

Youth [U17]and Junior [U19] triathlete speed, performance and trajectory development profiles for INTERNATIONAL swimming and running

Domestic Development

International Development

Championship Competitor

Exceptional Single Sport Ability

SWIM
First buoy speed'

50m		Margins of improvement either REQUIRED or MAINTAINED .									
MALE	FEMALE	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
32	32	31.7	31.4	31.1	30.8	30.4	30.1	29.8	29.5	29.2	28.8
31.5	31.5	31.2								28.7	28.4
31	31	30.7								28.3	
30.5	30.5	30.2							28.1		
30	30	29.7						27.9			
29.5	29.5	29.2					27.8				
29	29	28.7					27.3				
28.5	28.5	28.2				27.1					
28	28	27.7			26.9						
27.5	27.5	27.2		26.7							
27	27	26.7	26.5								
26.5	26.5	26.3									
26	26	25.8									

Technical form:
 - What is the conditioning status of the athlete? - shoulder mobility, recruit lats, core tension through rotation etc...
 - Dive and reaction speed.
 - Streamline and kick pattern.
 - Breathing off 'breakout'
 - Breakout speed.
 - Stroke rate
 - Stroke count

Considerations:
 - How to access this power at start of races and also 'change of pace' for entry/exit of buoys.
 - What is the impact of 2-3-4 athletes in a lane? can stroke and rhythm be maintained under physical pressure and disruptions.

Speed sets like 20-30x50 +60-90secs recovery to allow maximum speed and strengthen mechanics

100m		Margins of improvement either REQUIRED or MAINTAINED .									
MALE	FEMALE	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
33	33	65.4	64.7	64.1	63.4	62.7	62.1	61.4	60.8	60.1	59.4
65	65	64.4									58.5
32	32	63.4								58.3	
64	64	62.4							58		
31	31	61.4						57.7			
62	62	60.4					57.4				
30	30	59.4				57					
60	60	58.4			56.7						
59	59	57.4		56.3							
29	29	56.4	55.9								
57	57	55.5									
28	28	55.5									

Technical form: -What is the conditioning status of the athlete? - shoulder mobility, recruit lats, core tension through rotation etc...

- Dive and reaction speed.
 - Streamline and kick pattern.
 - Breathing off 'breakout'
 - Breakout speed.
 - Stroke rate and stroke count
 - Momentum off walls

Considerations:
 - How to access this power at start of races and also 'change of pace' for entry/exit of buoys.
 - What is the impact of 2-3-4 athletes in a lane? can stroke and rhythm be maintained under physical pressure and disruptions.
 - What 'cruise speed' can be handled for 400m after this level of effort?.i.e. how well does athlete know limits?

200m		Margins of improvement either REQUIRED or MAINTAINED .									
MALE	FEMALE	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
70	2m20	2m18.6	2m17.2	2m15.8	2m14.4	2m13	2m11.6	2m10.2	2m08.9	2m07.4	2m06
69	2m18	2m16.7								2m05.6	
68	2m16	2m14.7								2m03.8	
67	2m14	2m12.7							2m03.2		
66	2m12	2m10.7							2m01.5		
65	2m10	2m08.7						2m00,9			
64	2m08	2m06.7						1m59.1			
63	2m06	2m04.7					1m58.5				
62	2m04	2m02.8					1m56.6				
61	2m02	2m00.8				1m55.9					
60	2m00	1m58.8			1m55.2						
59	1m58	1m56.8		1m54.5							
58	1m56	1m54.8	1m53.7								

Technical form [built from 50/100].
 - What is the conditioning status of the athlete? - shoulder mobility, recruit lats, core tension through rotation etc...
 - Form maintenance
 - Stroke rate and stroke counts.
 - Drop off speed? [no more than 3-4secs from first 100m]

Considerations:
 - What 'cruise speed' can be handled for 400m after this level of effort?.i.e. how well does athlete know limits?
 - What is the athlete confidence for this duration [first buoy speed]?
 - What is the aerobic conditioning training to support this anaerobic capacity...?
 - What over-distance swims are in the athletes' program?

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Critical and cruise speeds

400m pace/100m			Margins of improvement either REQUIRED or MAINTAINED.									
	MALE	FEMALE	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
72	4m48	4m48	4m45.2	4m42.3	4m39.4	4m36.5	4m33.6	4m30.8	4m27.9	4m25	4m22.1	4m19.2
	4m46	4m46	4m43.2									4m17.4
71	4m44	4m44	4m41.2									4m15.6
	4m42	4m42	4m39.2									4m13.8
70	4m40	4m40	4m37.2								4m14.8	
	4m38	4m38	4m35.2								4m13	
69	4m36	4m36	4m33.2								4m11.2	
	4m34	4m34	4m31.3							4m12.1		
68	4m32	4m32	4m29.3							4m10.3		
	4m30	4m30	4m27.3							4m08.4		
67	4m28	4m28	4m25.3						4m09.3			
	4m26	4m26	4m23.3						4m07.4			
66	4m24	4m24	4m21.4						4m05.6			
	4m22	4m22	4m19.4					4m06.3				
65	4m20	4m20	4m17.4					4m04.4				
	4m18	4m18	4m15.4							4m05.1		
64	4m16	4m16	4m13.4							4m03.2		
	4m14	4m14	4m11.5				4m03.9					
63	4m12	4m12	4m09.5				4m02					
	4m10	4m10	4m07.5		4m02.5							
62	4m08	4m08	4m05.5	4m03.1								
	4m06	4m06	4m03.6									

Technical form [built from 50/100/200].

- Form and conditioning maintenance
- Stroke rate and stroke counts.
- Drop off speed?[no more than 4-5secs from first 200m]
- When target speeds are hit, reduce rest cycle and /or extend length of block;
- Example sets might be; 16-24x100 off 2mins, then reduce recovery to 1m45/30, broken in blocks of 6-8 reps.

Considerations:

- What aerobic support work can the athlete handle to produce these speeds?
- i.e. can they swim 10x300 holding aerobic pace off 10-20secs rest?
- or 30-40x100 off 5-10secs rest?

800m pace/100m			Margins of improvement either REQUIRED or MAINTAINED.									
	MALE	FEMALE	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
75	10m00	10m00	9m54	9m48	9m42	9m36	9m30	9m24	9m18	9m12	9m06	9m00
	9m56	9m56	9m48									8m56.4
74	9m52	9m52	9m46.1									8m52.8
	9m48	9m48	9m42.1								8m55.8	
73	9m44	9m44	9m38.1								8m51.5	
	9m40	9m40	9m34.2								8m47.5	
72	9m36	9m36	9m30.2							8m49.9		
	9m32	9m32	9m26.3							8m46.3		
71	9m28	9m28	9m22.3							8m42.6		
	9m24	9m24	9m18.4						8m44.6			
70	9m20	9m20	9m14.4						8m40.8			
	9m16	9m16	9m10.5						8m37.1			
69	9m12	9m12	9m06.5					8m38.9				
	9m08	9m08	9m02.5					8m35.2				
68	9m04	9m04	8m58.6					8m36.8				
	9m00	9m00	8m54.6					8m33				
67	8m56	8m56	8m50.6				8m34.6					
	8m52	8m52	8m46.7				8m30.8					
66	8m48	8m48	8m42.7		8m32.2							
	8m44	8m44	8m38.8	8m33.6								
65	8m40	8m40	8m34.8									

Technical form [built from 50/100/200].

- Form and conditioning maintenance
- Stroke rate and stroke counts.
- Drop off speed?[no more than 4-5secs from first 200m]
- When target speeds are hit, reduce rest cycle and /or extend length of block;
- Example sets might be; 16-24x100 off 2mins, broken in blocks of 4-8 reps.

Considerations:

- What aerobic support work can the athlete handle to produce these speeds?
- i.e. can they swim 10x300 holding aerobic pace off 10-20secs rest?
- or 30-40x100 off 5-10secs rest?
- What threshold work / length of rep can the athlete handle holding speeds?
- i.e. for sets above-what is their best effort sustained pace? and what is the gap in pace to the 800m race pace?

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RUN

Power per stride and frequency

800m pace /100m / 200m	MALE	Margins of improvement either REQUIRED or MAINTAINED .									
		1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
17 / 34	2m16	2m14.7	2m13.2	2m11.9	2m10.5	2m09.2	2m07.8	2m06.4	2m05.1	2m03.7	2m02.4
	2m14	2m12.6								2m01.9	
16.5 / 33	2m12	2m10								2m00.1	
	2m10	2m08.7							1m59.6		
16 / 32	2m08	2m06.7							1m57.7		
	2m06	2m04.7						1m57.2			
15.5 / 31	2m04	2m02.7						1m55.3			
	2m02	2m00.7				1m54.6					
15 / 30	2m00	1m58.8				1m52.8					
	1m58	1m56.8			1m52.1						
14.5 / 29	1m56	1m54.8		1m51.3							
	1m54	1m52.8		1m50.6							
14 / 28	1m52	1m50.8	1m49.7								

800m pace /100m / 200m	FEMALE	Margins of improvement either REQUIRED or MAINTAINED .									
		1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
19 / 38	2m32	2m30.4	2m28.9	2m27.4	2m25.9	2m24.4	2m22.8	2m21.4	2m19.8	2m18.3	2m16.8
	2m30	2m28.5								2m16.5	
18.5 / 37	2m28	2m26.5								2m14.6	
	2m26	2m24.5							2m14.3		
18 / 36	2m24	2m22.5							2m12.4		
	2m22	2m20.5						2m12			
17.5 / 35	2m20	2m18.6						2m10.2			
	2m18	2m16.6				2m09.7					
17 / 34	2m16	2m14.6				2m07.8					
	2m14	2m12.6			2m07.3						
16.5 / 33	2m12	2m10.6		2m06.7							
	2m10	2m08.7		2m06.1							
16 / 32	2m08	2m06.7	2m05.4								

Technical form:

- What is the conditioning status of the athlete? - can they move correctly holding posture through sets and speeds?
- Limb speed and coordination?
- Execution of glute recruitment, hip range/mobility, functional movement drills?

Considerations:

- How is the athlete achieving these speeds[stride length/frequency - i.e. power per stride and delivery of force?]
- What is the balance of EASY aerobic running work?
- What are the pre-dominant characteristics of the athlete - fast twitch /slower twitch?
- Whilst the speed may give an indication of HR max and possible Vo2 max 'intensity', consider that the VO2max SPEED may be too quick for the mechanics and cardiology, and this is a predominantly anaerobic contribution depending on athlete.
- Consider the technical benefits of producing this speed and power opposed to the purely physiological 'interference' with the aerobic development.
- Can the athlete 'access' this form/cadence/limb coordination off the bike?

- Example sets may be 8-15x 200m [in blocks of 4-5] OR 4-6x500m

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Critical and capacity speeds

1500m pace /100m [100/200/400m]		Margins of improvement either REQUIRED or MAINTAINED .									
MALE	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
18.6	4m40	4m37.2	4m34.4	4m31.6	4m28.8	4m26	4m23.2	4m20.4	4m17.6	4m14.8	4m12
18.3	4m35	4m32.2									4m07.5
18/36/72	4m30	4m27.3									4m03
17.6	4m25	4m22.3									3m58.5
17.3	4m20	4m17.4								3m56.6	
17/34/68	4m15	4m12.4							3m55.6		
16.6	4m10	4m07.5						3m52.5			
16.3	4m05	4m02.5				3m50.3					
16/32/64	4m00	3m57.6			3m50.4	3m48					
15.6	3m55	3m52.6		3m48							
15.3	3m50	3m47.7	3m45.4								
15/30/60	3m45	3m42.7									

1500m pace /100m [100/200/400m]		Margins of improvement either REQUIRED or MAINTAINED .									
FEMALE	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
21/42/84	5m15	5m11.9	5m08.7	5m05.5	5m02.4	4m59.3	4m56.1	4m53	4m49.8	4m46.7	4m43.5
20.6	5m10	5m06.9									4m39
20.3	5m05	5m02									4m34.5
20/40/80	5m00	4m57								4m33	
19.6	4m55	4m52.1								4m28.5	
19.3	4m50	4m47.1							4m26.8		
19/38/76	4m45	4m42.2						4m25			
18.6	4m40	4m37.2						4m20.4			
18.3	4m35	4m32.3					4m18.5				
18/36/72	4m30	4m27.3				4m16.5	4m14.8				
17.6	4m25	4m22.4			4m14.4						
17.3	4m20	4m17.4		4m12.2							
17/34/68	4m15	4m12.5	4m10								
16.6	4m10	4m07.5									

Technical form:

- What is the conditioning status of the athlete? - can they move correctly holding posture through sets and speeds?
- Limb speed and coordination?
- Execution of glute recruitment, hip range/mobility, functional movement drills?

Considerations:

- How is the athlete achieving these speeds[stride length/frequency - i.e. power per stride and delivery of force?]
- What is the balance of EASY aerobic running work?
- Whilst the speed may give an indication of HR max and possible Vo2 max 'intensity', consider that the VO2max SPEED may be too quick, and this is a predominantly anaerobic contribution depending on athlete.
- Consider the technical benefits of producing this speed and power opposed to the purely physiological 'interference' with the aerobic development.
- Can the athlete 'access' this form/cadence/limb coordination off the bike?
- Example sets may be 8-15x 200m [in blocks of 4-5] OR 4-6x500m

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Critical and capacity speeds

3000m pace /400m	MALE	Margins of improvement either REQUIRED or MAINTAINED .									
		1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
76	9m30	9m24.3	9m18.6	9m16.9	9m07.2	9m01.5	8m55.8	8m50.1	8m44.4	8m38.7	8m33
75.3	9m25	9m19.3									8m28.5
74.6	9m20	9m14.4									8m24
74	9m15	9m09.4									8m19.5
73.3	9m10	9m04.5									8m15
72.6	9m05	8m59.5								8m16	
72	9m00	8m54.5								8m11.4	
71.3	8m55	8m49.6							8m12.2		
70.6	8m50	8m44.6							8m07.6		
70	8m45	8m39.7						8m08.3			
69.3	8m40	8m34.7						8m03.6			
68.6	8m35	8m29.8					8m04				
68	8m30	8m24.8					7m59.4				
67.3	8m25	8m19.9				7m59.8					
66.6	8m20	8m14.9			8m00						
66	8m15	8m10		7m59.2							
65.3	8m10	8m05		7m55.3							
64.6	8m05	8m00.1	7m55.3								
64	8m00	7m55.1									

3000m pace /400m	FEMALE	Margins of improvement either REQUIRED or MAINTAINED .									
		1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
84	10m30	10m23.7	10m17.4	10m11.1	10m04.8	9m58.5	9m52.2	9m45.9	9m39.6	9m33.3	9m27
	10m25	10m18.3									9m22.5
	10m20	10m13.8									9m18
82	10m15	10m08.9									9m13.5
	10m10	10m03.9									9m09
	10m05	9m59								9m10.6	
80	10m00	9m54								9m06	
	9m55	9m49.1							9m07.4		
	9m50	9m44.1							9m02.8		
78	9m45	9m39.2						9m06			
	9m40	9m34.2						8m59.4			
	9m35	9m29.3					9m00.5				
76	9m30	9m24.3				9m01.5					
	9m25	9m19.4			9m02.4						
	9m20	9m14.4			8m57.6						
74	9m15	9m09.5		8m58.4							
	9m10	9m04.5	8m59								
	9m05	8m59.6									
72	9m00	8m54.6									

Technical form:

- What is the conditioning status of the athlete? - can they move correctly holding posture through sets and speeds?
- Limb speed and coordination?
- Execution of glute recruitment, hip range/mobility, functional movement drills?...and has the remedial/structural/core program grown with the increased development of the athlete?
- With the increase in 'load' and 'speed endurance' does the athlete hold stride pattern?

Considerations:

- How is the athlete achieving these speeds[stride length/frequency - i.e. power per stride and delivery of force?]
- What is the balance of EASY aerobic running work?
- What is the balance of threshold work and where does this sit as a fractional useage of the 3000m/Vo2 max speed?
- This distance[race as well as set design] is a more true reflection of aerobic capacity 'fitness' - it is important to ascertain the speed at Vo2 max and allow recovery periods to maximise this -it is easy for athletes to run TOO FAST and become too anaerobic, but give a false impression of fitness.
- Consider the technical benefits of producing this speed and power opposed to the purely physiological 'interference' with the aerobic development.
- Can the athlete 'access' this form/cadence/limb coordination off the bike?

- Example sets may be 10-15x400m [in blocks of 4-5] OR 4-6x1000m [in blocks of 2 or 3]

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Flat race speed

5000m pace/400m		Margins of improvement either REQUIRED or MAINTAINED .									
		MALE	1%	2%	3%	4%	5%	6%	7%	8%	9%
78	16m30	16m20.1	16m10.2	16m00.3	15m50.4	15m40.5	15m30.6	15m20.7	15m10.8	15m00.9	14m50
	16m25	16m15.1									14m46.5
	16m20	16m10.2									14m42
	16m15	16m05.2									14m37.5
	16m10	16m00.3									14m33
76	16m05	15m55.3								14m38.2	
	16m00	15m50.4								14m33.6	
	15m55	15m45.4								14m29	
	15m50	15m40.5								14m24.5	
	15m45	15m35.5								14m20	
74	15m40	15m30.6							14m24.8		
	15m35	15m25.6							14m20.2		
	15m30	15m20.7							14m15.6		
	15m25	15m15.7							14m11		
	15m20	15m10.8							14m15.6		
72	15m15	15m05.8							14m11		
	15m10	15m00.9							14m06.3		
	15m05	14m55.9							14m10.7		
	15m00	14m50							14m06		
	14m55	14m45							14m01.3		
70	14m50	14m41.1							14m05.5		
	14m45	14m36.1							14m00.8		
	14m40	14m31.2							14m04.8		
	14m35	14m26.2							14m00		
	14m30	14m21.3							13m55.2		
68	14m25	14m16.3							13m59		
	14m20	14m11.4							13m54.2		
	14m15	14m06.4	13m57.9								
	14m10	14m01.5									

Technical form[building on from 3000m];
 - What is the conditioning status of the athlete? - can they move correctly holding posture through sets and speeds?
 - Limb speed and coordination?
 - Execution of glute recruitment, hip range/mobility, functional movement drills?...and has the remedial/structural/core program grown with the increased development of the athlete?
 - With the increase in 'load' and 'speed endurance' does the athlete hold stride pattern?

Considerations;
 - How is the athlete achieving these speeds[stride length/frequency - i.e. power per stride and delivery of force?]
 - What is the balance of EASY aerobic running work?
 - What is the balance of threshold work and where does this sit as a fractional usage of the 3000m/Vo2 max speed?
 - This distance[race as well as set design] is a more true reflection of aerobic capacity 'fitness' - it is important to ascertain the speed at Vo2 max and allow recovery periods to maximise this -it is easy for athletes to run TOO FAST and become too anaerobic, but give a false impression of fitness.
 - Consider the technical benefits of producing this speed and power opposed to the purely physiological 'interference' with the aerobic development.
 - Full lab data and athlete tracking - awareness of economy as well as thresholds and blood profile.
 - What is the pace judgement of the athlete like? also in 'non-measured' work outs.
 - In reps does the athlete hold pace with no drop off.
 - Greater consideration to the recovery period as holding speeds with less rest will indicate aerobic fitness versus anaerobic contributions.

- Example sets may be 5-8x1000m OR extension sets like [2k, 2x1k, 5x400]

RUNNING OFF THE BIKE considerations;
 -Can the athlete 'access' this form/cadence/limb coordination off the bike?
 -what pace does the athlete perform sets like 'off the bike' - either IMMEDIATELY off specific race intensity OR off extended strength endurance work? [i.e 6x1k, 3x2k after a crit race or 90min solid ride?]
 -technically what is seen in ALL speed profiles at which the athlete runs from a structural/physiotherapist perspective? i.e. filmed sequences of

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Flat race speed

5000m pace / 400m		Margins of improvement either REQUIRED or MAINTAINED .										
		FEMALE	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
86	18m05	17m54.2	17m43.3	17m32.5	17m21.6	17m10.8	17m00	16m49.1	16m38.2	16m27.4	16m16.5	
	18m00	17m49.2									16m12	
	17m55	17m44.2									16m07.5	
	17m50	17m39.3									16m03	
	17m45	17m34.3									15m58.5	
84	17m40	17m29.4								16m09.6		
	17m35	17m24.4								16m00		
	17m30	17m19.5								15m55.5		
	17m25	17m14.5								15m51		
	17m20	17m09.6							15m54.8			
82	17m15	17m04.6							15m52.2			
	17m10	16m59.7							15m47.6			
	17m05	16m54.7							15m43			
	17m00	16m49.8							15m38.4			
	16m55	16m44.8						15m44				
80	16m50	16m39.9						15m39.3				
	16m45	16m34.9						15m34.7				
	16m40	16m30						15m30				
	16m35	16m25					15m35.3					
	16m30	16m20.1					15m30.6					
78	16m25	16m15.1					15m25.9					
	16m20	16.10.2					15m21.2					
	16m15	16m05.2				15m26.3						
	16m10	16m00.3				15m21.5						
	16m05	15m55.3				15m16.8						
76	16m00	15m50.4			15m21.6							
	15m55	15m45.4			15m16.8							
	15m50	15m40.5			15m12							
	15m45	15m35.5		15m16.7								
	15m40	15m30.6		15m11.8								
74	15m35	15m25.6	15m16.3									
	15m30	15m20.7	15m11.4									
	15m25	15m15.7										

Technical form[building on from 3000m];

- What is the conditioning status of the athlete? - can they move correctly holding posture through sets and speeds?
- Limb speed and coordination?
- Execution of glute recruitment, hip range/mobility, functional movement drills?...and has the remedial/structural/core program grown with the increased development of the athlete?
- With the increase in 'load' and 'speed endurance' does the athlete hold stride pattern?

Considerations;

- How is the athlete achieving these speeds[stride length/frequency - i.e. power per stride and delivery of force?]
- What is the balance of EASY aerobic running work?
- What is the balance of threshold work and where does this sit as a fractional usage of the 3000m/Vo2 max speed?
- This distance[race as well as set design] is a more true reflection of aerobic capacity 'fitness' - it is important to ascertain the speed at Vo2 max and allow recovery periods to maximise this -it is easy for athletes to run TOO FAST and become too anaerobic, but give a false impression of fitness.
- Consider the technical benefits of producing this speed and power opposed to the purely physiological 'interference' with the aerobic development.
- Full lab data and athlete tracking - awareness of economy as well as thresholds and blood profile.
- What is the pace judgement of the athlete like? also in 'non-measured' work outs.
- In reps does the athlete hold pace with no drop off.
- Greater consideration to the recovery period as holding speeds with less rest will indicate aerobic fitness versus anaerobic contributions.

- Example sets may be 5-8x1000m OR extension sets like [2k, 2x1k, 5x400]

RUNNING OFF THE BIKE considerations;

- Can the athlete 'access' this form/cadence/limb coordination off the bike?
- what pace does the athlete perform sets like 'off the bike' - either IMMEDIATELY off specific race intensity OR off extended strength endurance work? [i.e 6x1k, 3x2k after a crit race or 90min solid ride?]
- technically what is seen in ALL speed profiles at which the athlete runs from a structural/physiotherapist perspective? i.e. filmed sequences of