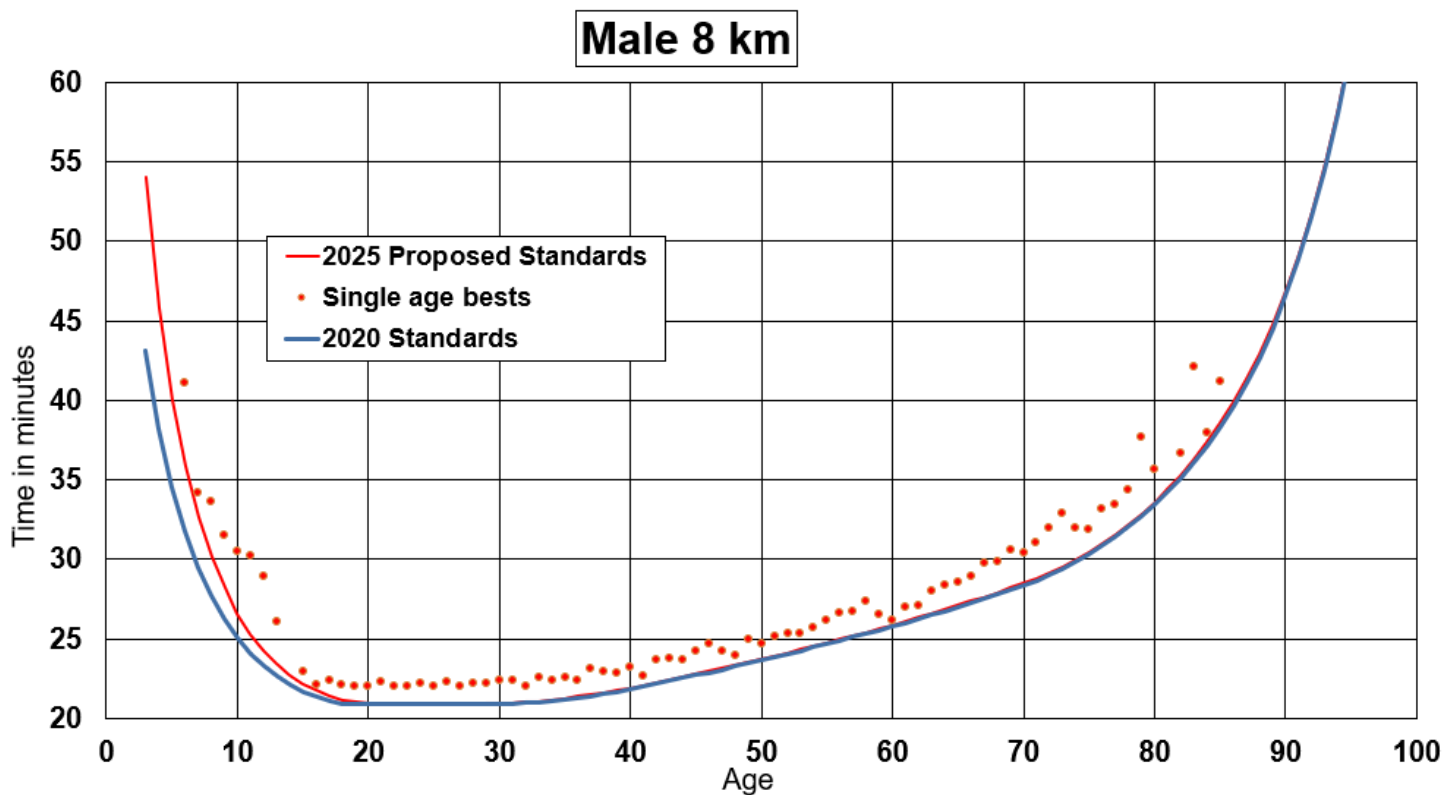
As stated above, the standards are computed for the “Calibration Distances” of 5 km, 10 km, Half Marathon, and Marathon. Then interpolation is used to compute the standards at the other distances.

Here is a plot of how the age factor varies with race distance for youth ages.



The interpolation does an excellent job as you can see.

Here is the chart for the 8 km produced by interpolation.

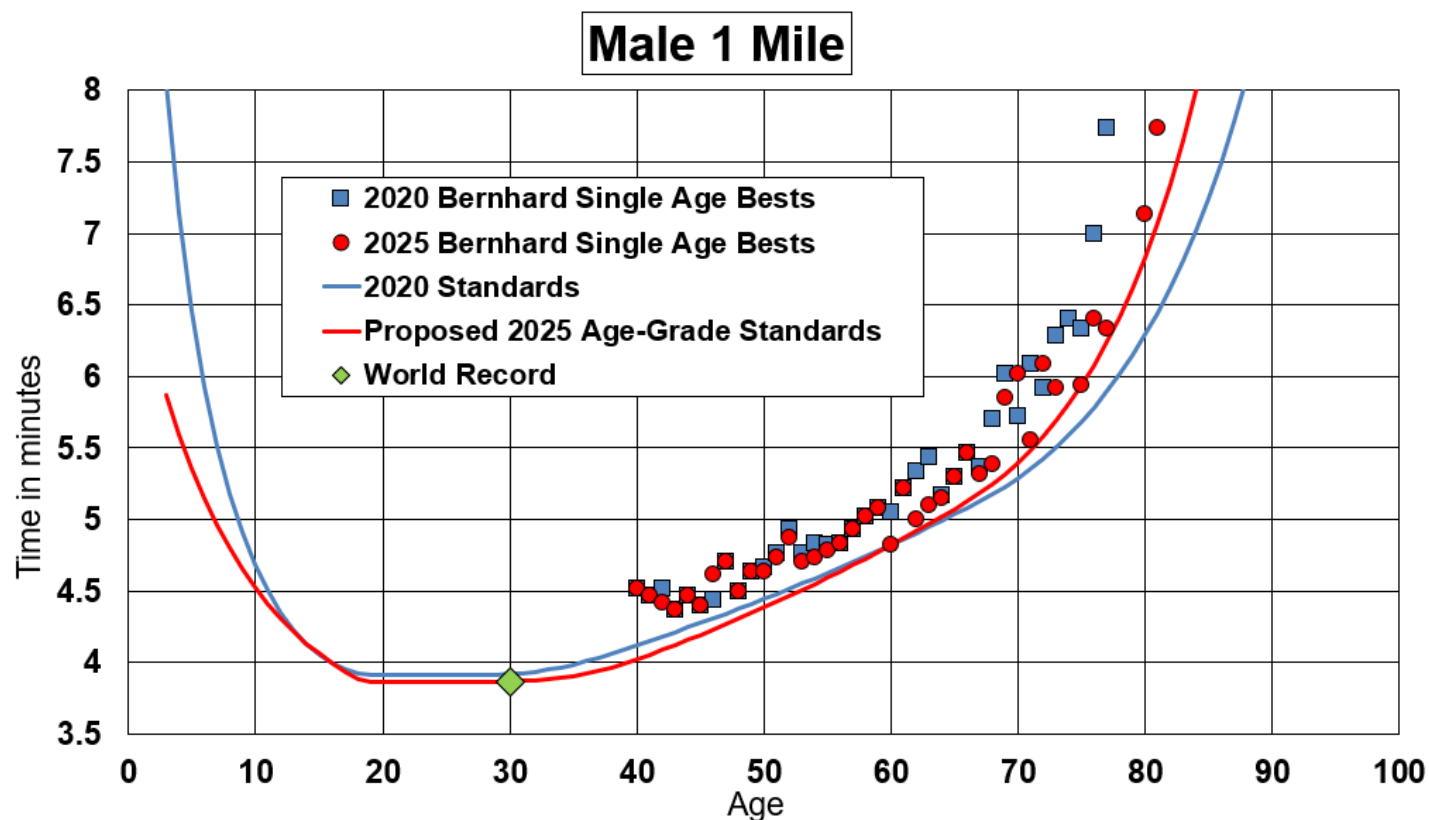


Except for the youth ages, the 2020 and 2025 curves are just about identical. The interpolation fixed the youth problem.

Male Results

We find that the male single-age bests have not changed as much as the female single-age bests.

Male One Mile Road

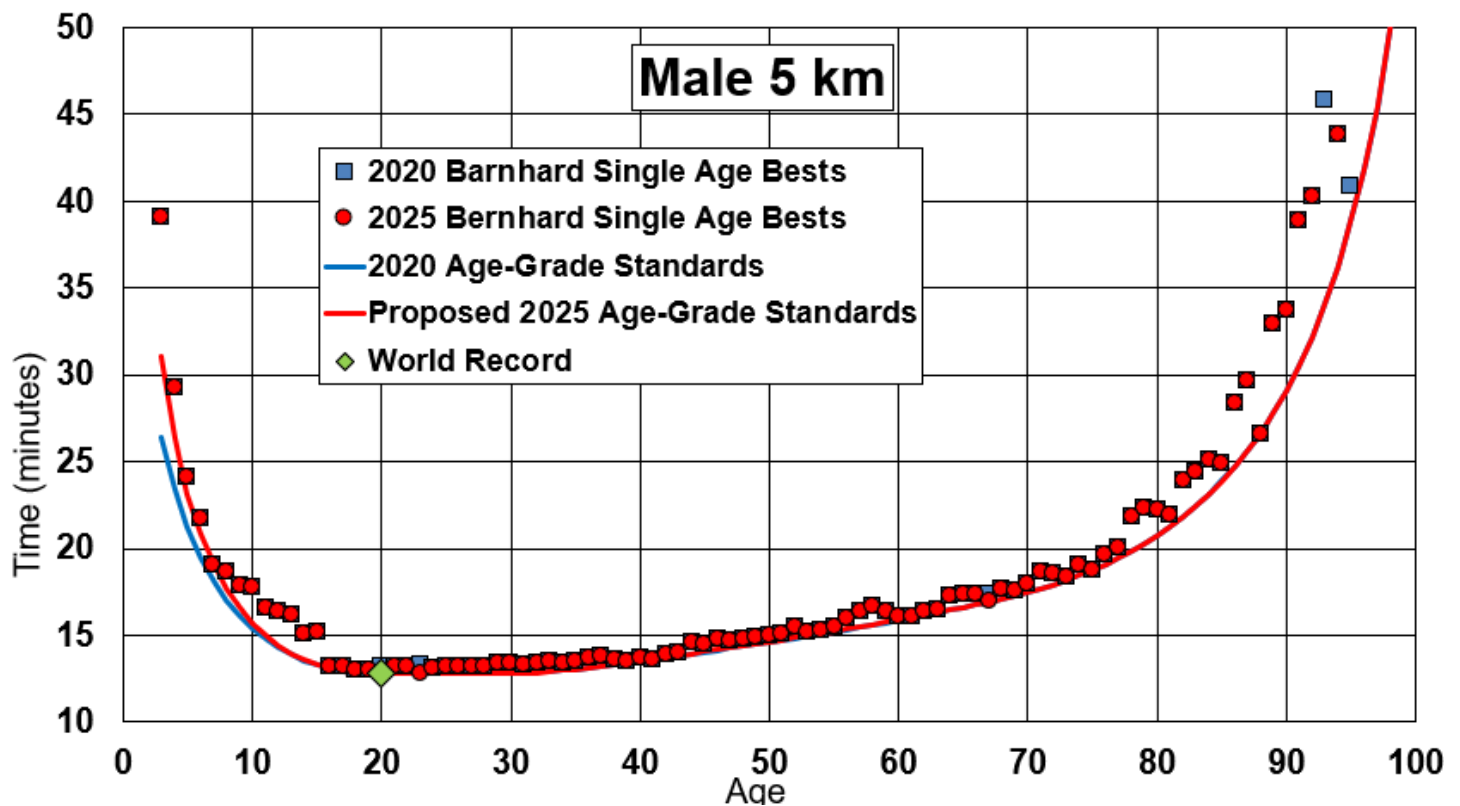


We don't have any youth data. The parameters are estimated based on the 5 km.

The road mile world record improved since 2020 dragging the whole curve down.

The proposed standards match the data better than in 2020.

Male 5 km



The only change in the 5 km since 2020 was in the world record for the 5 km and it only changed by two seconds, from 12:51 to 12:49 for age 20. That is why the red (2025 standard) almost exactly covers the red (2020 standard) except for the youth ranges. The reason the youth curves are not on top of each other is that, apparently, we did not do a good fit for those ages when producing the 2020 standards. We did better this time.

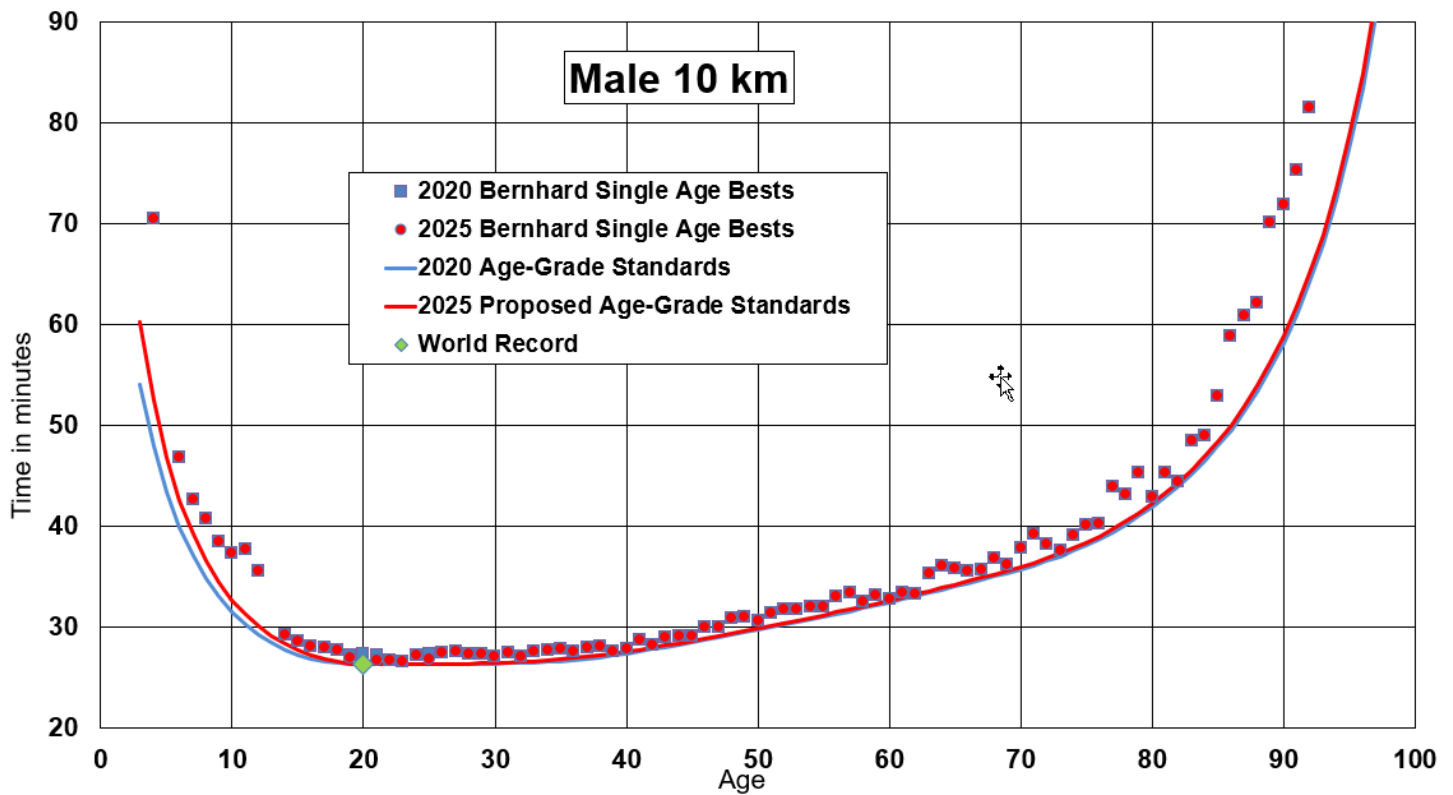
The table below also shows how little change there has been in the male 5 km standards.

Note that I have been able to adjust the parameters so that five different ages' performance is 100.0%.

Age	Performance 2025 data vs 2020 standards	Performance 2025 data vs 2025 standards
1		
2		
3		79.4
4		90.2
5	87.8	96.0
6	89.4	95.6
7	95.1	100.0
8	91.0	94.5
9	90.0	92.5
10	86.3	88.0
11	88.9	90.0
12	87.1	87.8
13	85.6	86.0
14	89.6	89.8
15	87.7	87.7
16	98.9	98.9
17	97.9	98.0
18	98.9	98.9
19	98.8	98.6
20	100.3	100.0
21	97.5	97.2
22	97.5	97.2
23	100.0	99.7
24	97.6	97.3
25	97.5	97.2
26	97.1	96.9
27	97.1	96.9
28	96.9	96.6
29	96.1	95.9
30	95.5	95.3
31	96.5	96.3
32	96.0	95.8
33	95.8	95.7
34	97.0	97.0
35	96.8	96.9
36	95.7	95.8
37	95.8	95.9
38	97.9	98.0
39	99.3	99.4
40	99.0	99.1
41	99.9	100.0
42	98.7	98.8
43	98.5	98.6
44	95.7	95.8
45	97.0	97.1

46	95.4	95.6
47	96.7	96.9
48	96.8	97.0
49	97.1	97.2
50	97.4	97.5
51	97.6	97.8
52	95.8	95.9
53	98.7	98.8
54	98.9	99.1
55	98.1	98.2
56	96.2	96.3
57	94.5	94.7
58	93.3	93.5
59	96.2	96.4
60	98.4	98.6
61	99.4	99.6
62	98.4	98.6
63	99.1	99.2
64	95.1	95.3
65	95.3	95.5
66	96.2	96.4
67	99.4	99.6
68	96.6	96.8
69	98.1	98.3
70	96.8	96.9
71	94.4	94.5
72	96.5	96.7
73	98.8	98.9
74	96.5	96.6
75	100.0	100.0
76	97.0	97.1
77	97.0	97.0
78	90.7	90.7
79	90.8	90.9
80	93.3	93.3
81	96.7	96.7
82	91.3	91.3
83	92.1	92.1
84	92.1	92.0
85	95.7	95.6
86	87.1	87.1
87	86.5	86.4
88	100.0	100.0
89	84.3	84.2
90	86.0	86.0
91	78.4	78.4
92	79.9	79.9
93		
94	82.5	82.5

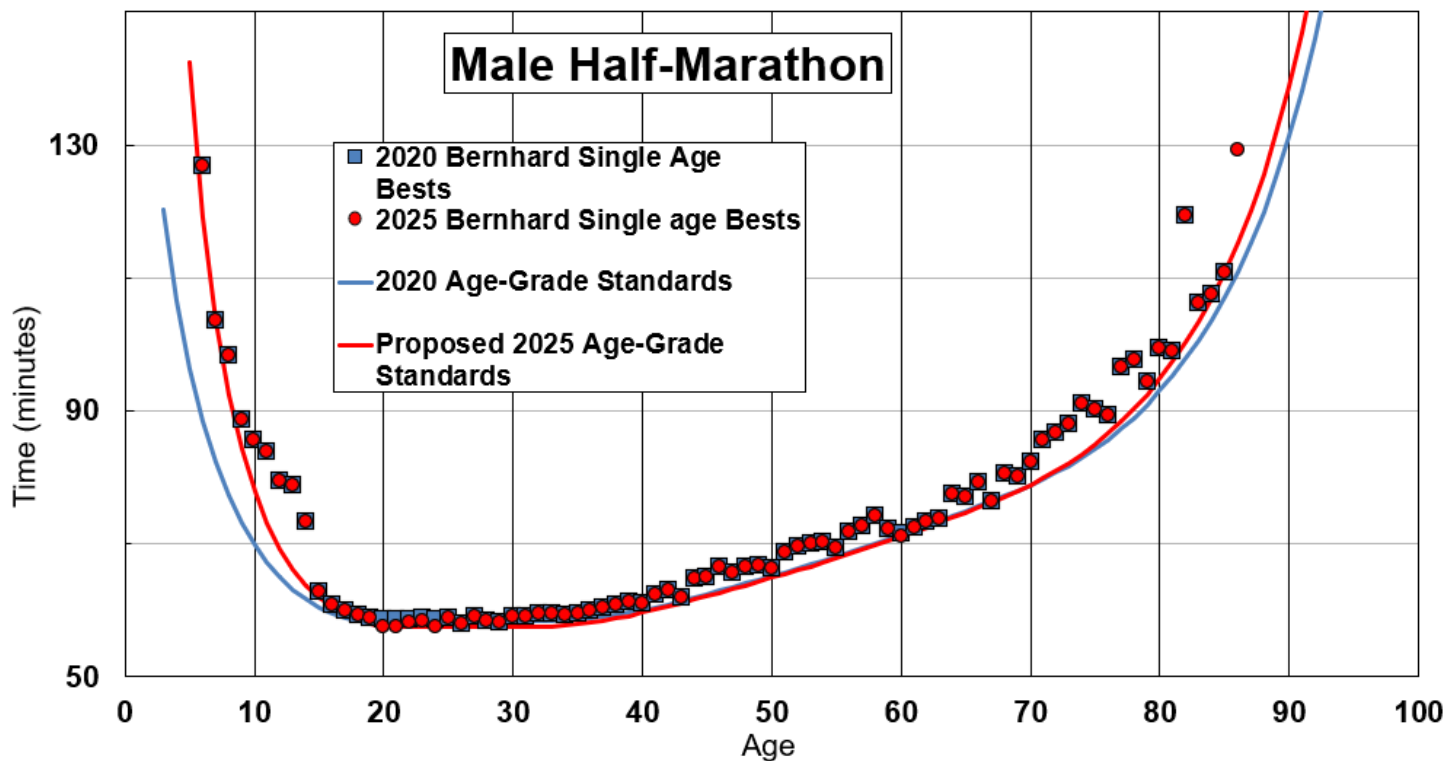
Male 10 km



Again, new standards have changed very little except for the youth ages. In that age range, we have done a better fit.

Age	Performance	Performance			
	2025 data vs 2020 standards	2024 data vs 2025 standards			
1			46	95.8	96.3
2			47	96.7	97.2
3			48	94.7	95.2
4	68.1	74.5	49	95.1	95.6
5			50	97.1	97.7
6	85.2	90.9	51	95.3	95.8
7	86.9	91.9	52	95.1	95.6
8	85.5	89.8	53	96.0	96.5
9	85.6	89.3	54	95.9	96.4
10	84.5	87.6	55	96.8	97.4
11	80.2	82.8	56	94.9	95.4
12	82.3	84.6	57	94.5	95.1
13			58	98.0	98.6
14	95.0	96.9	59	96.8	97.4
15	95.2	96.9	60	98.9	99.5
16	95.7	97.1	61	97.9	98.5
17	95.3	96.3	62	99.2	99.8
18	95.5	95.9	63	94.4	95.0
19	98.0	98.0	64	93.5	94.1
20	100.0	100.0	65	95.0	95.6
21	98.8	98.8	66	96.5	97.1
22	98.8	98.8	67	97.2	97.9
23	99.1	99.1	68	95.2	95.8
24	96.9	96.9	69	97.8	98.4
25	98.3	98.3	70	94.5	95.1
26	96.1	96.1	71	92.1	92.7
27	95.5	95.5	72	95.5	96.1
28	96.4	96.4	73	98.6	99.3
29	96.6	96.7	74	96.1	96.8
30	97.5	97.8	75	94.9	95.6
31	96.2	96.5	76	96.3	97.0
32	97.4	97.8	77	89.7	90.4
33	95.7	96.3	78	93.2	93.9
34	95.7	96.3	79	90.5	91.3
35	95.7	96.3	80	97.5	98.3
36	96.7	97.4	81	94.7	95.5
37	95.9	96.6	82	99.1	100.0
38	96.1	96.8	83	93.2	94.0
39	98.4	99.0	84	95.0	95.9
40	98.6	99.1	85	90.6	91.5
41	96.2	96.7	86	84.2	85.0
42	98.6	99.1	87	84.4	85.3
43	96.7	97.2	88	85.8	86.8
44	97.3	97.8	89	79.3	80.2
45	97.8	98.4	90	80.8	81.8
			91	80.9	81.9
			92	78.8	79.8
			93	67.6	68.6
			94	67.2	68.2

Male Half Marathon



Again, there are not many changes. The main change is that we have tightened up the youth standards and the senior standards. The changes in the 20s age group don't show up well in the chart but do in the performance table. See below.

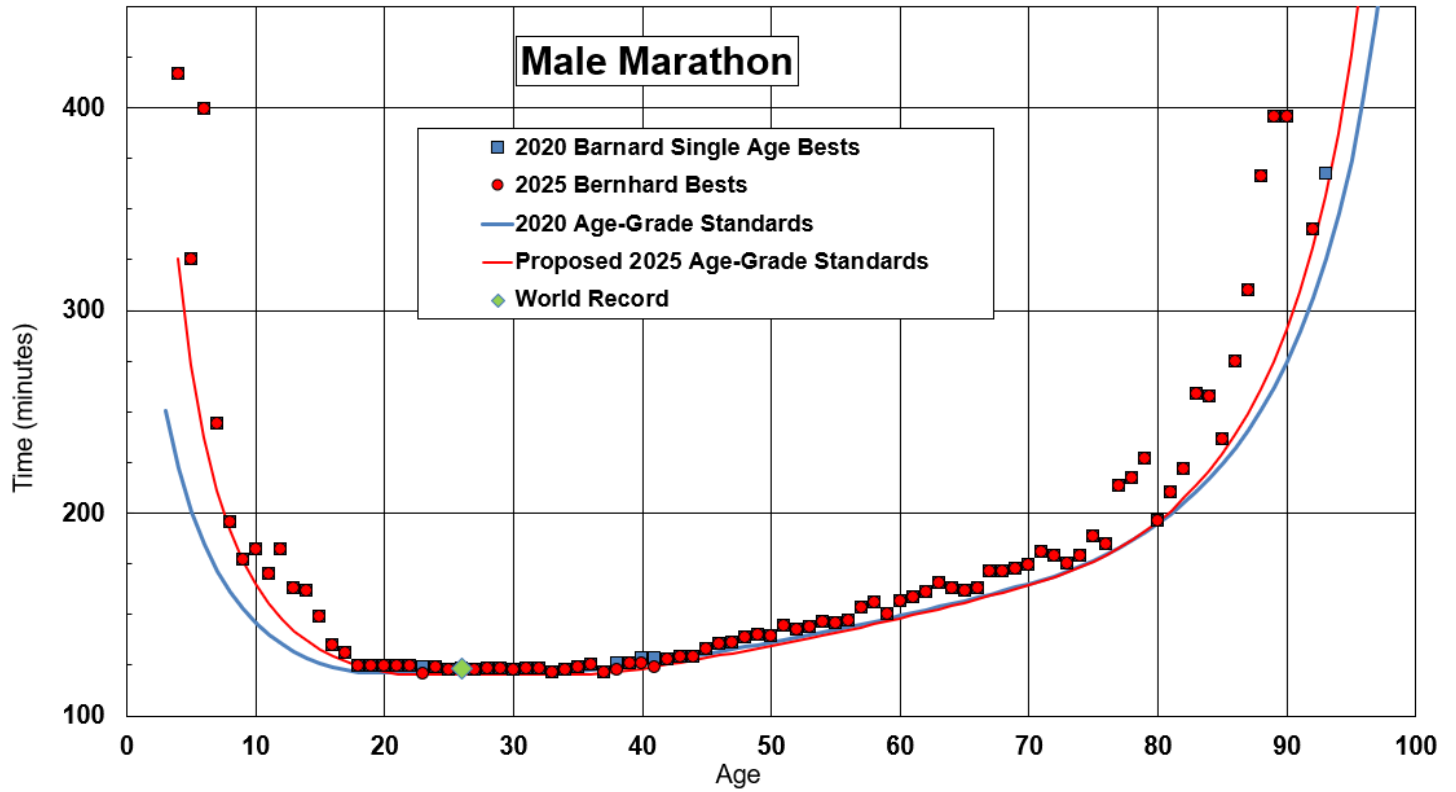
	Performance 2025 data vs 2020 standards	Performance 2025 data vs 2025 standards
1		
2		
3		
4		
5	52.7	77.8
6	69.8	94.0
7	79.4	100.0
8	78.6	94.0
9	82.5	95.0
10	81.5	90.9
11	80.0	87.0
12	81.7	87.1
13	80.0	83.8
14	84.1	87.0
15	96.4	98.7
16	98.1	99.7
17	98.2	99.4
18	98.6	99.1
19	99.3	98.5
20	101.3	99.8
21	101.5	100.0
22	100.4	98.9
23	99.9	98.4
24	101.5	100.0
25	99.1	97.7
26	100.6	99.1
27	98.8	97.3
28	100.0	98.5
29	100.1	98.7
30	98.9	97.5
31	99.0	97.5
32	98.2	96.7
33	98.4	97.0
34	98.8	97.4
35	98.6	97.3
36	98.1	96.9
37	98.0	96.9
38	97.5	96.6
39	97.4	96.6
40	98.5	97.9
41	96.8	96.3
42	96.6	96.2
43	99.1	98.6
44	95.5	95.1
45	96.0	95.6

46	94.6	94.2
47	96.6	96.2
48	96.3	95.9
49	96.8	96.4
50	98.1	97.7
51	95.5	95.1
52	95.4	95.0
53	95.6	95.3
54	96.2	95.8
55	98.3	98.0
56	95.8	95.5
57	95.5	95.2
58	94.2	93.9
59	97.8	97.5
60	100.3	100.0
61	99.4	99.1
62	99.1	98.8
63	99.5	99.2
64	95.6	95.4
65	97.2	96.9
66	95.4	95.2
67	100.0	99.8
68	95.9	95.7
69	97.2	97.1
70	95.7	95.7
71	93.2	93.3
72	93.1	93.4
73	92.9	93.3
74	91.1	91.7
75	93.4	94.2
76	95.8	96.9
77	90.3	91.5
78	91.2	92.6
79	96.3	97.9
80	93.5	95.4
81	96.3	98.5
82	82.0	84.0
83	94.7	97.4
84	96.4	99.4
85	96.7	100.0
86	85.8	89.1
87	76.4	
88	76.6	80.2
89	75.1	79.0
90	74.6	78.9
91	75.1	79.8

As mentioned, there have been a number of small changes in the 20-29 age range.

We have managed to have 100% at five different ages when rated by the 2025 proposed standards.

Male Marathon



Again, there are not many changes. Note that the standards for youths and seniors match the data much better. The 2020 standards were too tough.

	Performance 2025 data vs 2020 standards	Performance 2020 data vs 2020 standards
1		
2		
3		
4	53.3	78.2
5	61.8	84.0
6	46.2	59.5
7	70.2	86.6
8	82.4	98.3
9	86.2	100.0
10	79.8	90.6
11	82.3	91.6
12	74.2	81.2
13	80.6	87.0
14	79.4	84.6
15	84.4	89.0
16	91.9	96.0
17	93.8	97.1
18	97.8	100.0
19	97.5	98.4
20	97.5	97.4
21	97.8	97.1
22	97.4	96.6
23	100.9	100.0
24	98.1	97.2
25	99.1	98.2
26	98.4	97.5
27	99.0	98.1
28	98.4	97.6
29	98.7	97.8
30	98.9	98.1
31	98.8	98.0
32	98.5	97.6
33	100.1	99.1
34	99.5	98.3
35	98.7	97.3
36	97.8	96.2
37	101.3	99.4
38	101.0	99.1
39	98.9	97.1
40	99.7	97.9
41	101.7	100.0
42	99.7	98.1
43	99.6	98.0
44	100.3	98.7
45	98.4	96.9

46	97.3	95.9
47	97.5	96.0
48	96.4	95.1
49	96.7	95.4
50	97.7	96.5
51	95.3	94.1
52	97.6	96.4
53	97.4	96.2
54	96.4	95.3
55	97.7	96.6
56	97.8	96.8
57	94.8	93.8
58	94.0	93.1
59	98.4	97.5
60	95.4	94.6
61	95.3	94.6
62	94.5	93.8
63	93.0	92.3
64	95.4	94.8
65	96.9	96.3
66	97.3	96.8
67	93.5	93.1
68	94.6	94.2
69	94.6	94.2
70	94.7	94.4
71	92.3	92.0
72	94.3	94.1
73	98.0	97.7
74	97.2	97.1
75	93.6	93.5
76	97.1	97.0
77	85.6	85.7
78	85.9	86.1
79	83.9	84.2
80	99.4	100.0
81	94.8	95.6
82	92.3	93.3
83	81.3	82.5
84	84.2	85.7
85	94.8	96.9
86	84.5	86.8
87	77.9	80.4
88	68.6	71.4
89	66.3	69.4
90	69.5	73.4
91	57.2	61.1
92	90.0	97.2

Interpolation

As with the female age grading, we have interpolated to determine the age-grade standards.

