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Gearing up to the World Tour level: more than ‘just’ power output

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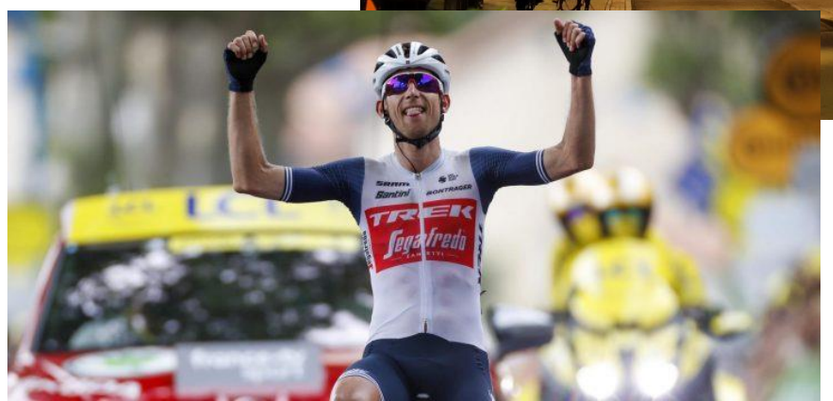
Groningen

Talent and performance optimization in sport

Sport Science Institute Groningen

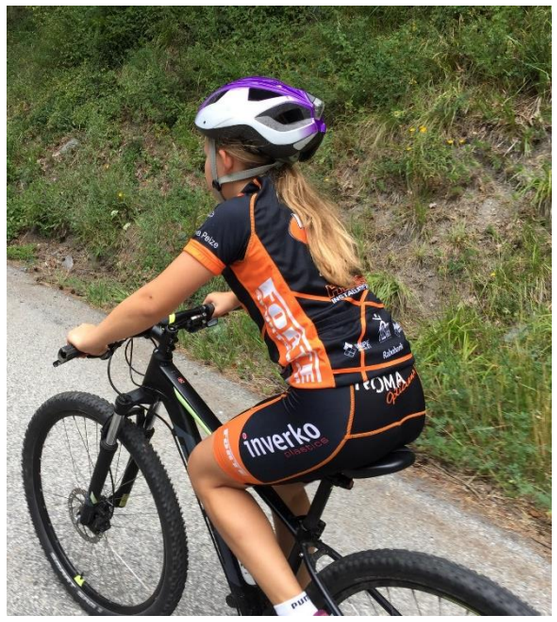
Netwerk Sport & Talent



Definition of talent

"A talented youth athlete is an athlete who performs better than peers during training and competion AND has the potential to become an elite athlete in the future."

- External reference
- Comparison between children



Howe et al, 1998; Helsen et al., 2000; Elferink-Gemser et al, 2004, 2007, 2011

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From talent to professional

- N=24 talented Dutch cyclists (U19)
- Physiological and psychological measures
- Peak performance at senior age (period of 10 years)

Helmantel, 2019 , unpublished thesis master Sport Sciences

Table 1. Means and standard deviations of physiological and psychological performance characteristics in talented junior cyclists categorized by their senior performance level (n=24)

	Successful cyclists n=5		Non-successful cyclists n=19		
	Mean	± (sd)	Mean	± (sd)	Cohen's d
Physiological performance characteristics					
Absolute VO_{2max} (ml/min)	5864	(739)	5582	(400)	0.14
Relative VO_{2max} (ml/min/kg)*	84.6	(1.39)	80.21	(3.74)	1.56
Absolute Power Output (Watt)	424	(42.64)	428	(31.07)	-0.11
Relative Power Output (Watt/kg)	6.37	(0.37)	6.15	(0.29)	0.66
Maximum heartrate*	202	(5.37)	193	(6.27)	1.56
Psychological performance characteristics					
Sport Motivation Scale					
Self-determined motivation	5,53	(0.72)	5.3	(0.64)	0.34
IM to experience stimulation (1-7)	5.8	(0.45)	5.84	(0.89)	
IM to know (1-7)	6	(0.68)	5.55	(0.72)	
IM to accomplish (1-7)	5.25	(1.12)	5.05	(0.8)	
Identified regulation (1-7)	5.05	(0.91)	4.74	(0.78)	
*Non self-determined motivation**	4,78	(0.68)	3.82	(0.87)	1.23
Introjected regulation (1-7)	4.85	(0.8)	3.91	(1.07)	
External regulation (1-7)*	4.7	(0.65)	3.72	(1.01)	
Amotivation	1,8	(0.82)	1.83	(0.66)	-0.04
Psychological Skills Inventory for Sports					
Motivation (1-5)	4.38	(0.38)	4.36	(0.41)	0.05
Self-confidence (1-5)	4.08	(0.23)	3.55	(0.75)	0.96
Anxiety control (1-5)	4.2	(0.58)	3.91	(0.51)	0.53
Mental preparation (1-5)	2.97	(0.83)	3.05	(0.74)	-0.1
Team emphasis (1-5)	3.14	(0.3)	3.17	(0.52)	-0.06
Concentration (1-5)	3.69	(0.44)	3.51	(0.52)	0.37

Note: d around .2 = small; d around .5 = medium; d around .8 is large
*p < .05
Abbreviations: IM = Intrinsic Motivation

Helmantel, 2019 , unpublished thesis master Sport Sciences

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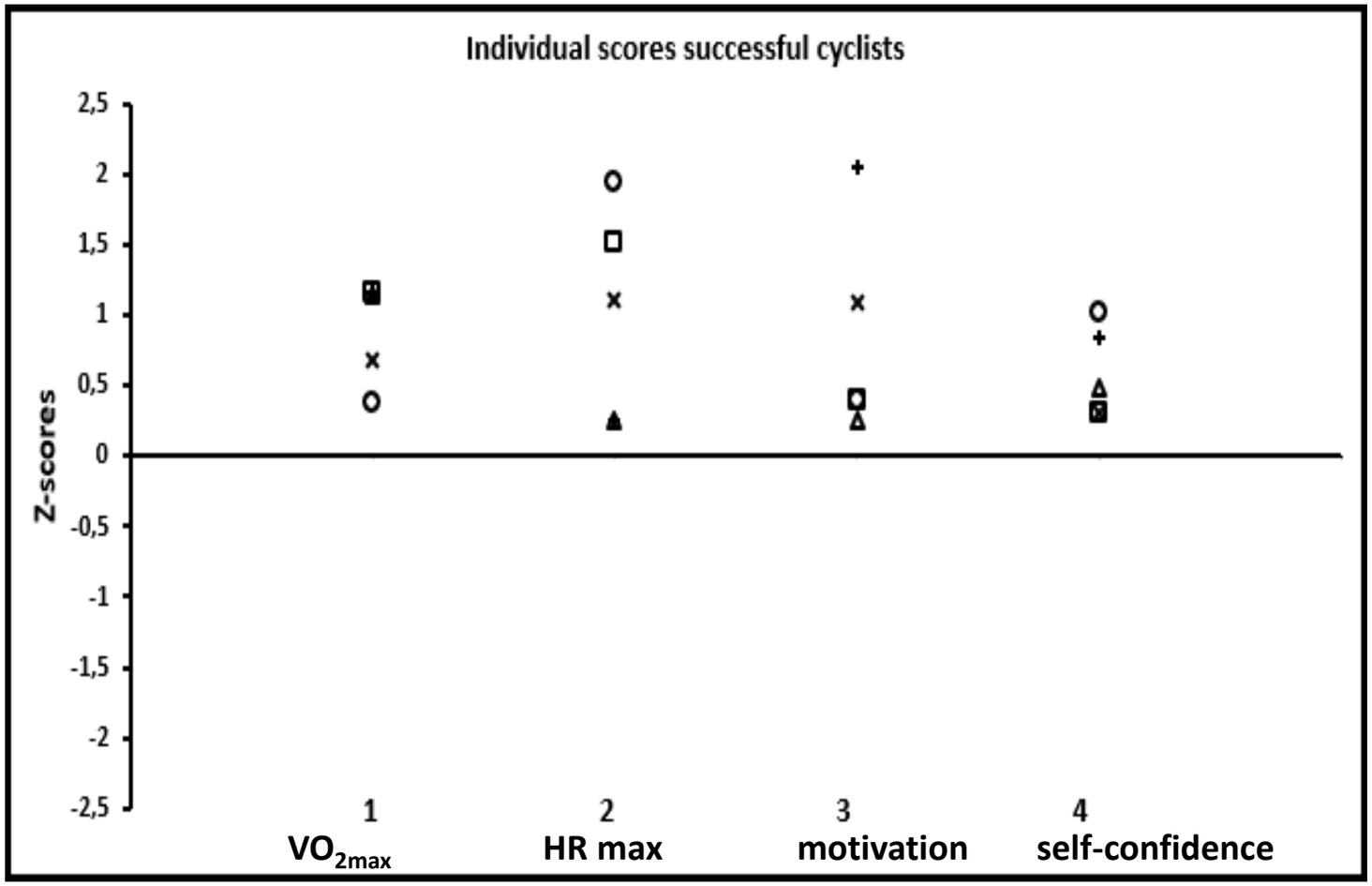
From talent to professional



Helmantel, 2019 , unpublished thesis master Sport Sciences

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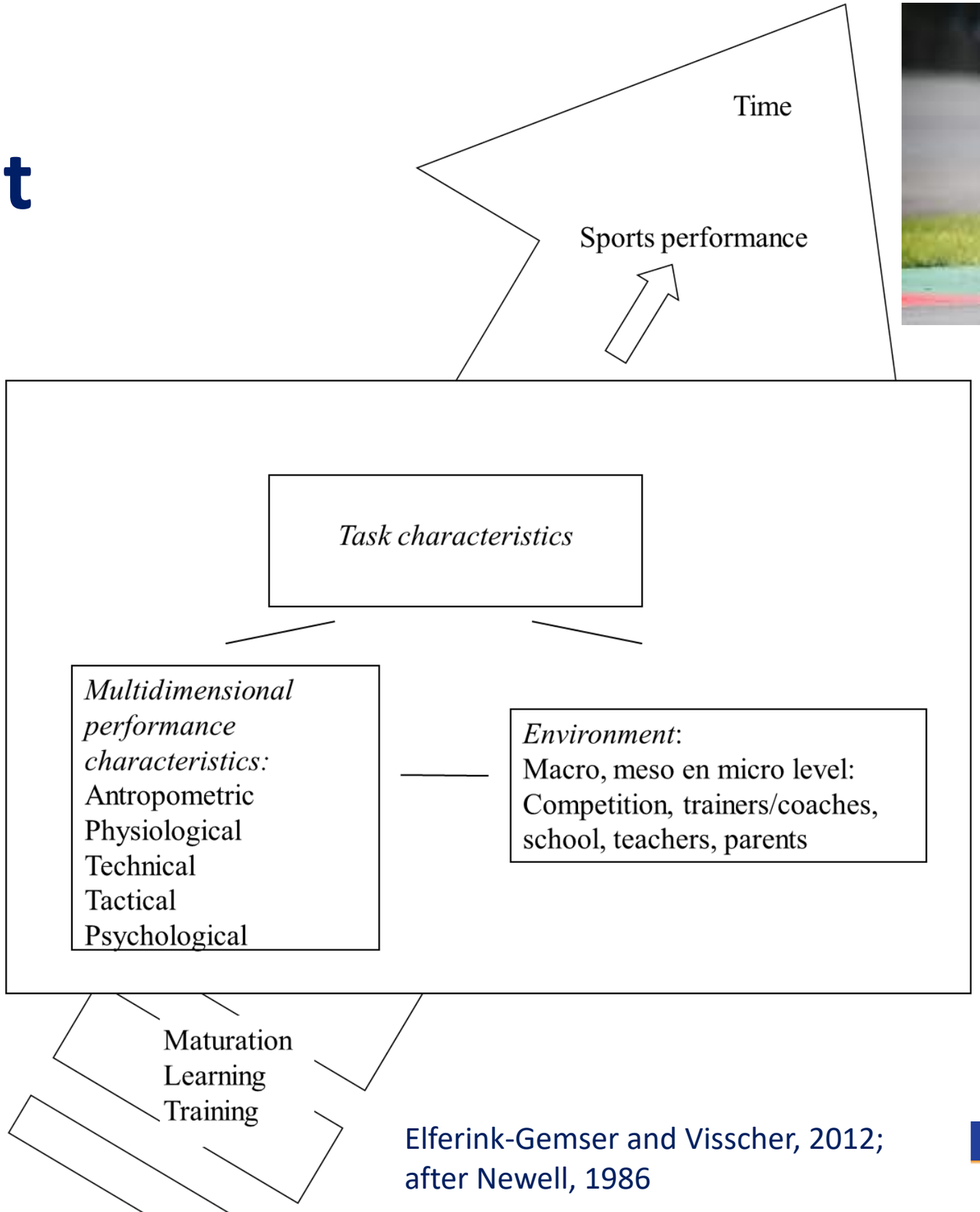
Groningen Sport Talent Model (GSTM)



Elferink-Gemser and Visscher, 2012; after Newell, 1986

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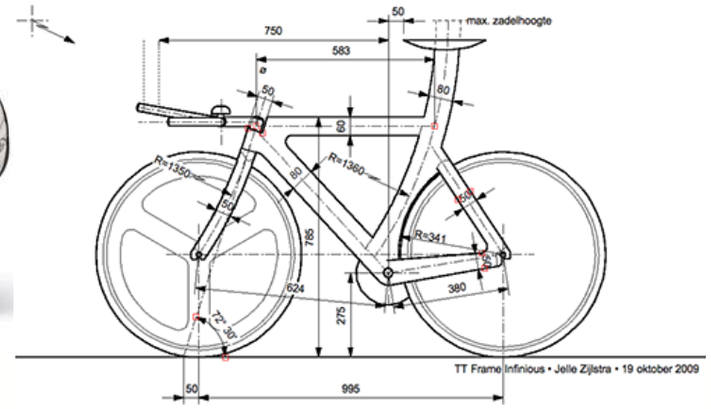

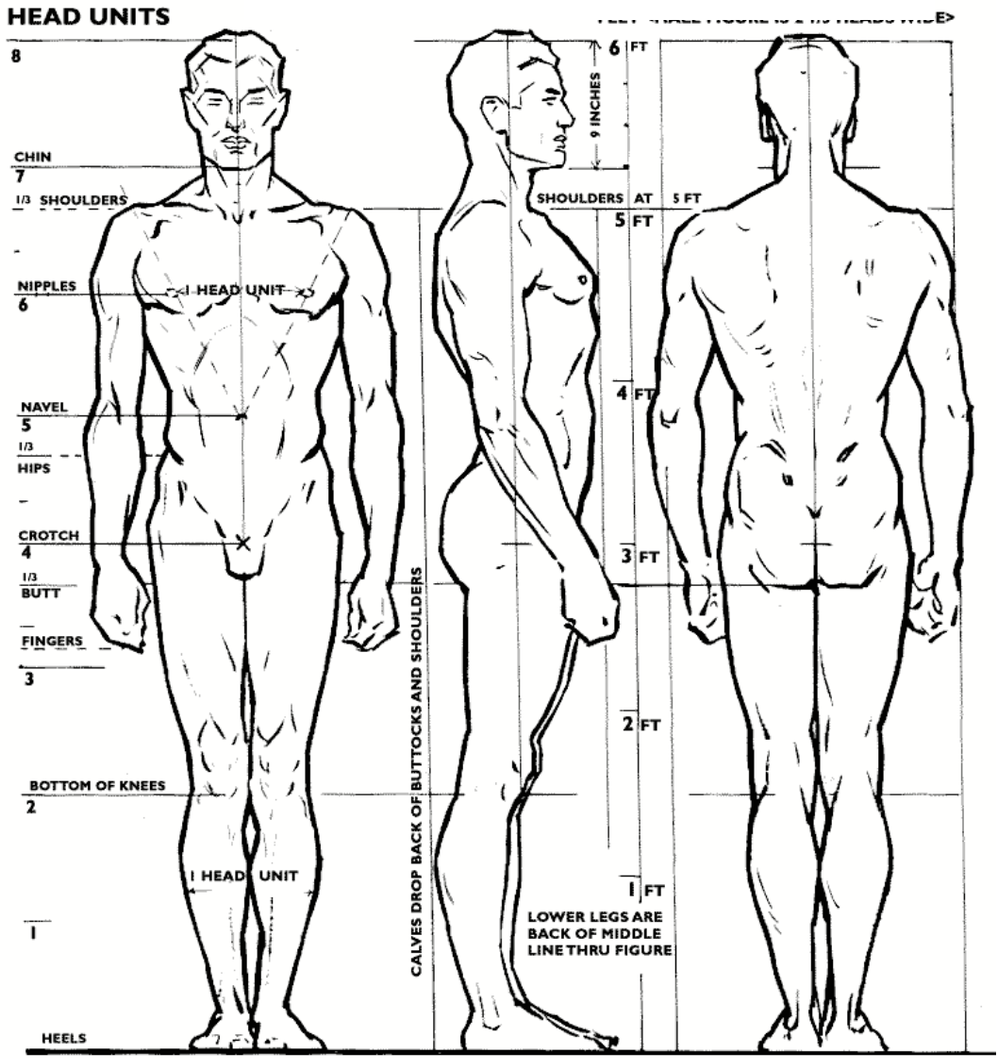

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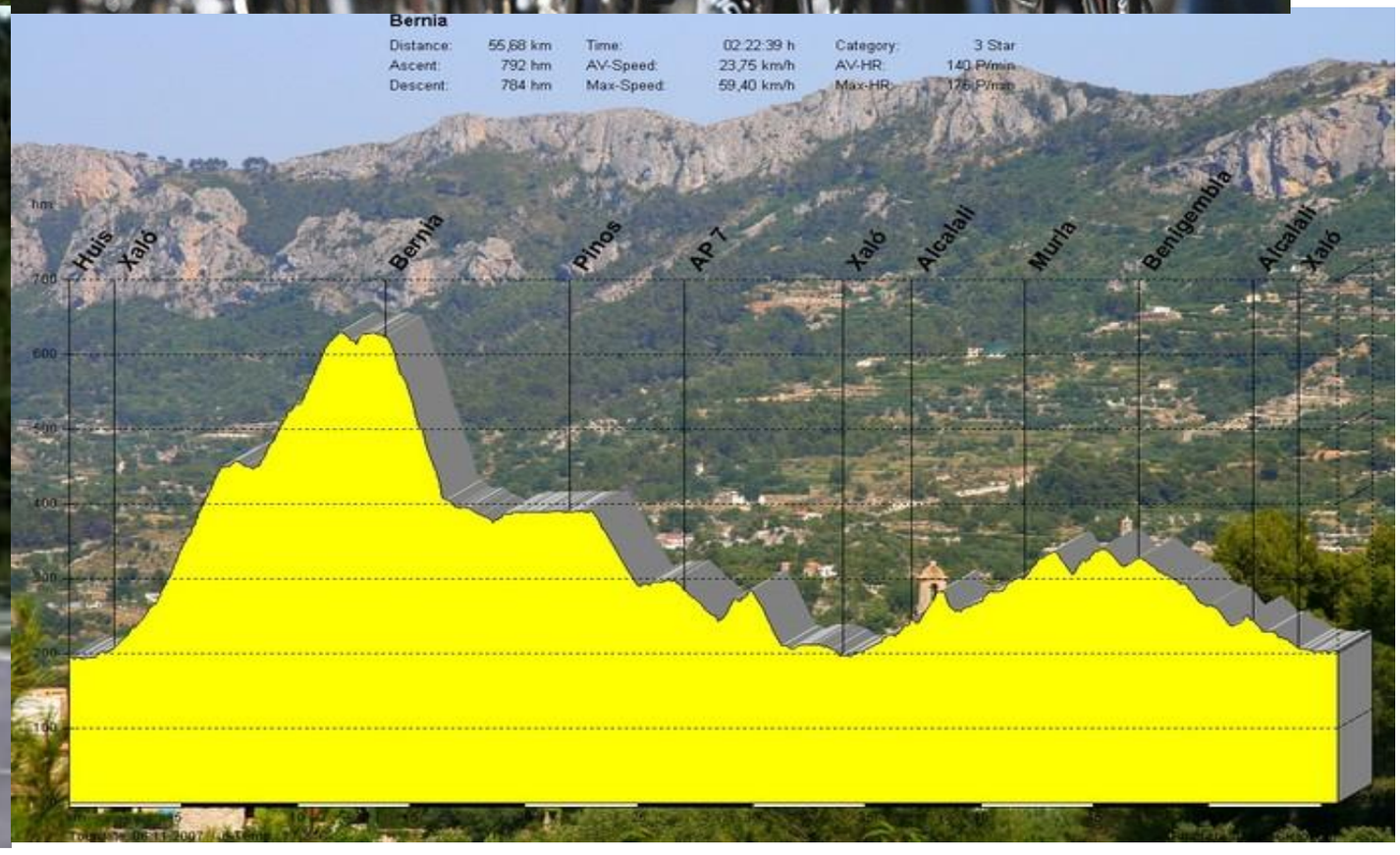
Persoon	VERHOLEN Bart	Datum	19/12/2008	Gemiddelde	132 hsm	Herstel	-21 hsm
Training	2008/12/19 9:33:44	Tijd	8:33:44.0	Duur van de training: 3:00:14.4			
Opmerking	Extensieve duur (80 km)			Geselecteerde periode: 0:00:00.0 - 3:00:10.0 (3:00:10.0)			

Age	Very Poor	Poor	Fair	Good	Excellent	Superior
13-19	<35.0	35.0-38.3	38.4-45.1	45.2-50.9	51.0-55.9	>55.9
20-29	<33.0	33.0-36.4	36.5-42.4	42.5-46.4	46.5-52.4	>52.4
30-39	<31.5	31.5-35.4	35.5-40.9	41.0-44.9	45.0-49.4	>49.4
40-49	<30.2	30.2-33.5	33.6-38.9	39.0-43.7	43.8-48.0	>48.0
50-59	<26.1	26.1-30.9	31.0-35.7	35.8-40.9	41.0-45.3	>45.3
60+	<20.5	20.5-26.0	26.1-32.2	32.3-36.4	36.5-44.2	>44.2



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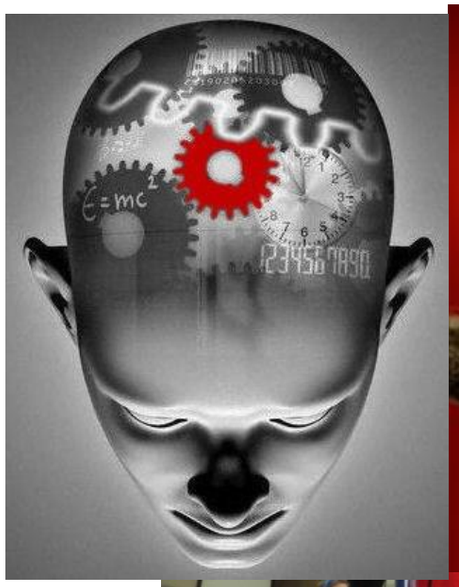

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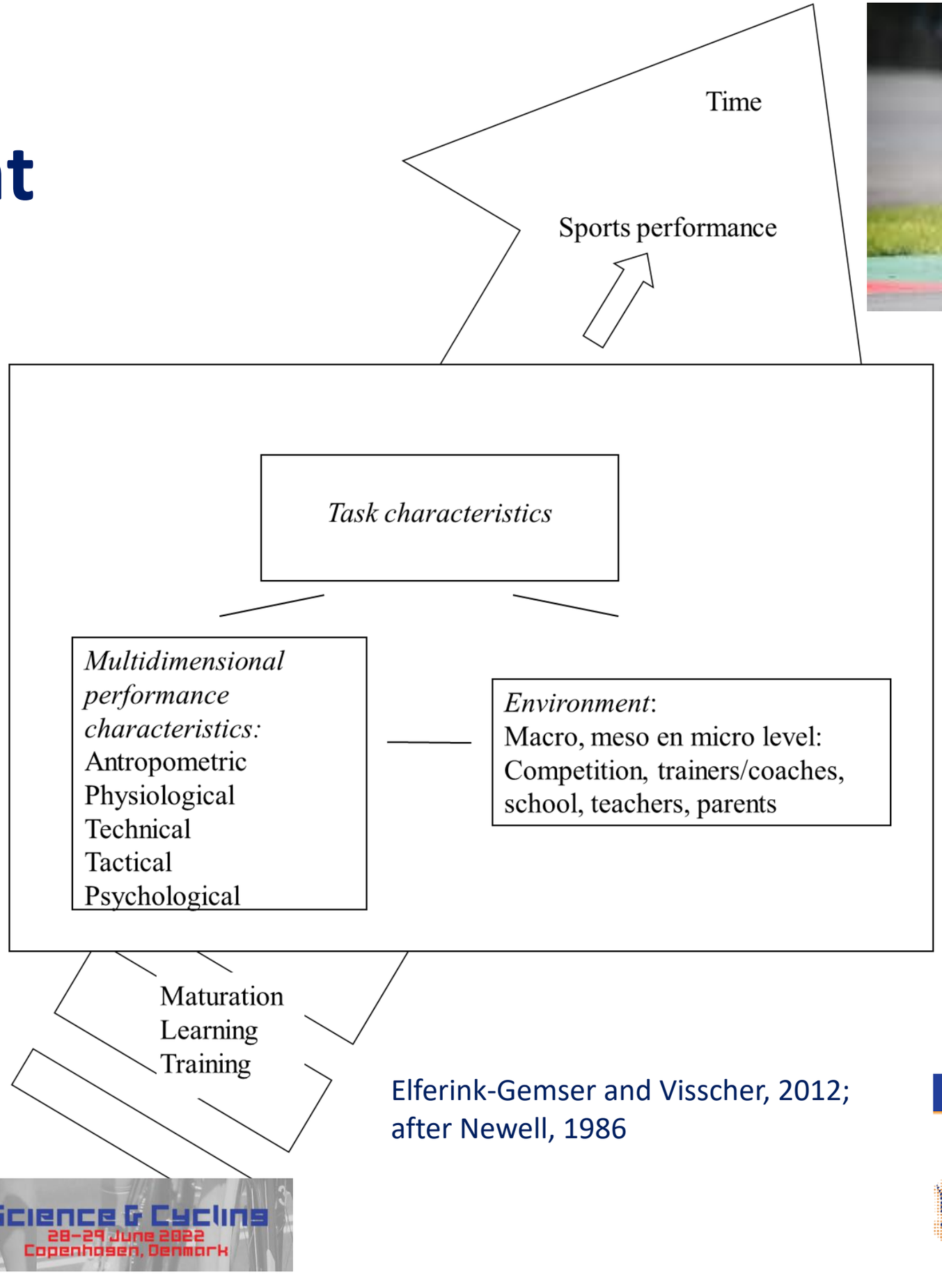

Elferink-Gemser and Visscher, 2012; after Newell, 1986

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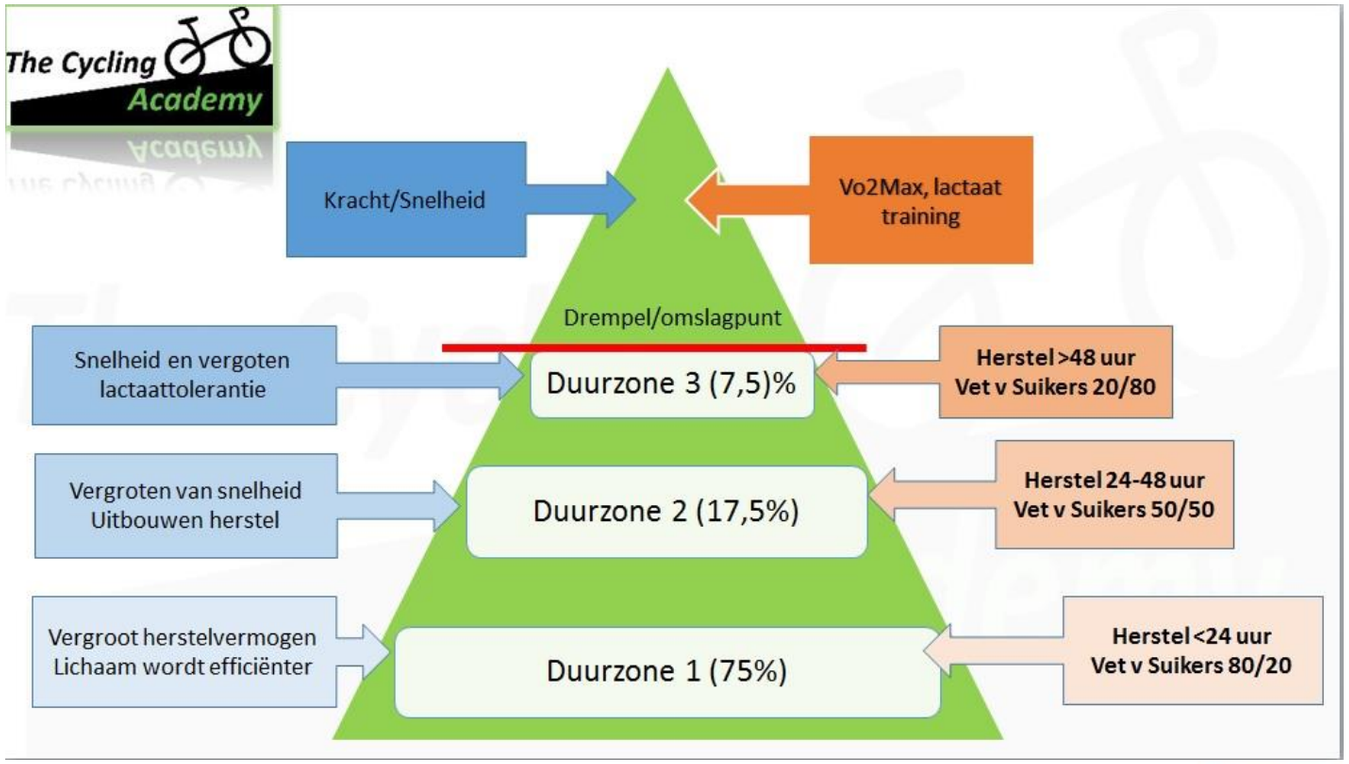
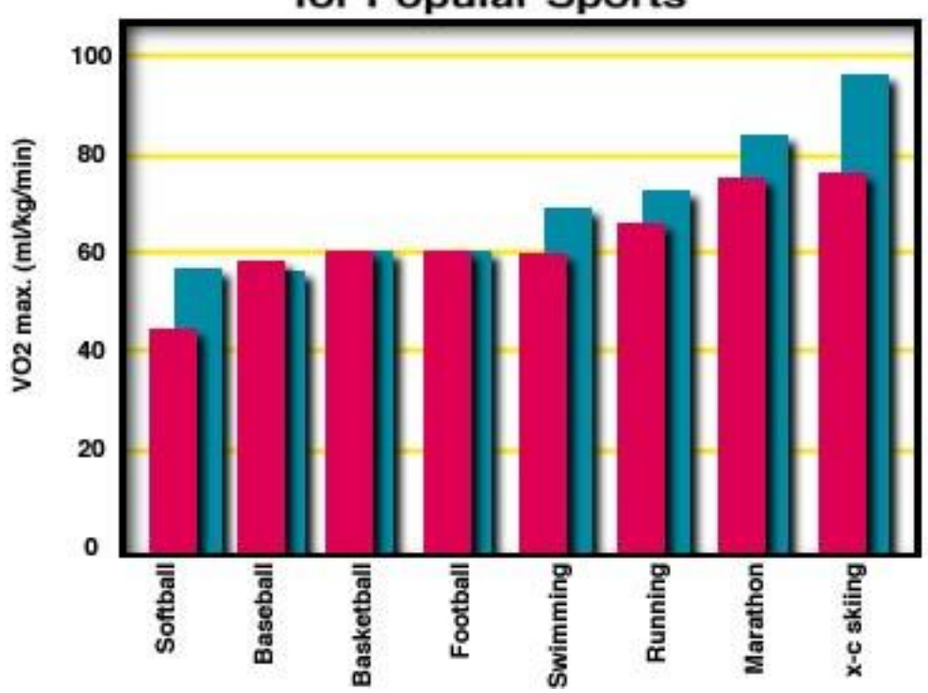
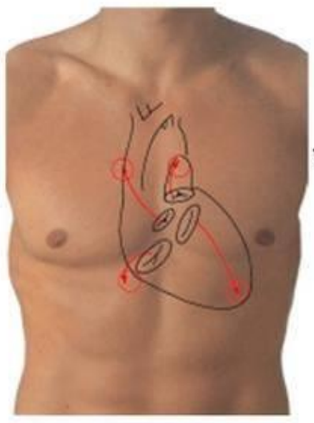
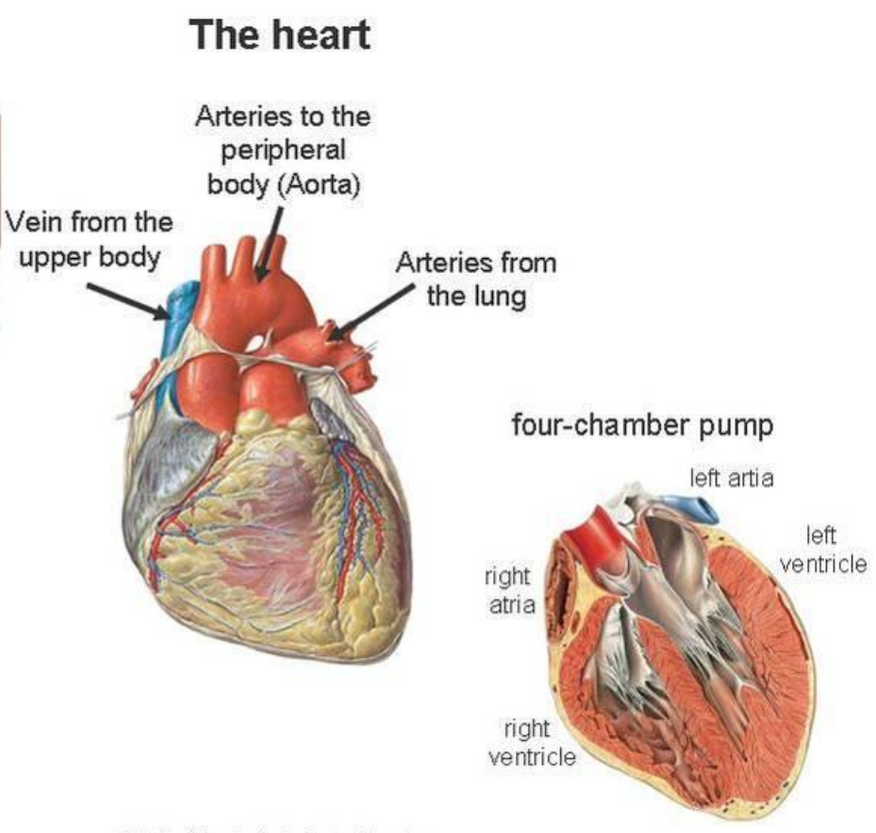
Training







Location of the heart in the human body



Sobotta: Atlas der Anatomie des Menschen
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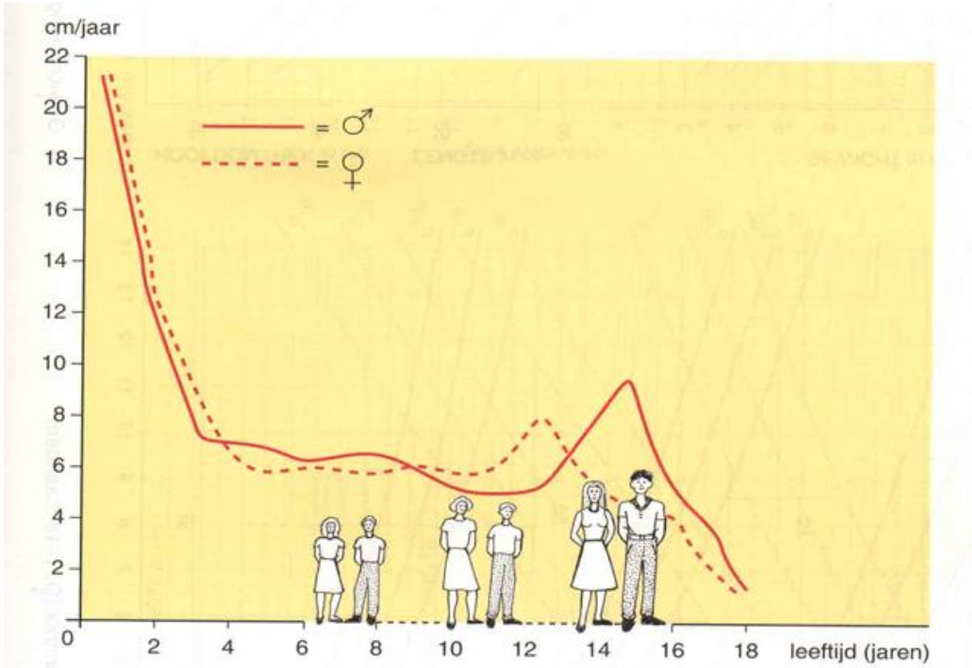
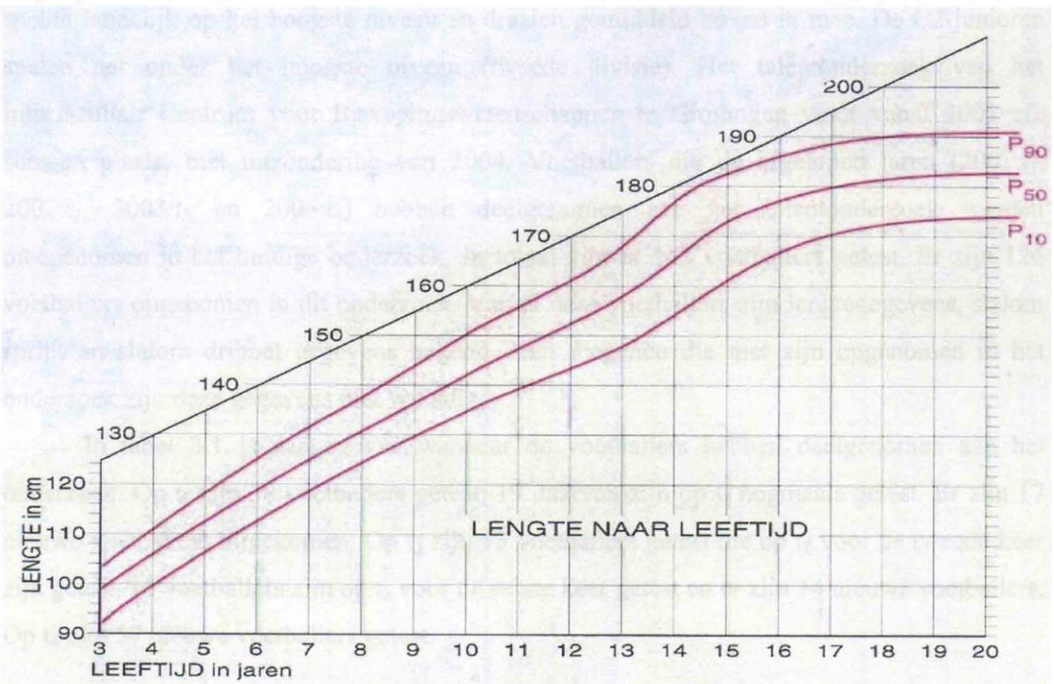
Maturation





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Learning

Motor skills, e.g., motor coordination

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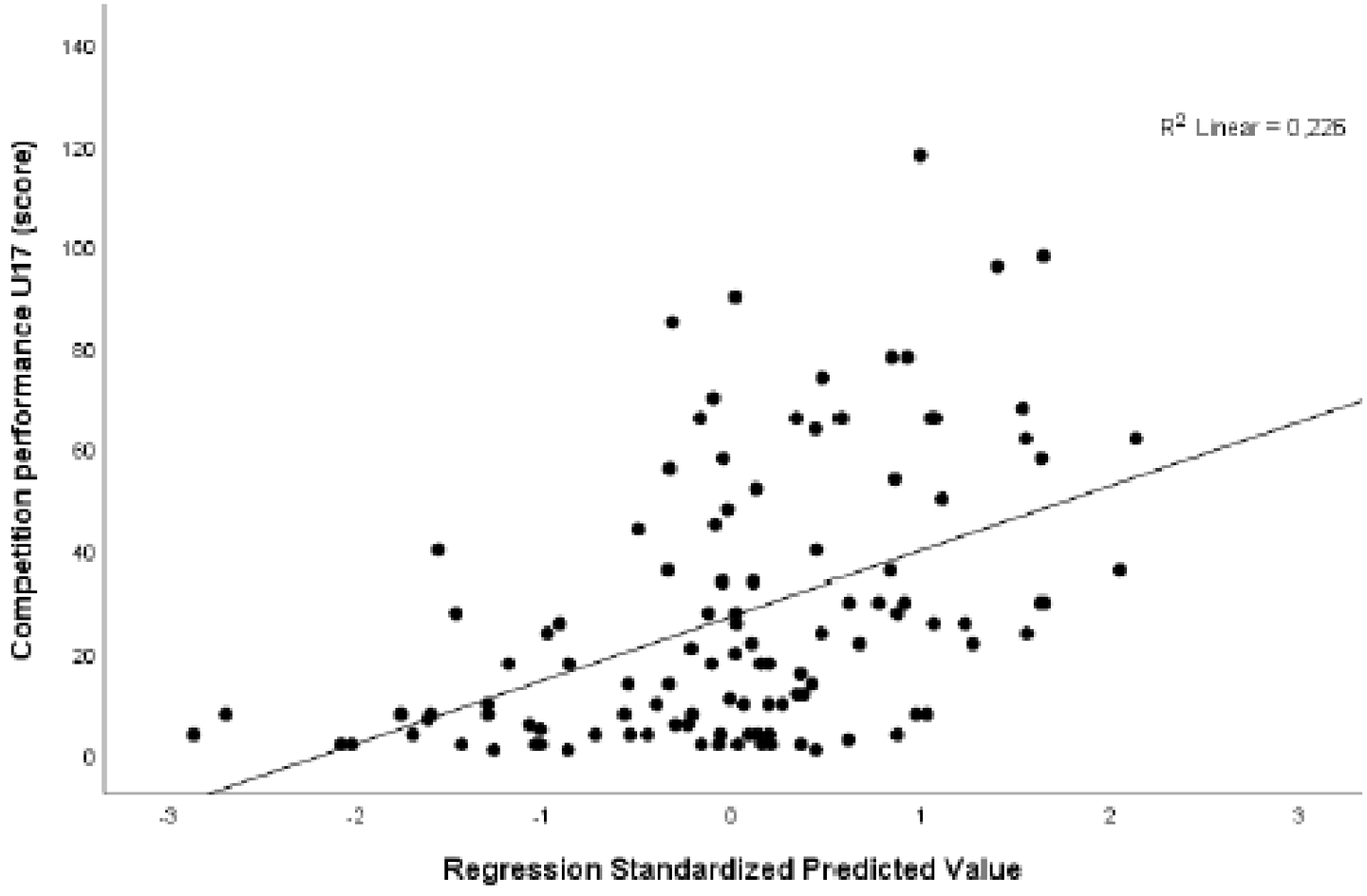
Motor coordination



Study 2 : Is motor coordination the key to success in youth cycling?

Mireille Mostaert[1*], Pieter Vansteenkiste[1], Felien Laureys[1], Nikki Rommers[2], Johan Pion[1,3], Frederik J.A. Deconinck[1], Matthieu Lenoir[1]

N = 111 Belgian cyclists
Tested when U15

Relation with performance when U17

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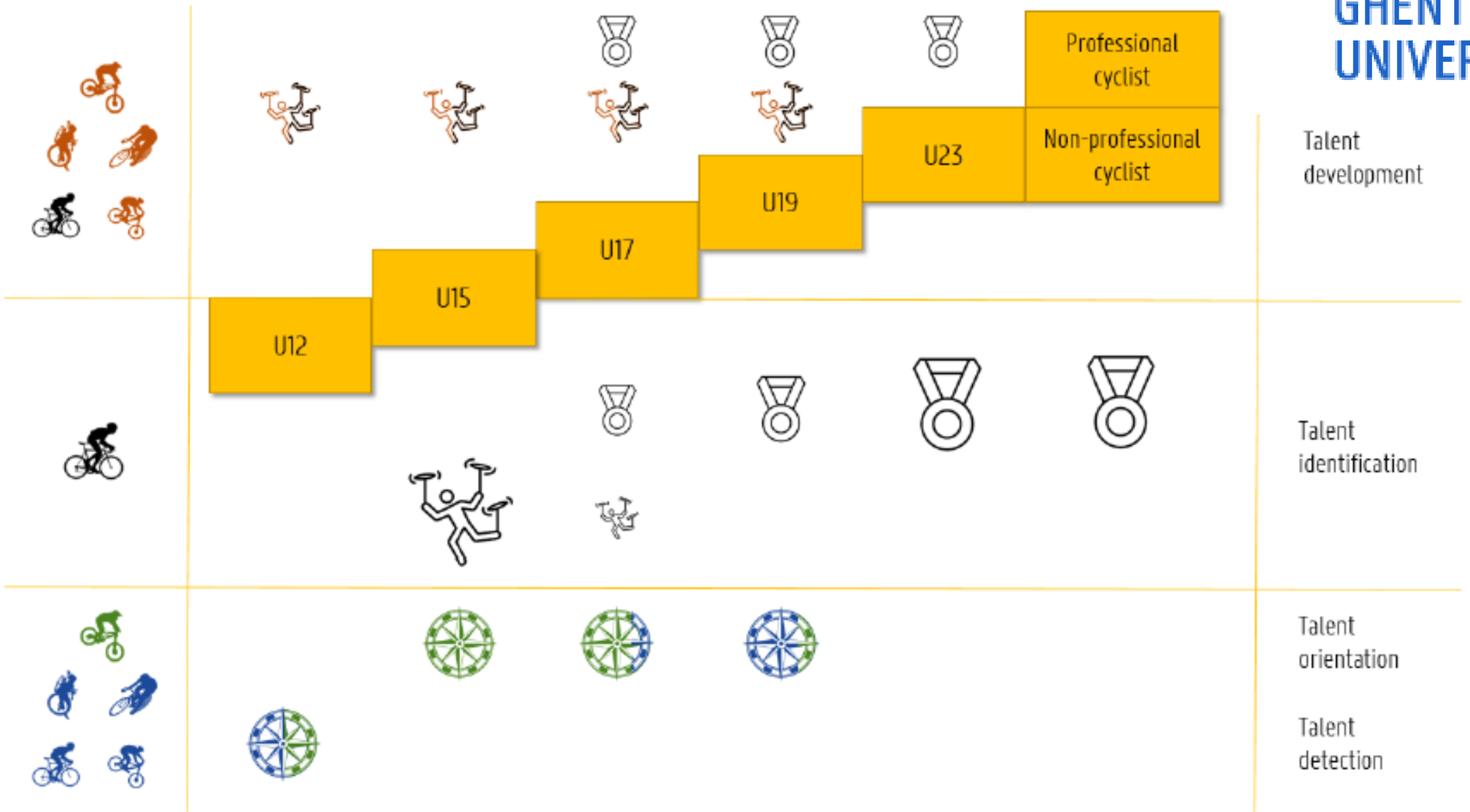
Cycling Compass

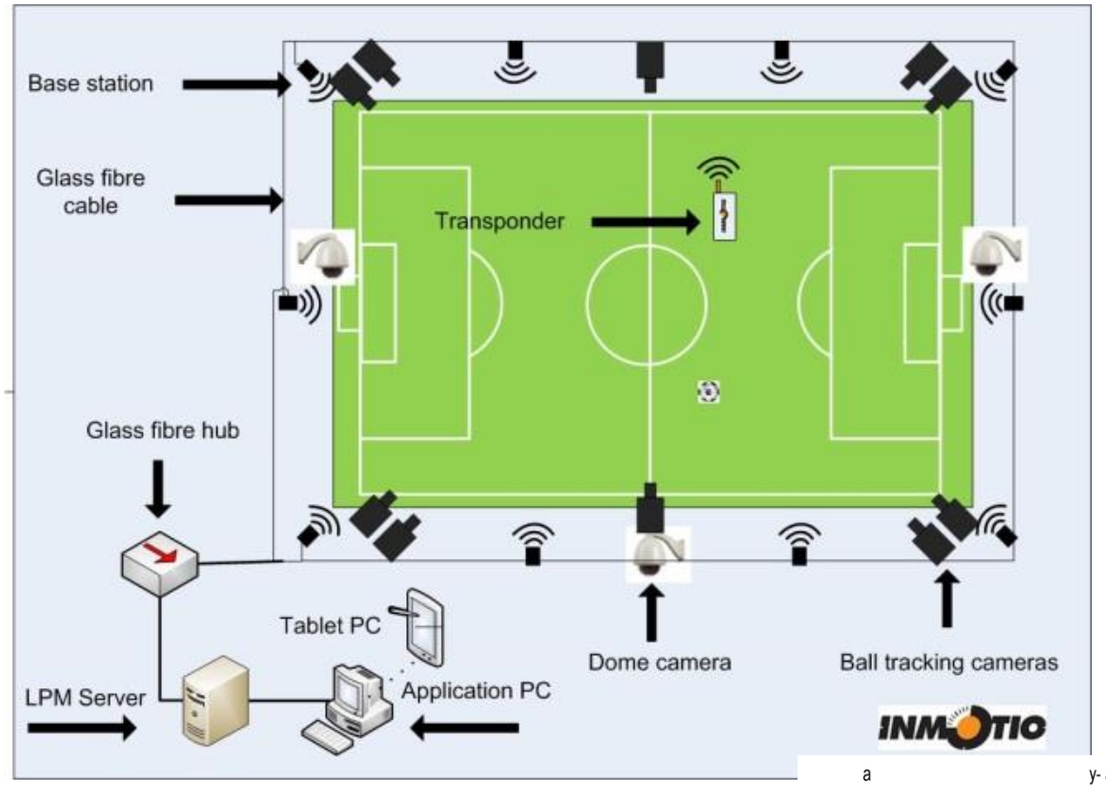


Mostaert et al., 2022

Learning

Cognitive skills, e.g., tactical skills, pacing

Measuring tactical skills in teamsports



Scand J Med Sci Sports 2010
doi: 10.1111/j.1600-0838.2010.01104.x

SCANDINAVIAN JOURNAL OF MEDICINE & SCIENCE IN SPORTS

Positioning and deciding: key factors for talent development in soccer

R. Kannekens, M. T. Elferink-Gemser, C. Visscher

Center for Human Movement Sciences, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands Corresponding author: Rianne Kannekens, Center for Human Movement Sciences, University Medical Center Groningen, Antonius Deusinglaan 1, 9713 AV Groningen, the Netherlands. Tel: +31 50 363 6231, Fax: +31 50 363 3150, E-mail: r.kannekens@med.umcg.nl

Accepted for publication 5 October 2009

Talent identification and development implicate recognizing youth players who will be successful in the future and guiding them to the top. A major determinant of this success is tactical skills. To identify possible key factors that help in predicting success over time, this study assesses the tactical skills of 105 elite youth soccer players who participated in a talent development program at an earlier stage of their sport career (mean age 17.8 ± 0.9). These skills were related to their adult performance level, specifically whether they became professionals ($n = 52$) or amateurs ($n = 53$). Defenders, midfielders and attackers completed the Tactical Skills Inventory for Sports with scales for declarative and procedural knowledge in either attacking or defensive situations. A logistic regression analysis was performed to identify the tactical skills that contribute to professional performance level in adulthood. *Positioning and deciding* appeared to be the tactical skill that best predicts adult performance level ($P < 0.05$). This is especially true for midfielders, with the correct classification of elite youth players in the range of 80%. For players scoring high on this skill, the odds ratios indicated a 6.60 times greater chance that a player became a professional than players scoring low ($P < 0.05$).

TACSIS Tactical Skills Inventory for Sports

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Goes et al., 2020, Kannekens et al., 2010

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Tactical skills in cycling

- **Declarative knowledge**
- I know how and when to take position in the peloton/breakaway
- I know the decisive moments of the race
- When I attack, I know exactly what my teammates can do for me
- I know how the favourites race

- **Procedural knowledge**
- I am very good in making the right decisions at the right moment
- I react quickly on changes in the race situation, like moments when the peloton splits or when groups come together
- When it comes to a sprint, I do the right things.

Tactical skills in high level cyclists

- N=41 male and female high level road cyclists (age 24.7 ± 5.3)
- Tactics in cycling questionnaire (TICQ):
  almost never (1) - always (6)
- Age, experience in years
- Captains versus non-captains
- Sprinters versus non-sprinters

Helmantel, 2019, academic assignment master Sport Sciences

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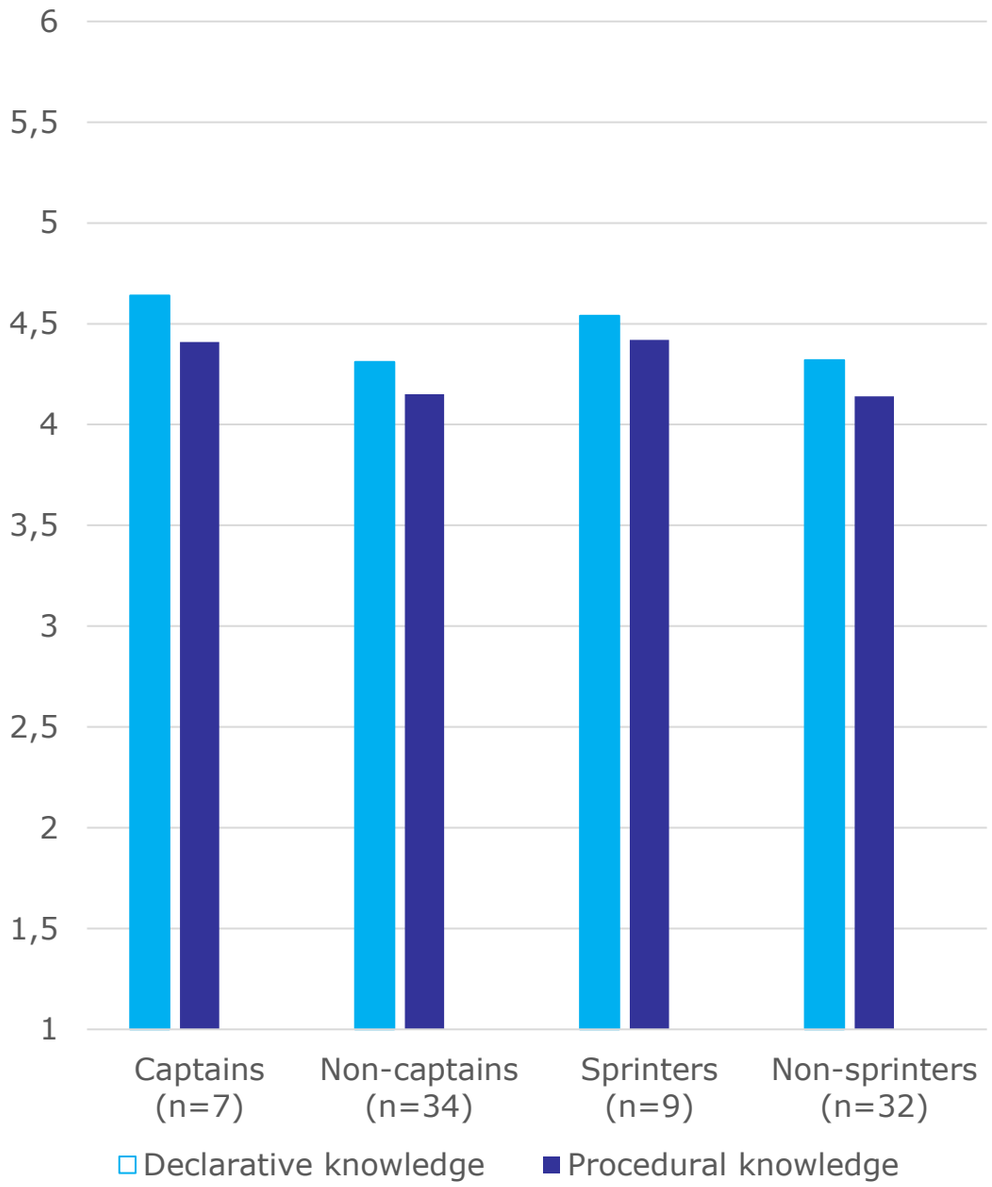
Tactical skills in high level cyclists



	Age	Experience	Declarative knowledge
Age			
Experience	.98*		
Declarative knowledge	.23	.34*	
Procedural knowledge	.37*	.38*	.71*

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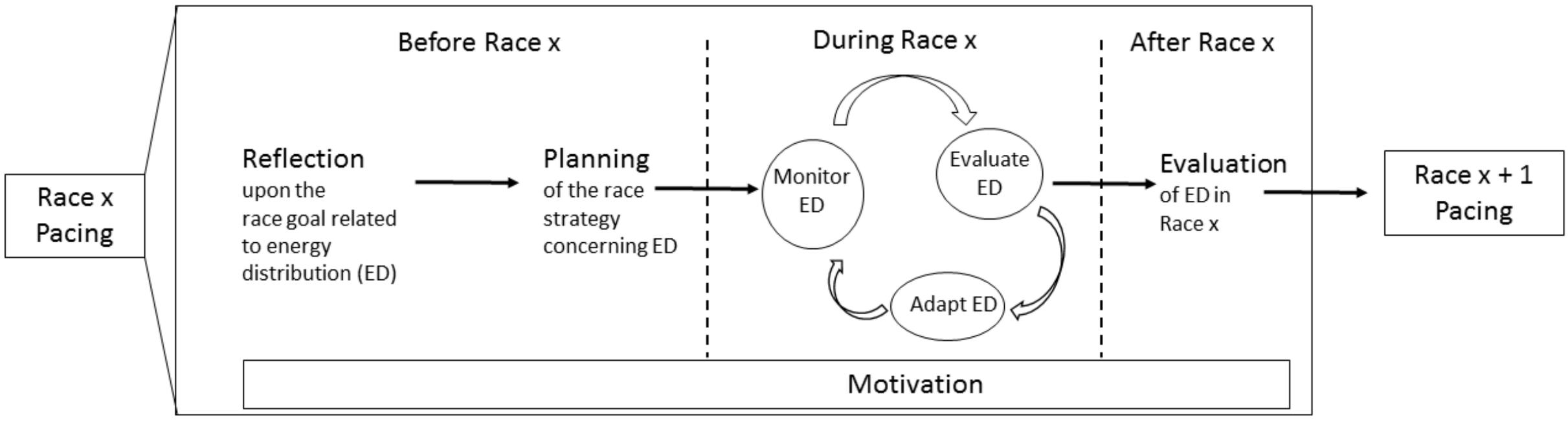
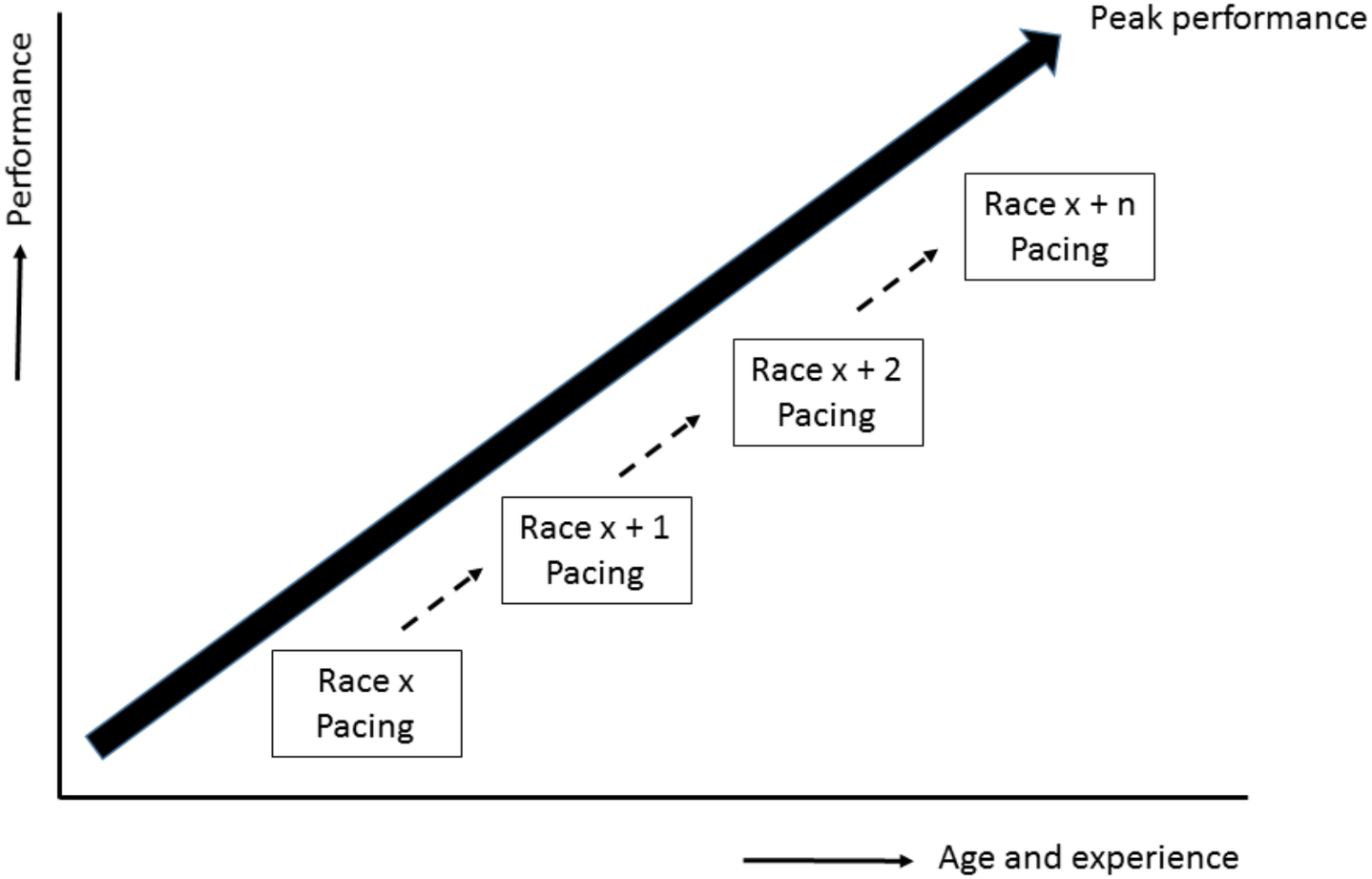
Pacing skills



Elferink-Gemser and Hettinga, 2017; Menting et al., 2019, 2020; Noorbergen et al., 2016; Wiersma et al. 2017

‘Building’ a performance template

Northumbria University NEWCASTLE



Elferink-Gemser and Hettinga, 2017; Foster et al., 2009; Micklewright et al., 2010; 2012; Menting et al., 2019

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Time trial versus racing opponents

Hettinga et al., 2019; Menting et al., 2019, 2020

Driving force for development: self regulation of learning and training

Long term goals

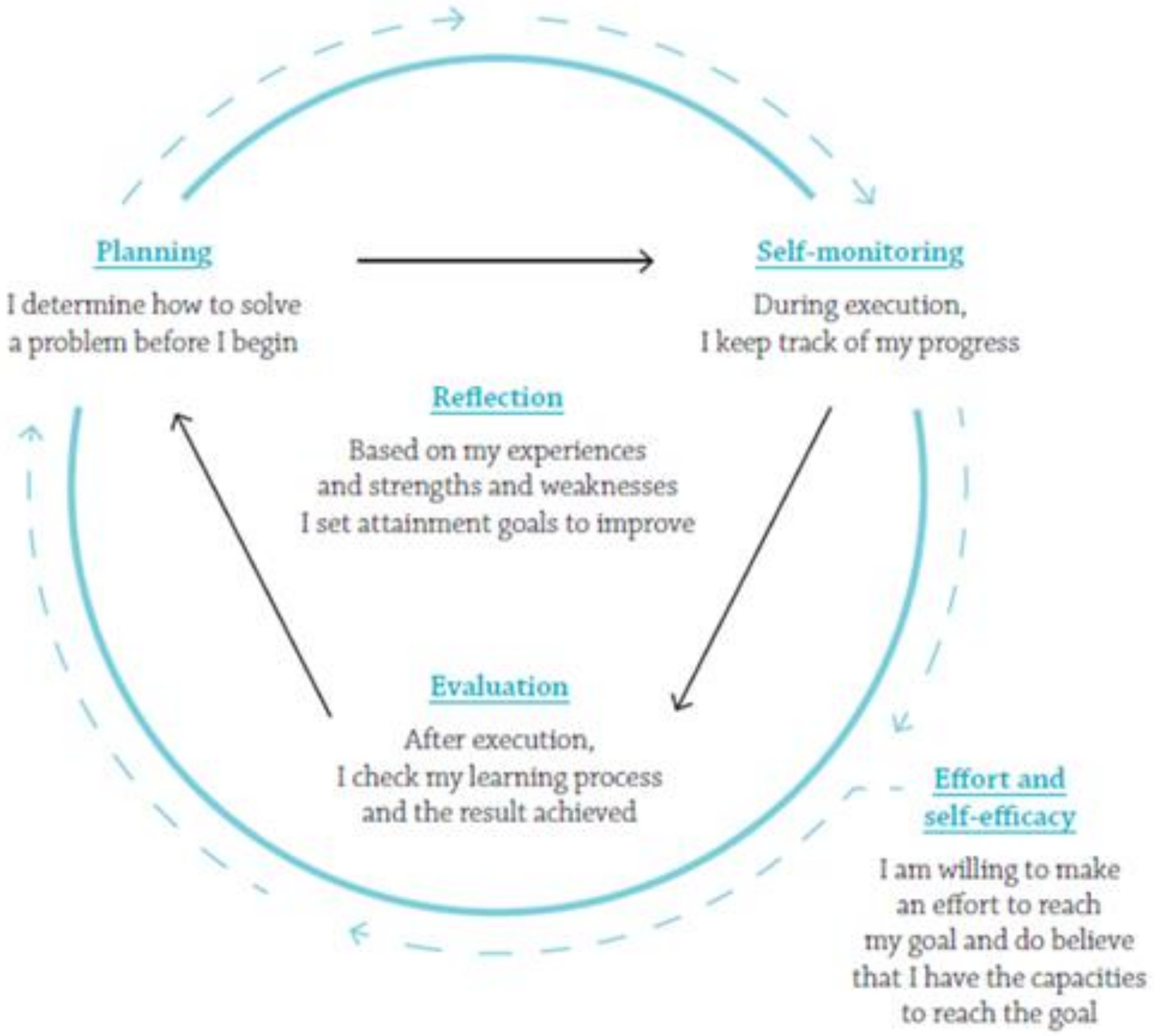
Short term goals

Zimmerman et al., 2006; Jonker et al., 2010; Toering et al., 2012

Self regulation of learning and training

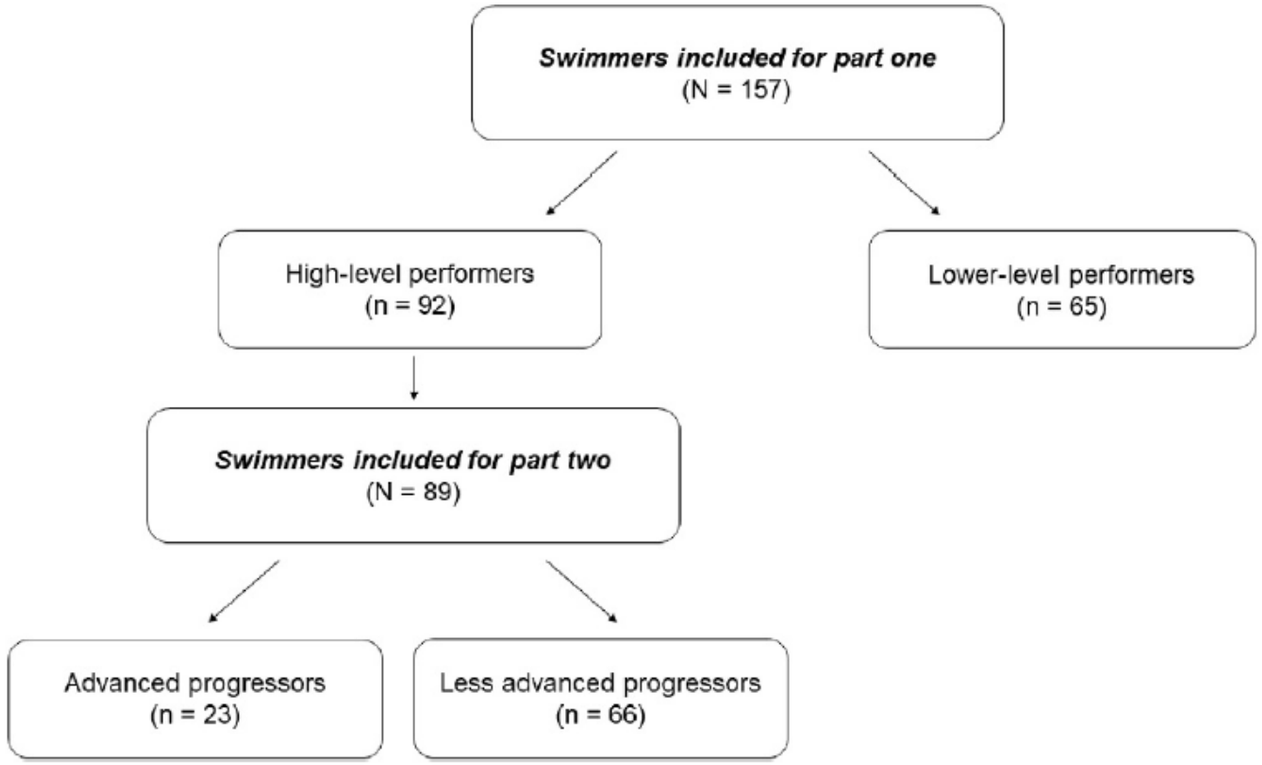
- Knowing what to improve and how to do this
- Being motivated to improve
- Taking action to improve
- Learning and training in a smart way!

Zimmerman et al., 2006; Jonker et al., 2010; Toering et al., 2012



Jonker et al., 2010, 2012

Relation with performance improvement



High versus lower level swimmers: Reflection and Effort
Advanced versus less advanced swimmers: Evaluation

Post et al., 2022

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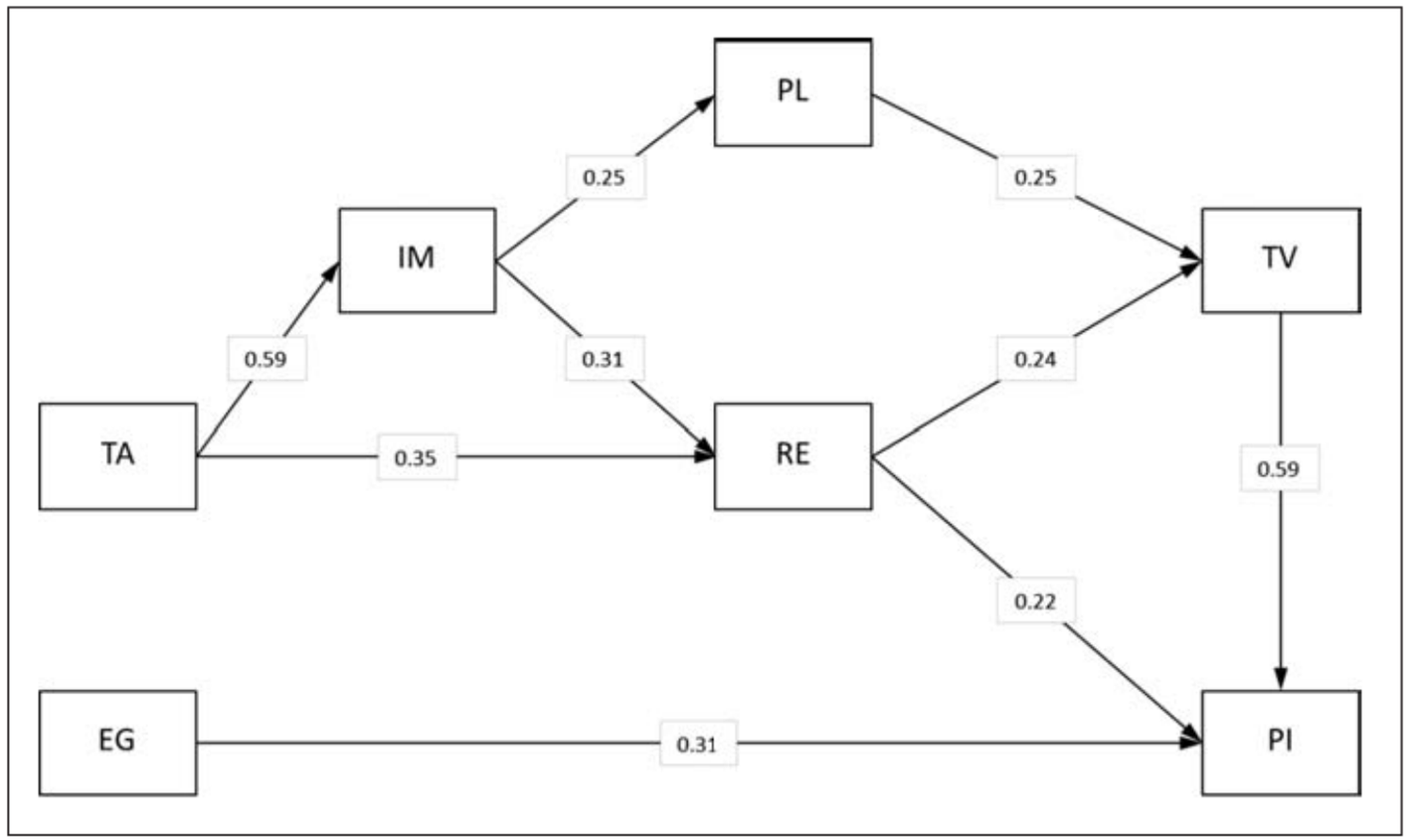
Relation with performance improvement



Reflection and goal orientation are positively related to performance improvement in speed skaters

Elferink-Gemser et al., 2015

Cycling Class NL

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Take home message

- Multidimensional approach
- Longitudinal approach
- Task-Person-Environment
- Maturation, Learning and Training
- Motor skills and cognitive skills
- Self-regulation
- Do not forget to pay attention to those factors as well!

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