IAS
Institute of Applied
SPORTS SCIENCE

Considering Long-Term Sustainability in Talent Promotion

Implications for Talent Development in Rowing

Arne Güllich

18th FISA Youth Coaches Conference, Hamburg, October 25th, 2013

Questions from Front-Line Practitioners' Perspective

- At which ***age*** should we ***start*** training and competitions?
- Which ***amounts*** of training and competitions are ***functional***?
- Which degree of ***specialised practice*** or of ***variability*** should we pursue?
- Which are the effects of an ***early specialisation*** or ***variability*** at ***short term*** and at the ***long term***?

Theory

Deliberate Practice (Ericsson et al., 1993)

- Performance is a function of the ***amount*** of specific ***deliberate practice***.
- ***Implication:*** Early start, early specialisation, high intensity of specific practice

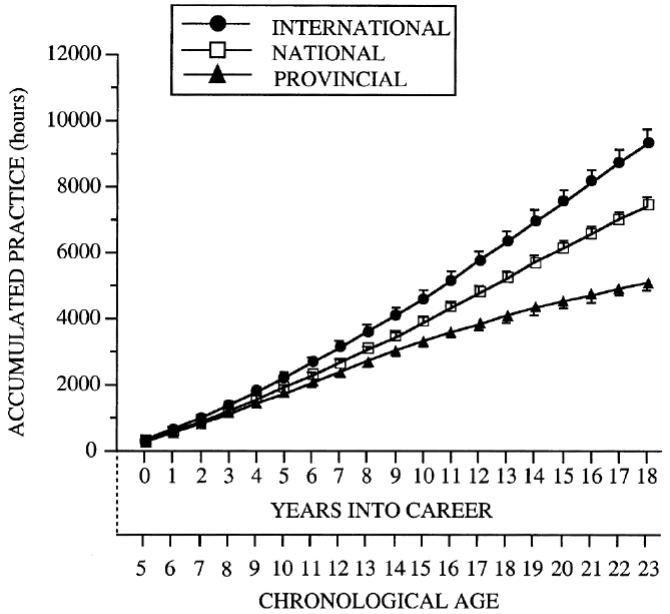


Fig. 3. Accumulated practice hours as a function of the number of years into one's soccer career and chronological age (mean ± standard error). Reprinted with permission from Helsen *et al.* (1998b).

Diversification Theory (Côté et al., 2007, 2012)

- Practicing ***various sports*** and ***sporting leisure play*** during childhood benefits the ***long-term performance*** development.
- ***Implication:*** Variable involvements, deliberate play, late specialisation

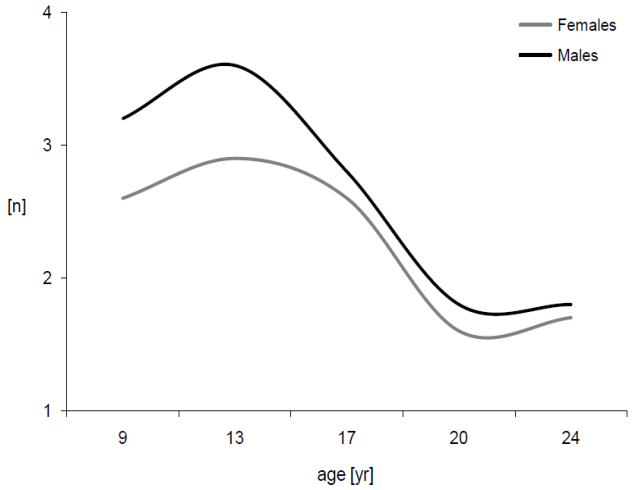
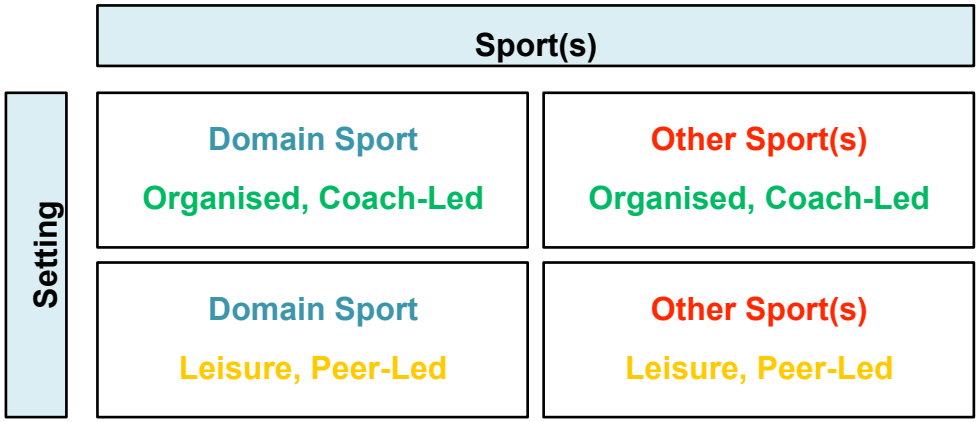


Abb. 3.11: Anzahl parallel betriebener Sportarten; retrospektive Angaben US-amerikanischer Olympiateilnehmer (n=816, nach Originaldaten von Hill et al. 2002)

Analytical Categories of Sporting Activities



→ **"MACRO-STRUCTURE"** of Practice

Research Questions

1. Did **more** and **less successful** athletes **differ** significantly in their **earlier participation patterns?**
2. **What** did they have **in common?**
3. To which extent did the **more successful** athletes **vary among each other?**



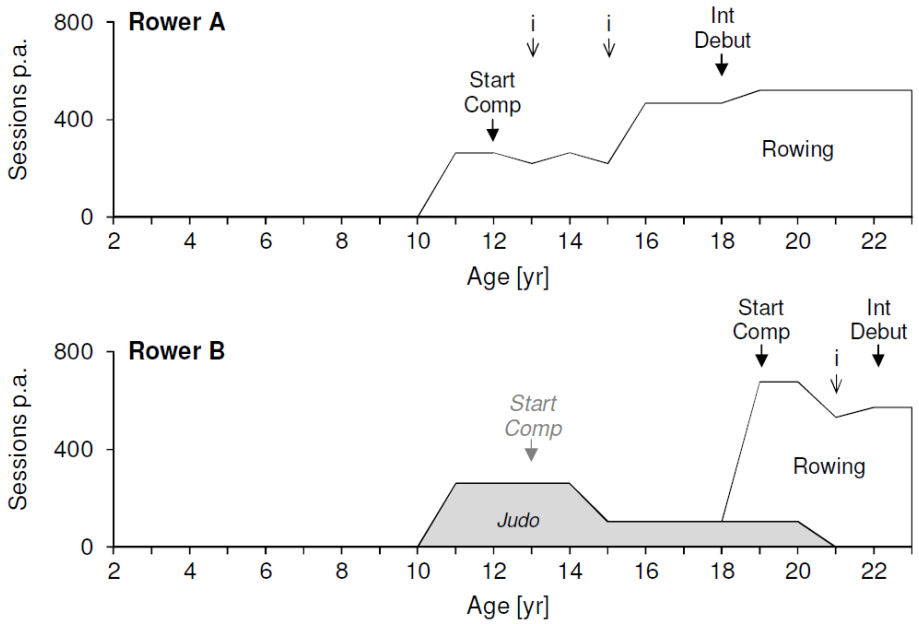

Situation of Research

\+ = positive correlation with success, o = indifferent, – = negative correlation with success

WC = World Class, NC = National Class, RC = Regional Class, bRC = below Regional Class

			Domain Sport			*Other Sports*		
Age, Success	Studies	Sports	**Total**	Pract	Play	**Total**	Pract	Play
***Adult** athletes*								
WC vs. NC	Carlson, 1990	Tennis	o			+		
	Güllich, 2013	Field Hockey	o	o	–	+	+	o
	Hornig et al., 2013	Football	o	o	o	+	+	o
	Johnson, 2006	Swimming	o	o		+		
	Ronbeck et al., 2009	Long-Distance Skiing	o			+		
	Van Rossum, 2000	Field Hockey	–					
NC vs. RC	Berry et al., 2008	Australian Football	o	o	o	+	+	o
	Hornig et al., 2013	Football	+	+	o	o	o	o
	Memmert et al., 2010	Team Ball Sports	o	+	–	o	o	
	Weissensteiner et al., 2008	Cricket	+	+	–	o	o	o
WC vs. RC	Baker et al., 2003	Team Ball Sports	+	+	–	o	o	
	Duffy et al., 2004	Dart	+	+	–			
	Hornig et al., 2013	Football	o	o	o	o	+	o
	Ronbeck et al., 2009	Long-Distance Skiing	+	+		+		
NC vs. bRC	Baker et al., 2006	Triathlon	+	+		+		
	Helsen et al., 1998	Soccer, Field Hockey	+	+				
	Hodges & Starkes, 1996	Wrestling	+	+				
	Hodges et al., 2004	Triathlon, Swimming	+	+				
***Youth** athletes*								
WC vs. NC	Law et al., 2007	Rhythmic Gymnastic	+	+		–		
NC vs. RC	Ford et al., 2009	Soccer	o	o	+	o		
	Weissensteiner et al., 2008	Cricket	+	+	+	o	o	o
NC vs. bRC	Ford et al., 2009	Soccer	+	+	o	o		
	Ward et al., 2004	Soccer	+	+	o	o	o	o

Research Programme
Training – Promotion – Success



- **Athlete Survey** National Squads **47** Olympic sports
- n=**1.558**, **45**% senior, **55**% junior

  387 Top Ten Olympic Games / World Championships

  213 Top Ten National Championships

- Practice/Training, Competitions:

  Domain Sport, **Other** Sports

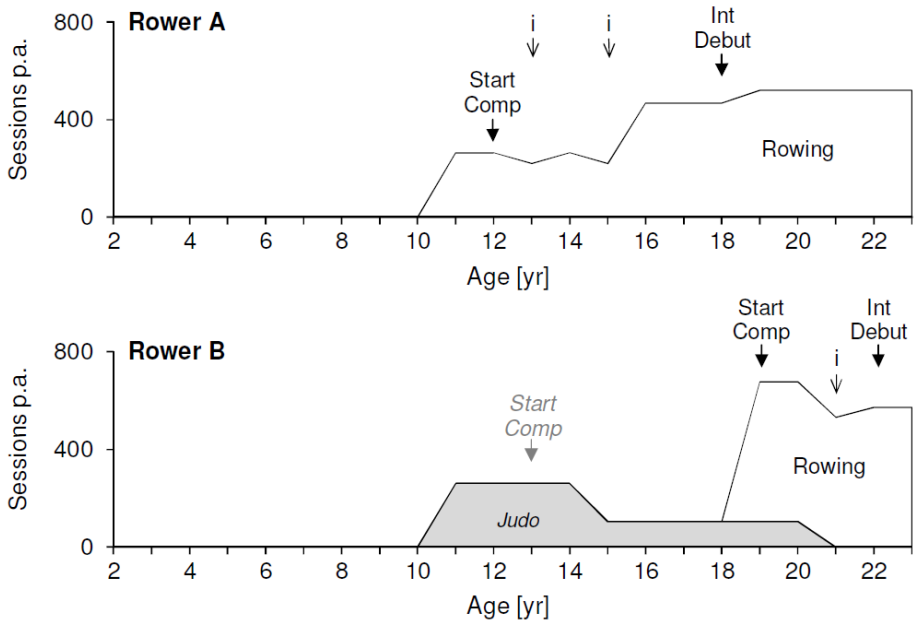
  Starting age, Specialisation, Volume, Success

  → Childhood, Adolescence, Adulthood

- **0.80** < r_{tt} < **1.00**

Deutscher Olympischer SportBund
Technische Universität Kaiserslautern
Universität des Saarlandes
USP
Bundesinstitut für Sportwissenschaft
Goethe Universität Frankfurt am Main
Johannes Gutenberg Universität Mainz
JG|U

Research Programme
Training – Promotion – Success



Study Design

1. Comparison **more** and **less successful** athletes

   Senior — **World** Class vs. **National** Class

   Youth — 14 y. **National** Class vs. **Below**

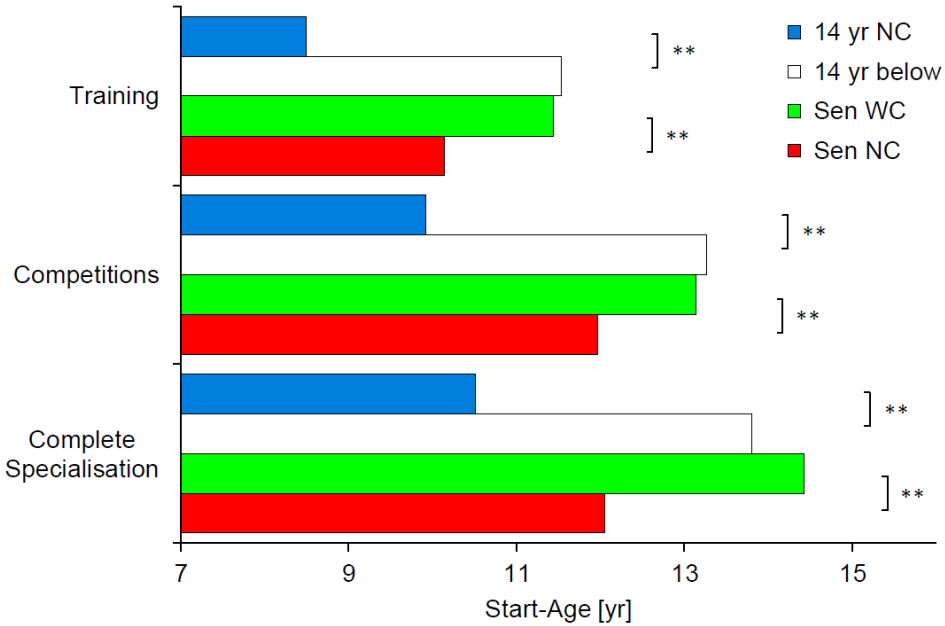
2. **Longitudinal** Testing over **3 years**

3. Examination of the **Scope** across **Types** of **Sports**

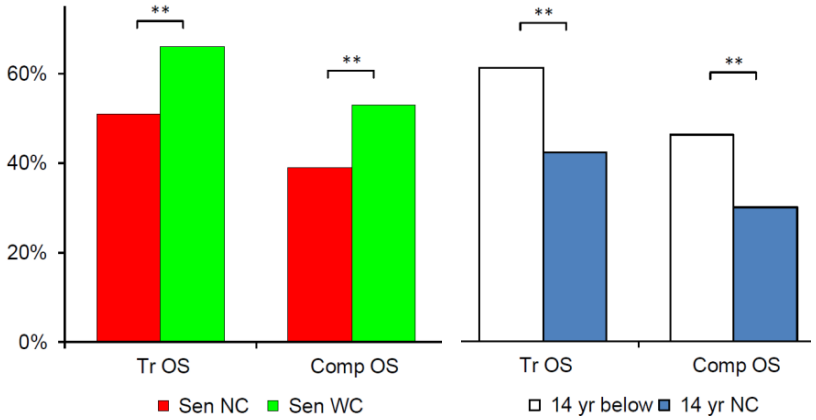
Deutscher Olympischer SportBund
Technische Universität Kaiserslautern
Universität des Saarlandes
USP
Bundesinstitut für Sportwissenschaft
Goethe Universität Frankfurt am Main
Johannes Gutenberg Universität Mainz
JG|U

Results

Age for Start and Specialisation



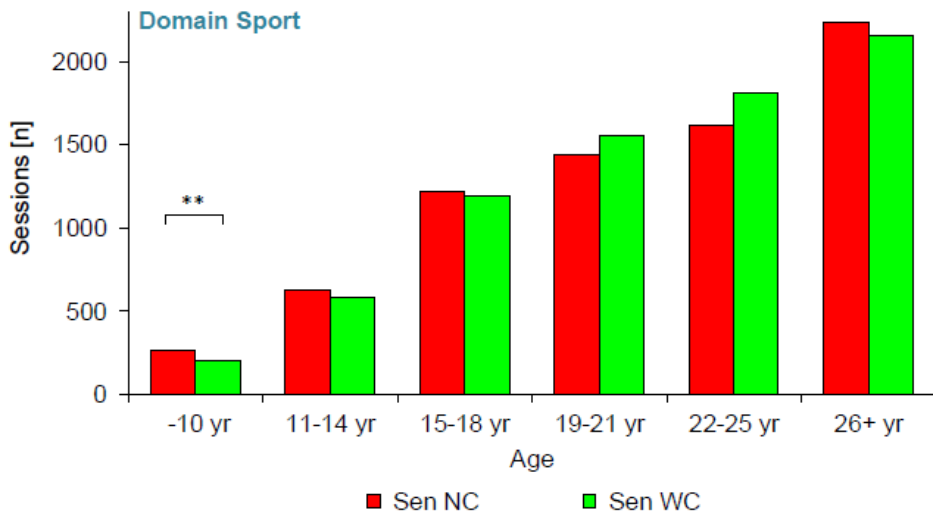
Involvement in Other Sports

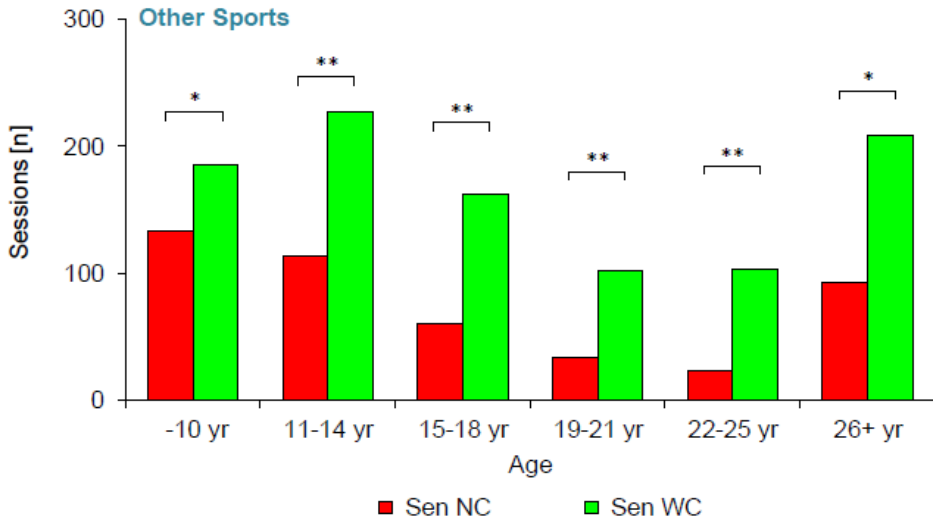


Results

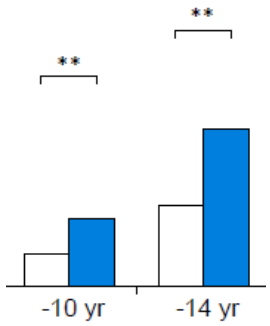
Volume Practice/Training

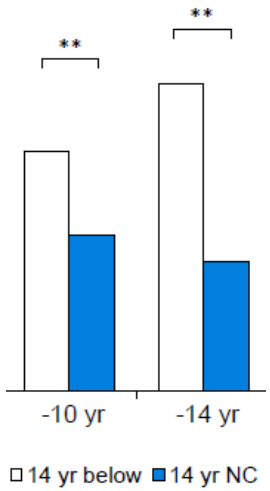
Senior





Youth





Results

Summary

		Overall		Cgs Sports		Composition Success		Martial Arts		Games	
Training and Competitions		Early	Senior	Early	Senior	Early	Senior	Early	Senior	Early	Senior
In the Domain Sport											
Early	Tr & Comp	+	−	+	−	o	o	+	−	+	o
	Specialisation	+	−	+	−	o	o	+	−	+	o
	Int Debut		−		−		−		o		o
Intensity	Childhood	+	−	+	o	+	o	+	−	+	−
	Adolescence		o		o		o		o		−
	Adulthood		o		o		+		o		o
In Other Sports											
Involvement	Tr & Comp	−	+	−	+	o	o	−	+	−	+
Intensity	Childhood	−	+	−	+	→ − Effects Irrespective of				−	+
	Adolescence		+		+	***Relatedness*** of Sports					+
	Adulthood		+		+		o		+		+

\+ = positive correlation with success, o = indifferent, − = negative correlation with success

Summary

1. ***Relation*** between Practice/Training ***Volume*** and ***Success*** is ***neither Linear*** nor ***Monotonic*** – Athletes are ***No Trivial Machines***.

2. ***Patterns*** leading to ***Rapid Juvenile*** Success and to ***Long-Term Senior*** Success are ***Inconsistent*** and partly ***Contrary***.

3. ***World Class*** Success Requires ***Immense*** Volumes of ***Specific Practice/Training***. ***Variable Experience*** Benefits ***Long-Term*** Success ***Probability***.




Conclusions

Premises: Attaining **World Class** Success **requires …**

1. ***Matching*** between ***Athlete*** and ***Sport***
   - Task, performance progress, time demand, social interaction (peers, coach), enjoyment
2. Persistent ***Investment*** of enormous ***Resources***
   - Time, physical, psychological, social, material
3. Progressive ***Performance Improvement*** over many years while ***Balancing*** ...
   - Time in sport with demands and interests external to sport
   - Strain with individual stress tolerability
   - Resources availability, consumption, preservation, and (re-) generation
4. ***Discount*** subjective ***Costs***
   - Immediate in-process benefits (i.e.: Enjoyment)

Conclusions

Sustained Yield

- Von Carlowitz, 1713; Hartig, 1795
- ***Only a Quantity of Timber be Cut Down that Re-Grows within the same Time Period.***

Reinforcing rapid early success is possible.

- ***Acceleration*** through early ***Reinforcement*** of ***Intensified Specialised Practice/Training***

  → ***Exploitation*** of ***Individual Resources***

  → Increased ***Costs*** and ***Risks***

  - ***Opportunity*** Costs
  - ***Overuse*** and Injury
  - Reduced ***Enjoyment***
  - ***Motivational*** Weariness
  - Premature ***Withdrawal***

Conclusions

Sustained Yield

- Von Carlowitz, 1713; Hartig, 1795
- ***Only a Quantity of Timber be Cut Down that Re-Grows within the same Time Period.***

Resources through Within-Subject Variation

- ***TID a posteriori*** from ***variable experience*** rather than ***a priori***

  Maturity and ***Persistence*** of ***Decision*** to Expand ***Investment*** in a Sport

  → Reduced Risk of ***Misallocation*** of Resources

- ***Variable Repertoire*** of ***Motor Skills***

  → ***"Adaptive Expertise"***, Transfer as Preparation for ***Future Learning*** (PFL)

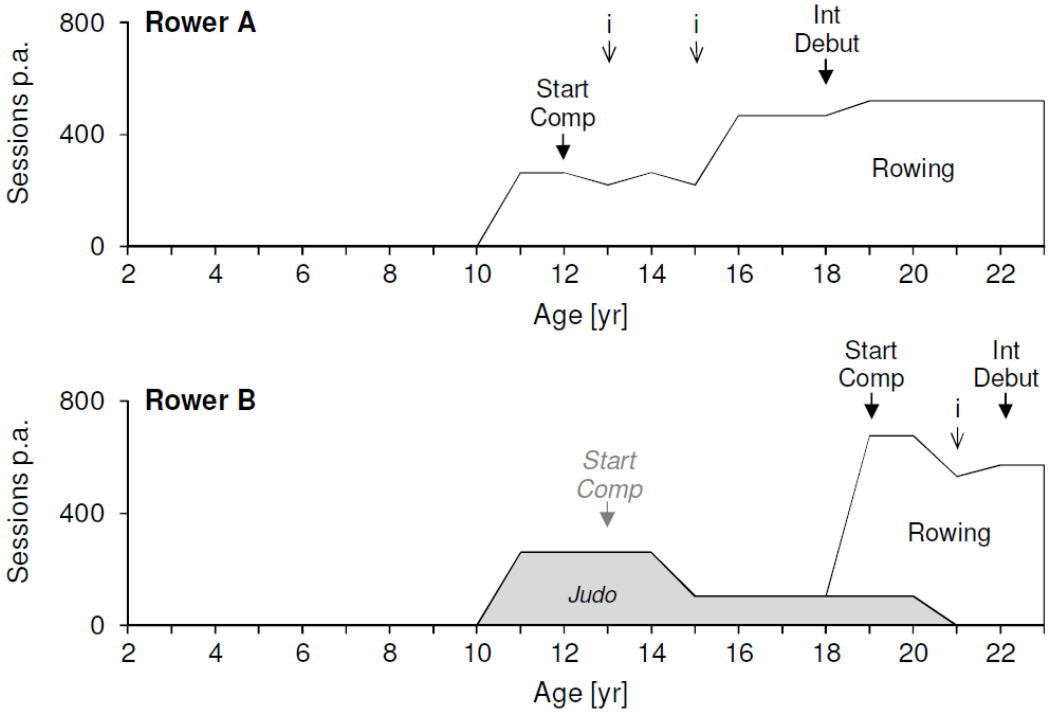
- ***Enjoyment***, motivational ***"Starting Capital"***
- Mechanical, Physiological ***Stress-Tolerability***

Correspondence in Rowing ?

London 2012 Olympic **Gold** Medallists (Examples)

	Start Rowing	Other Sports
Erin Cafaro (USA)	20 y	Crossfit, various others
Katherine Copeland (GBR)	14 y	
Caryn Davis (USA)	14 y	Skiing, Dancing, Horse Riding
Susan Francia (USA)	19 y	Swimming, various others
Hellen Glover (GBR)	22 y	Athletics, Field Hockey
Katherine Granger (GBR)	18 y	
Sophie Hosking (GBR)	14 y	Football
Tom James (GBR)		Athletics
Caroline Lind (USA)	18 y	Basketball
Esther Lofgren (USA)	13 y	Cycling, Volleyball
Eleanor Logan (USA)	16 y	
Megan Musnicki (USA)	18 y	
Pete Reed (GBR)	21 y	
Taylor Ritzel (USA)	18 y	Athletics, Swimming
Heather Stanning (GBR)	22 y	Sailing, Snowboard
Andrew Triffs-Hodge (GBR)	21 y	
Anna Watkins (GBR)	18 y	
Mary Wipple (USA)	14 y	Skiing, Snowboard

Correspondence in Rowing ?



- n=**49** Senior International **Medallists**

  Age **23.3** ± 3.4 years

Practice/Training and Competitions

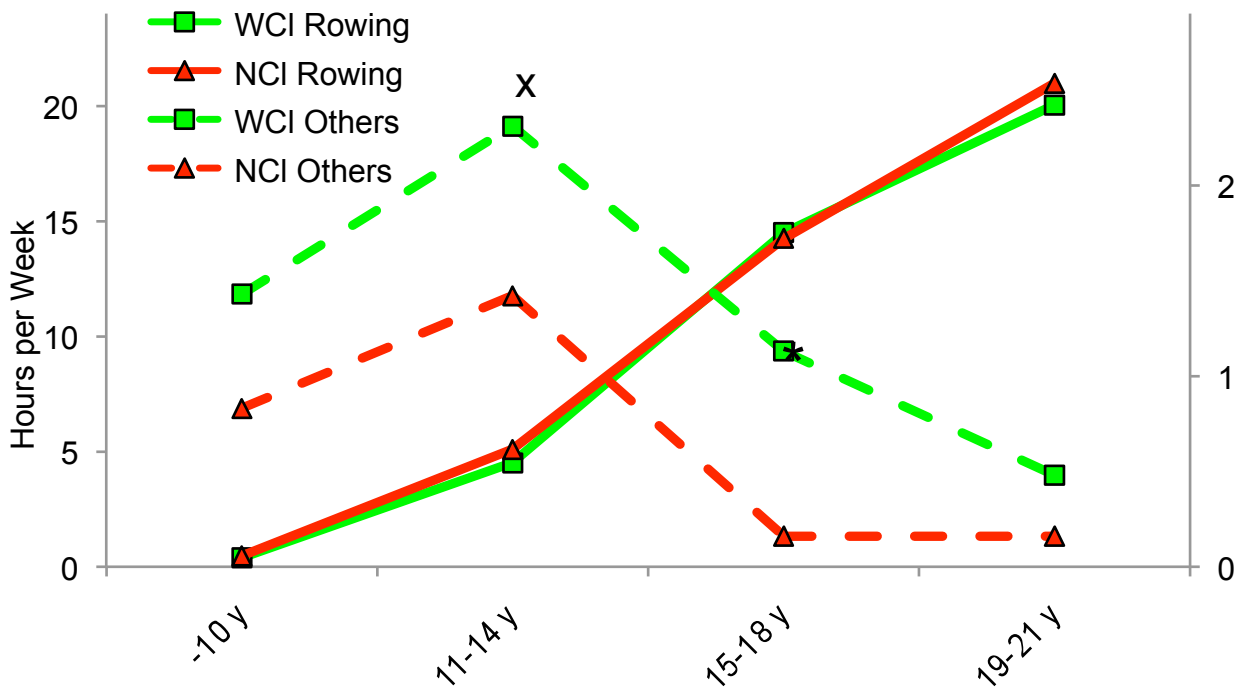
		M	± SD	Min – Max
Starting Age for … [years]				
Any Sport	Practice/Training	**10**	± 3	4 – 16
	Competitions	**11**	± 3	6 – 21
Rowing	Practice/Training	**13**	± 3	6 – 19
	Competitions	**14**	± 3	10 – 21
	International CS	**18**	± 2	14 – 21

Other Sports

Participation Other Sports[1]	n = **35**	(71%)	
Start before Rowing	n = 30		
Competitions in Other Sports	n = **30**		
Number of Other Sports	**2**	± 1	1 – 4
Specialise in Rowing [years]	**15**	± 4	8 – 21

[1] 16 CGS, 18 Game, 9 Martial Arts, 6 Artistic Composition, 3 others

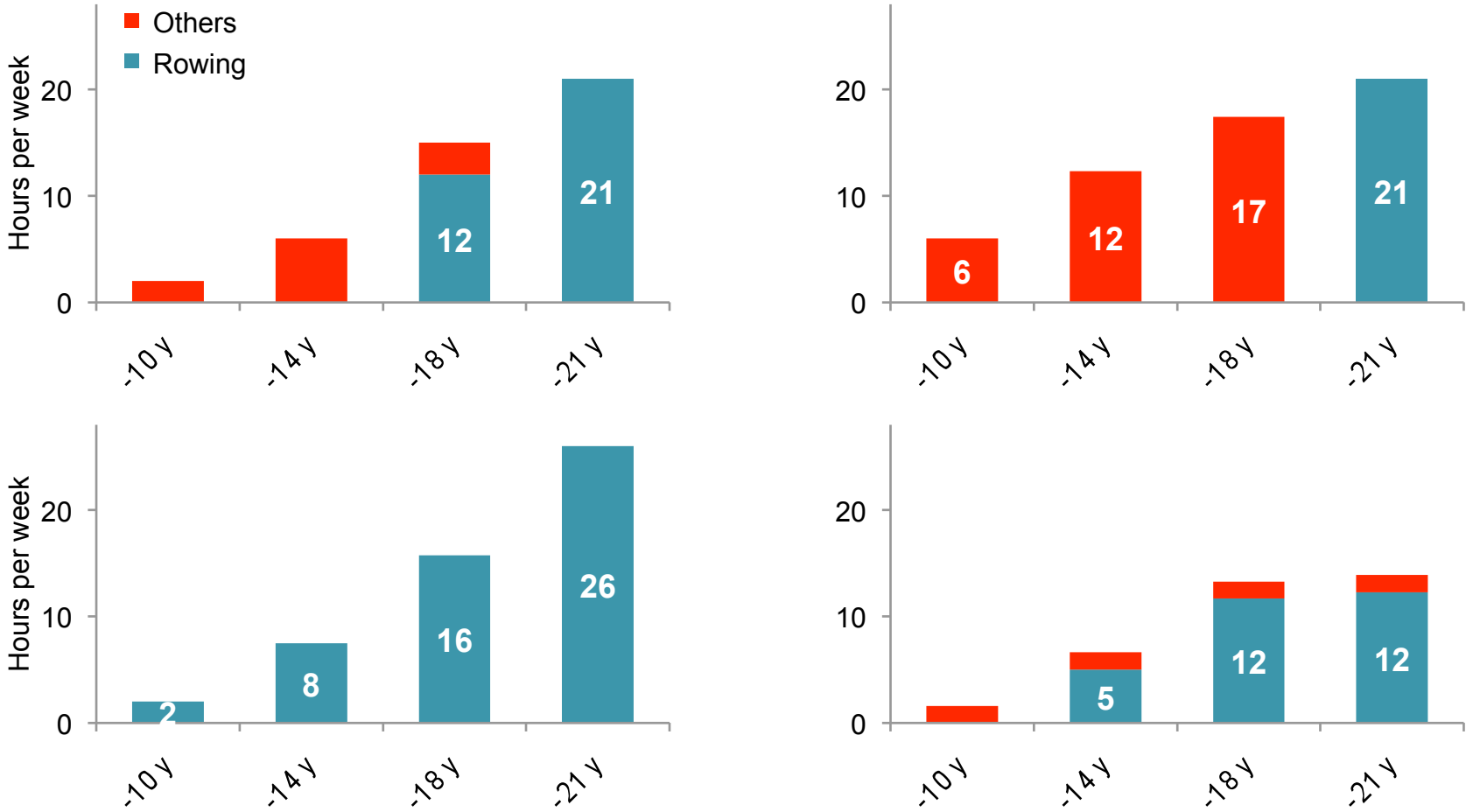
Involvement in Rowing and Other Sports



Hours per Week – Range

	World Class		National Class	
	Min	Max	Min	Max
Rowing				
-10 y	0	6	0	3
11-14 y	0	19	0	13
15-18 y	0	33	0	30
19-21 y	6	36	7	30
Other Sports				
-10 y	0	12	0	5
11-14 y	0	12	0	10
15-18 y	0	17	0	3
19-21 y	0	9	0	3

Four Olympic / World Champions



Conclusions

Sustained Yield

- Von Carlowitz, 1713; Hartig, 1795
- ***Only a Quantity of Timber be Cut Down that Re-Grows within the same Time Period.***

Profound Individuality

- ***"Many Roads*** lead to ***Rome"***

  → ***Between-Subjects Variation*** !

  → ***INDIVUALIZATION*** !

- ***When*** is ***which amount*** of ***which types*** of activities beneficial for ***which athlete***?

= ???

Conclusions

Sustained Yield

- Von Carlowitz, 1713; Hartig, 1795
- ***Only a Quantity of Timber be Cut Down that Re-Grows within the same Time Period.***

Within-Subject Variation

- No Matter ***Which Other*** Sports
- ***More Mature*** and ***Persistent Decision*** for ***Investment*** in Rowing
- ***"Smart" Learners***
- ***Organisation*** in ***Practice***? Cf. UK Sport ***"Talent Transfer"*** incl. ***"Sporting Giants"*** (Vaeyens et al., 2009)

Vielen Dank !

Thank You !