



Physical Activity and Exercise in Kids (PEAK)

A Randomized, Controlled, Single Blinded Trial of The Effects of Vigorous Exercise Training on Motor and Physical Function in Children with Arthritis

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Rationale

Benefits of fitness training in adults with RA

- Aerobic capacity
- Muscle strength
- Disease activity
- Pain
- Function
- Quality of life

Stenstrom et al. Arthritis & Rheumatism (2003)

Van den Ende et al. British Journal of Rheumatology (1998)

Rationale

Children with JIA de-conditioned and inactive

- Obesity
- Long term benefits
- No good trials

Henderson et al. Arthritis Care & Research (1995)

Takken et al Journal of Rheumatology (2002)

Klepper et al Arthritis Care & Research (1992)

Hypothesis

A 12 week cardiovascular fitness program in children with JIA will improve efficiency of gait (Sub-maximal VO_2) and ability to perform normal daily functions.

VO₂ Measurements

Maximal VO₂

- Used in elite athletes
- Protocols difficult

Peak VO₂

- Less stringent protocol often used in children

Sub-maximal VO₂

- Measure of performance in standardized activity
- Surrogate measure of Maximal VO₂
- Quantification of response to therapy

Subjects

Inclusion

- JIA
- 8-16 years
- Any course

Exclusion

- Co-existing disease
- Severe hip disease
- Active systemic disease
- >3 hours a week of extra curricular physical activity

Sample size 40 per group

- 10% drop out
- 10% difference,
- $\alpha = 0.05$ and $\beta = 0.20$

12 Week Intervention

Three times a week exercise program

- 1x week class session
- 2x week at home



“Experimental Group”

Intensive Cardio based program

“Control Group”

Qigong program



Outcomes

Formal Exercise Testing

- Sub-maximal VO_2
- Peak VO_2
- Peak power



Quality of My Life
(Please return to Division of Rheumatology) ID: _____

Some of the children who come to see us feel that their life is not that great, while others think that their life is O.K.
How about you?

OVERALL, my life is...

The WORST |-----| The BEST
☹️ |-----| 😊

Considering my HEALTH, my life is ...

The WORST |-----| The BEST
☹️ |-----| 😊

Since the last time I was here my life is...

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This is my FIRST visit	Much WORSE	A Little WORSE	The SAME	A Little BETTER	Much BETTER

Check one or both boxes.
This form was filled out by

Me:	<input type="checkbox"/>
My parent:	<input type="checkbox"/>
Other: (please explain)	<input type="checkbox"/>

Date: //

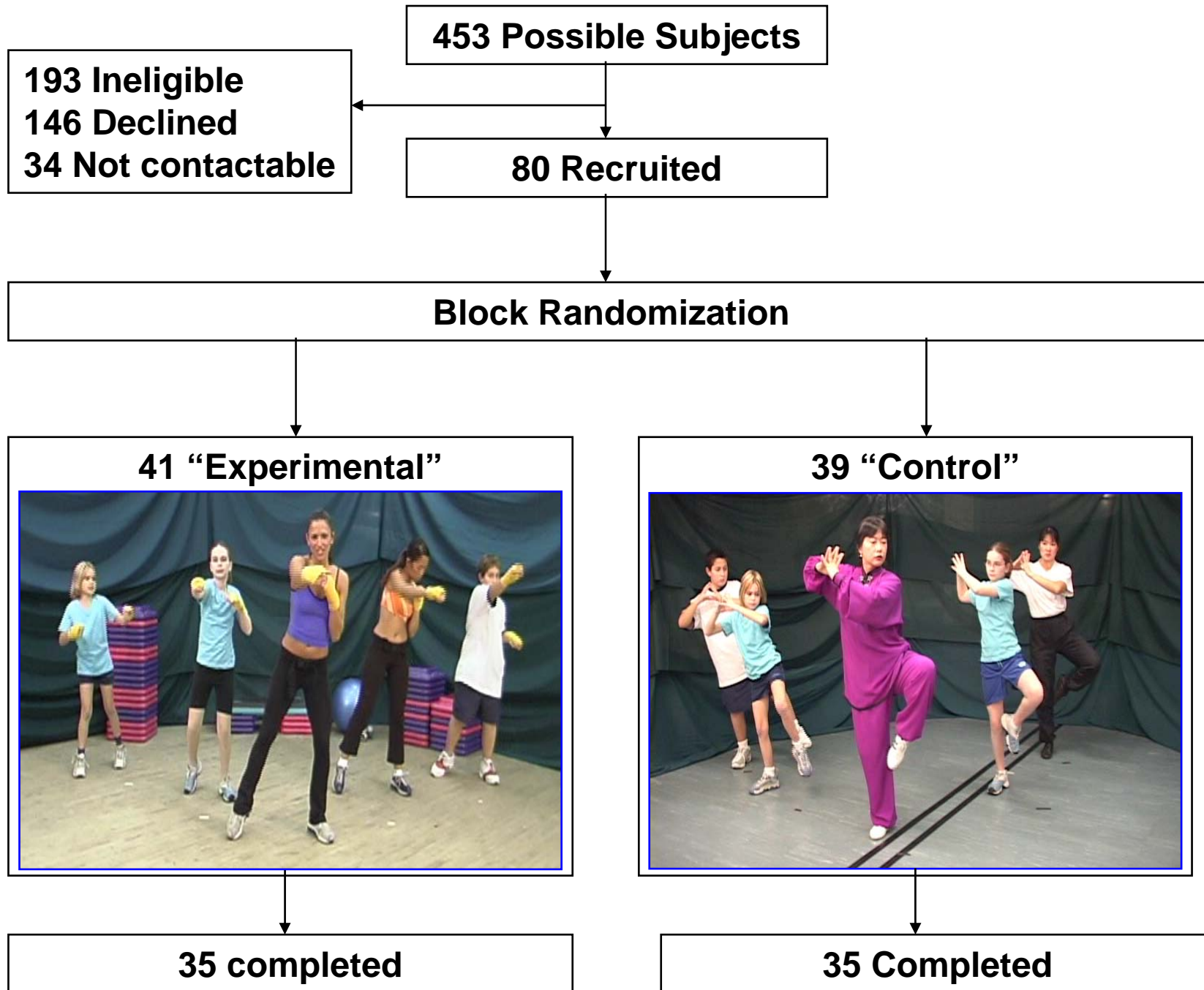
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Questionnaires

- Childhood Health Assessment Questionnaire (CHAQ)
- Quality of My Life (QOL)

Safety and Compliance

- Subject diaries
- Heart rate monitoring
- Joint count
- Pain measured on a VAS
- Changes in medications regime



Characteristics at Recruitment

Characteristic	Control Group (n=39)	Experimental Group (n=41)
Female (%)	29 (74.4)	35 (85.4)
Age in years (SD)	11.5 (2.4)	11.7 (2.5)
Postpubertal (%)	22 (56.4)	23 (56.1)
CHAQ score (SD)	0.34 (0.43)	0.31 (0.48)
JIA sub-type		
Polyarticular	15	19
Oligoarticular -persistent	2	5
-extended	5	6
Systemic	6	1
Enthesitis related	4	7
Psoriatic	6	2
Other	1	1

Baseline fitness – Peak VO₂

Study	BSA <1.0 m ²		1.0 m ² < BSA <1.2 m ²		BSA >1.2 m ²	
	Male	Female	Male	Female	Male	Female
Washington	47 (6)	42 (5)	46 (5)	43 (7)	47(10)	41 (6)
Present Study	49	36 (5)	-	36 (7)	39 (9)	32 (7)

Values for VO₂ peak given in ml/min/m²

Washington et al J Pediatr (1998)

Compliance

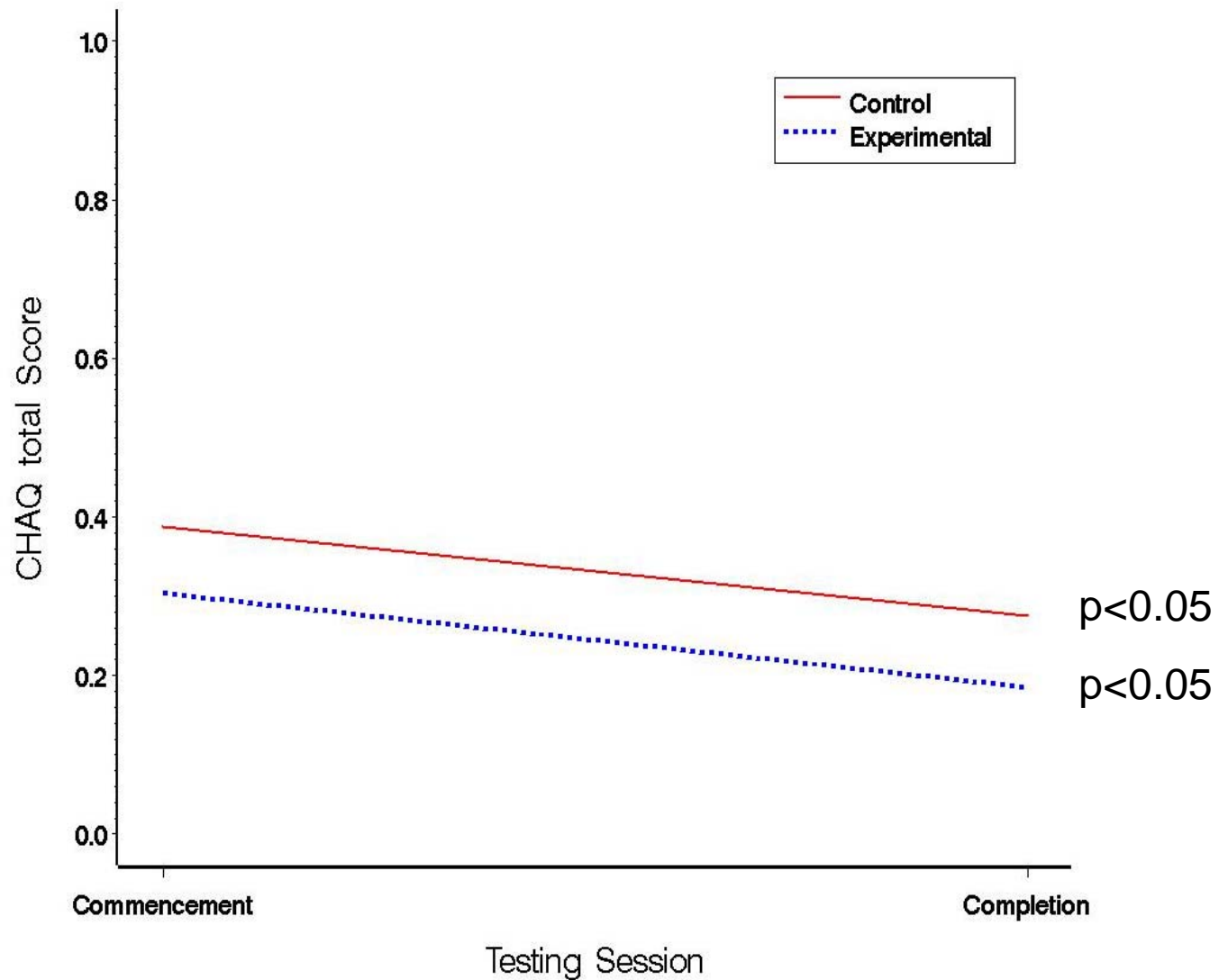
Compliance Measure	Control Group	Experimental Group
Mean number of training sessions completed:		
Supervised in class, n out of 12 sessions	7.8 (65%)	7.3 (61%)
Home based sessions, n out of 24 sessions	20.4 (85%)	14.9 (62%)
Total, n out of 36 sessions	28.6 (79%)	21.5 (62%)
Percent sessions in which HR >75%MHR	7.4%	51.0%

Comparison Between Groups

Outcome Variable	Control Group (n=35)		Experimental Group (n=35)		Est*	P-value*
	Commencement	Completion	Commencement	Completion		
VO₂sub-max (SD) ml/kg/min	11.5 (1.9)	11.6 (1.8)	11.4 (1.9)	11.0 (1.5)	0.5	0.23
VO₂peak (SD) ml/kg/min	35.7 (7.8)	36.2 (8.0)	33.3 (6.8)	34.8 (8.8)	-0.01	0.80
Peak power (SD) Watts	218 (133)	225 (134)	209 (103)	236 (114)	-9.7	0.40
Mean active joints (SD)	2.5 (5.1)	2.1 (5.1)	3.5 (6.8)	2.2 (6.5)	0.93	0.41
CHAQ (SD)	0.32 (0.45)	0.21 (0.35)	0.34 (0.49)	0.22 (0.37)	-0.01	0.80
QOL (SD)	8.5 (1.6)	8.7 (1.4)	7.9 (1.8)	8.4 (2.0)	-0.3	0.55

* Estimates and P-values are presented for the β -term for the interaction of 'group allocation * testing session' in the repeated measures, auto-regressive model and represent the difference of the paired differences in response seen in each of the two groups.

CHAQ Improved Within Groups



Limitations

- Low level of disability in subjects
- Poor compliance with program
- Inability to achieve exercise prescription
- Poor “Trainability” of children

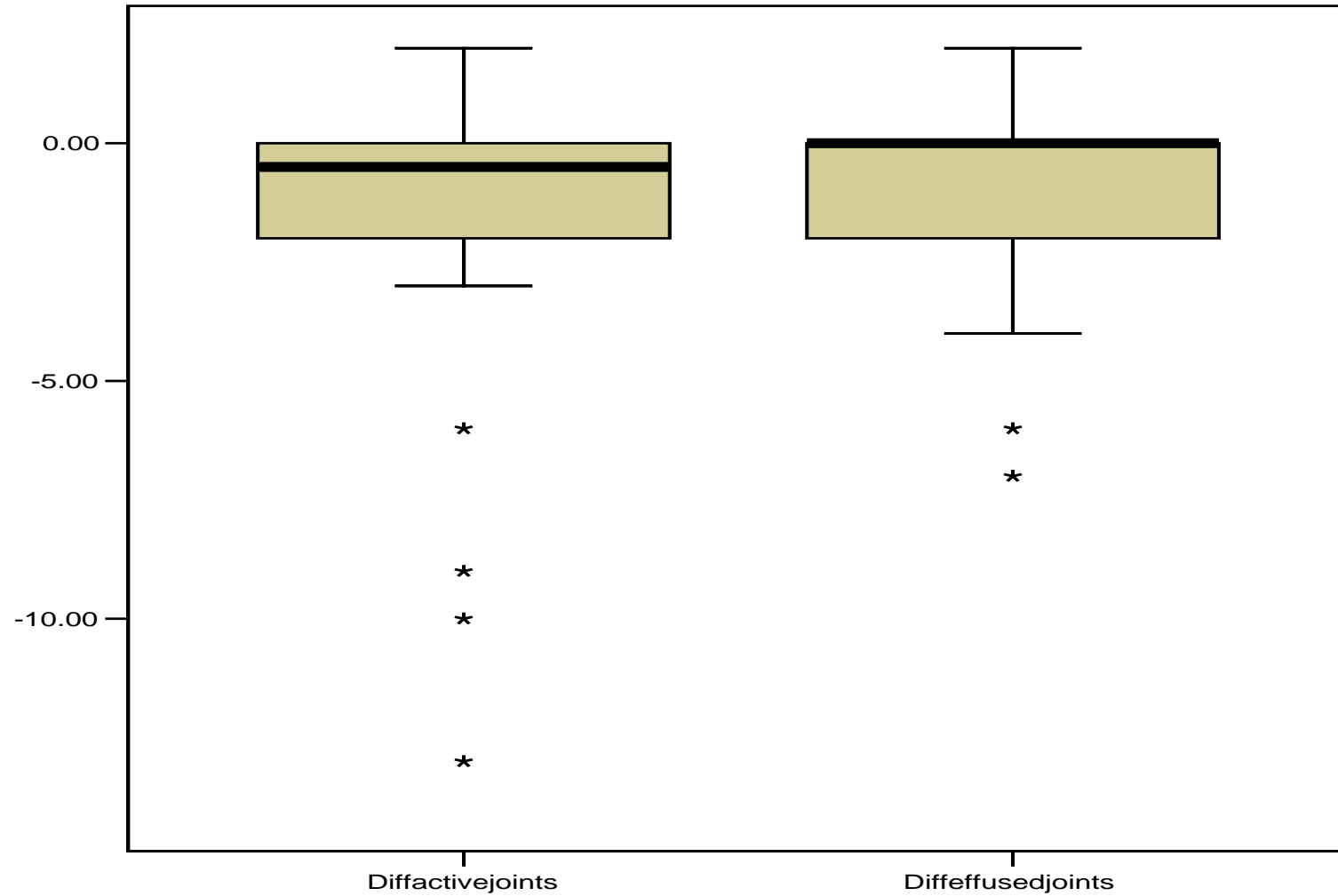
Summary

- Activity programs are safe and may result in significant improvements in function as measured by CHAQ
- Addition of aerobic training did not provide additional benefits
- Children with JIA should be encouraged to participate

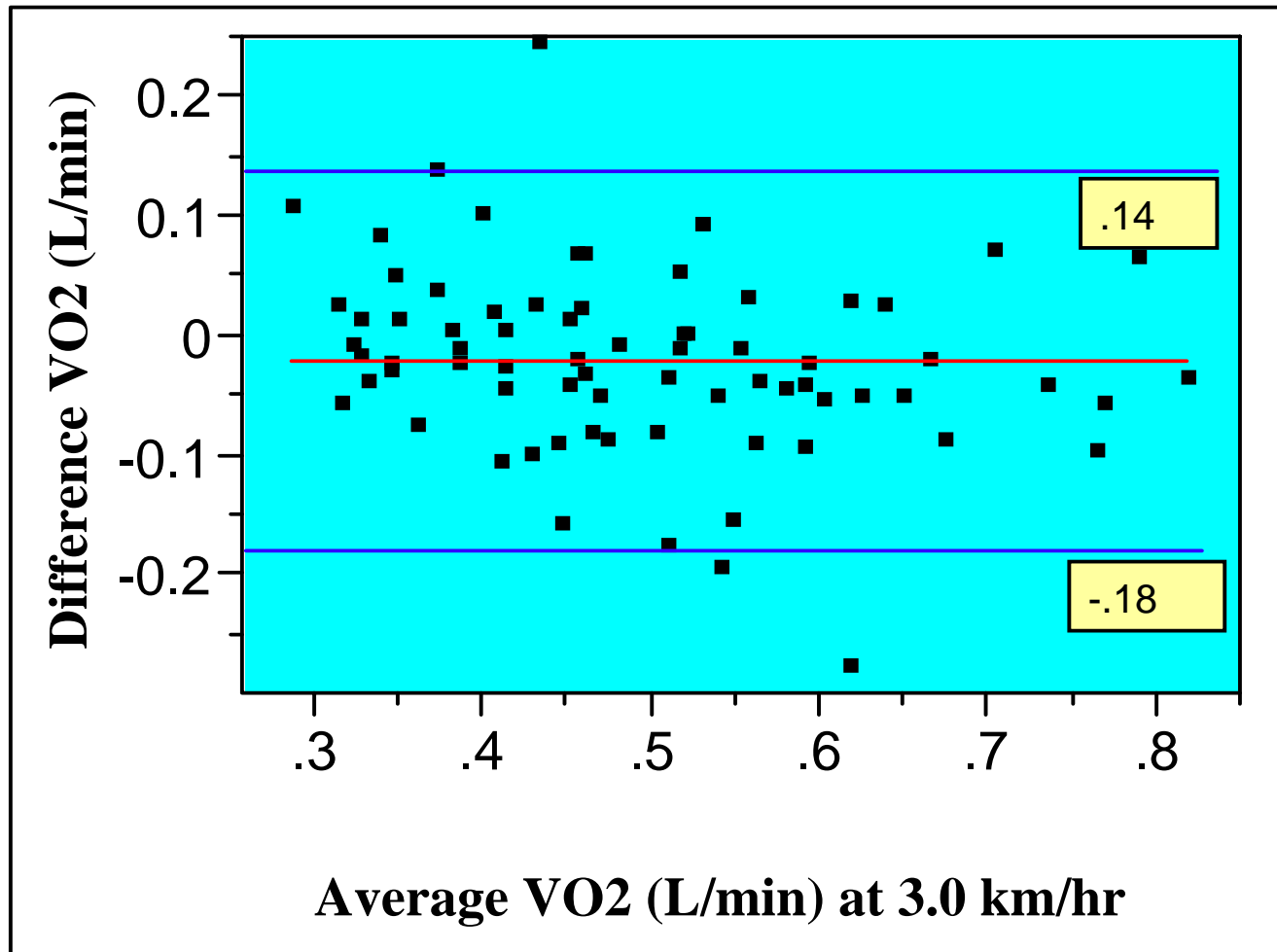
Acknowledgments

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- Co-authors and collaborators

Change in Joint Count



Reliability of VO_2 -submax



ICC – 0.82

Subgroup Analysis