OLYMPIATOPPEN

NORGES IDRETTSHØGSKOLE

Power Study 1)

Three forms of strength/power training used in the research at the Olympic Training Resource Center Norway:

1. Olympic lifts (weightlifting)
2. Quantum 1080
3. Traditional strength/power training

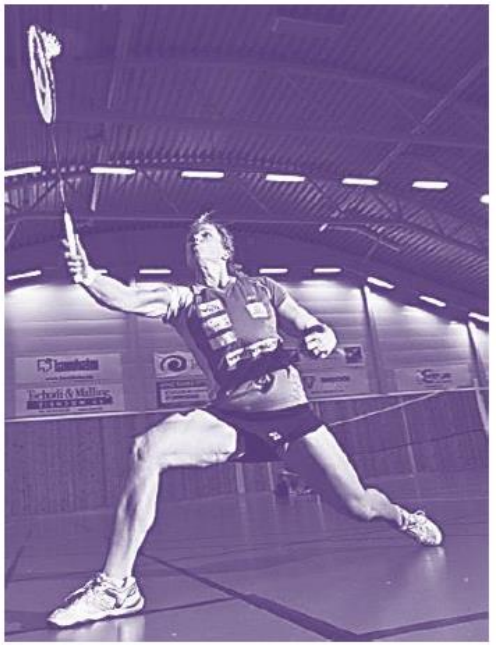
Purpose: To test the effect of Olympic lifts and 1080 Quantum against traditional training methods for strength and power.

1) This presentation is an excerpt from a published study by Goran Paulsen, responsible for force/strength at the Olympic Training Resource Center Norway in cooperation with the Norwegian School of Sport Sciences. Link to full study (Norwegian)

Methods - subjects

Volleyball, badminton and ice hockey

- National level
- Males and females (age: 17-30)



Methods - tests

- Countermovement jump (bi- and unilateral)
- Power (W) in countermovement jump/squat (females:10-20-30-40-50-60 kg and males: 20-40-60-80 kg)
- Squat jump
- Drop jump (20 and 40 cm)
- 1RM squat
- Body composition (DXA)
- Muscle thickness and architecture (m. vastus lateralis and m. rectus femoris)

Methods - intervention/training program

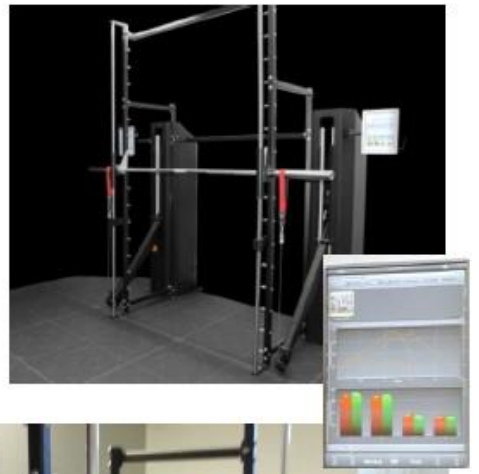
- 8 weeks; 2-4 sessions per week; 2 heavy and 1 light session
- 3 phases of progression
- 5-4-3 RM x 2-5 series
  - 1080 Quantum with 20-40% extra eccentric load in squat jumps
- 60-40-20% of 1RM in squat jumps
- All training were supervised

Methods - exercises

- Traditional strength and 1080 Quantum
  - Session 1 (heavy)
    - Squat
    - Single leg squat
    - Squat jump (knee angle 90-120°)
  - Session 2
    - Squat jump (90-120°)
    - Single leg squat (90-120°)
- Olympic lifts
  - Session 1 (heavy)
    - Clean with front squat
    - Hang clean
    - Snatch
    - Push jerk
  - Session 2
    - Clean
    - Hang clean
    - Hang snatch

Methods – 1080 Quantum

- Speed restriction/limit = isokinetic movements
- Allows for high acceleration in no flying weight setting
- Additional load in eccentric phase
- Measurements of force and speed in every repetition
  - Feedback



Results

Training volume and time per session

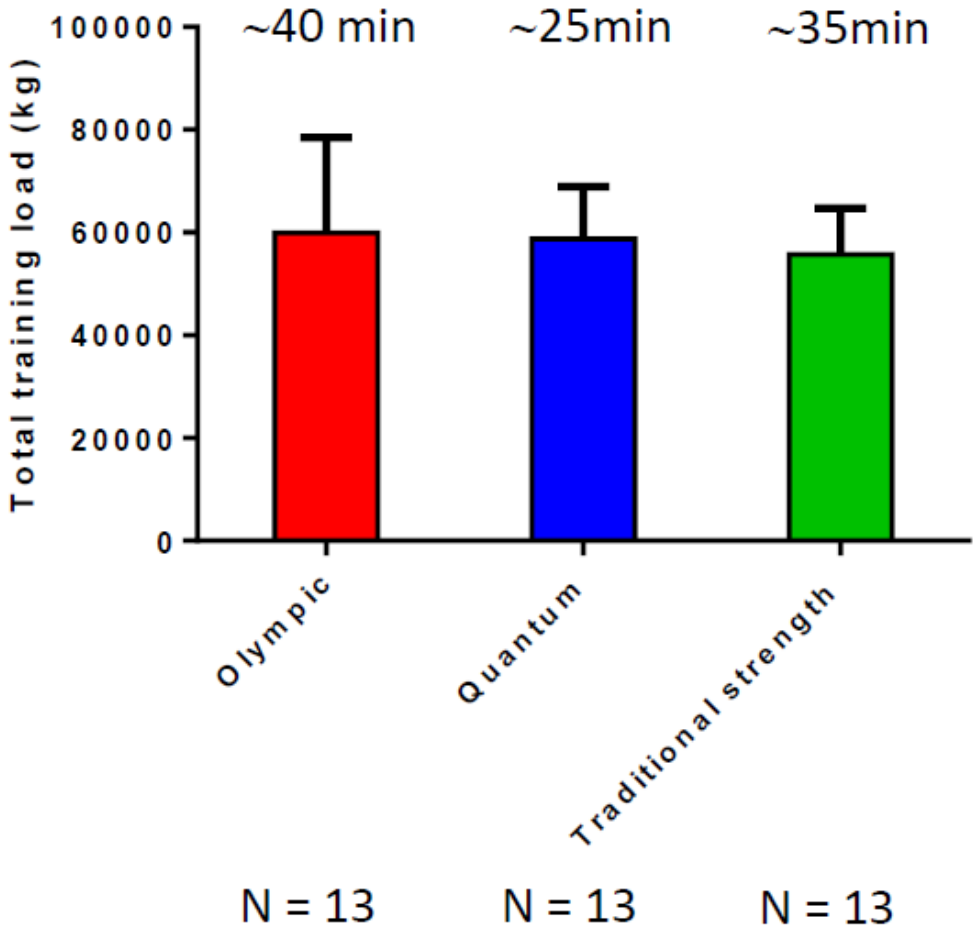


Table 2. Changes in variables across groups and magnitude-based inferences for the changes and for the difference in the changes.

	Olympic (n=13)		Classic (n=13)		Quantum (n=13)	
	M ± SD	Inference[a]	M ± SD	Inference[a]	M ± SD	Inference[a]
Performance tests						
1 RM Squat	4.1 ± 8.7	trivial ↑[2,3]	12.4 ± 5.7	small↑**	15.1 ± 5.6	mod↑***
Counter Movement Jump	0.2 ± 1.5	trivial ↑[2]	1.7 ± 1.9	small↑**	1.1 ± .2.3	trivial ↑
Squat Jump	0.4 ± 1.9	trivial ↑[2,3]	1.8 ± 1.0	small↑**	2.1 ± 2.0	small ↑**
Fallhopp40	-0.3 ± 2.2	trivial ↓[3]	0.2 ± 2.7	trivial↑	2.0 ± 2.0	small ↑**[1]
Max peak power (W)	52 ± 87	trivial↑[2,3]	215 ± 284	small↑*	128 ± 61	small↑**
Power 40/80kg (W)	109 ± 155	small↑**[2]	230 ±117	mod↑***[3]	130 ±143	small↑**
30 m sprint	-0.02 ± 0.09	trivial ↑[2]	0.04 ± 0.06	trivial↓	-0.05 ± 0.07	small**↑[2]
20-30 m flying	0.01± 0.05	trivial ↓	0.00 ± 0.03	trivial↓	-0.02 ± 0.04	small↑*[1,2]
Body Composition						
Bodyweight	0.4 ± 1.6	trivial ↑	0.5 ± 2.2	trivial ↑	0.5 ± 1.8	trivial ↑
LM Total (kg)	0.62 ± 1.42	trivial ↑	0.74 ± 1.92	trivial ↑	1.12 ± 2.18	trivial ↑
LM Legs	-0.06 ± 0.50	trivial ↑	0.25 ± 0.64	trivial ↑	0.50 ± 0.76	trivial ↑
LM Arms	0.26 ± 0.32	trivial ↑	0.00 ± 0.39	trivial ↑	0.12 ± 0.31	trivial ↑
Fat mass (kg)	-0.17 ± 0.82	trivial ↓	-0.34 ± 1.41	trivial ↓	-0.13 ± 1.47	trivial ↓
VL	0.11 ± 0.10	small↑**	0.14 ± 0.13	small↑**	0.15 ± 0.08	small↑**
RF	0.09 ± 0.13	small↑**[3]	0.09 ± 0.11	small↑**[3]	0.20 ± 0.23	mod↑***
Architecture						

Magnitude thresholds (for difference in means divided by baseline SD of the total sample): <0.20, trivial; 0.20-0.59, small; 0.60-1.19, moderate; >1.20, large.

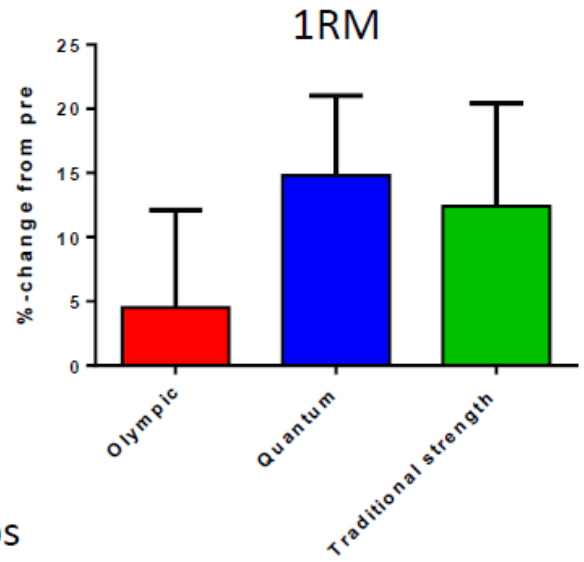
Asterisks indicate effects clear at the 5% level and likelihood that the true effect is substantial or trivial, as follows: *possible, **likely, ***very likely, ****most likely.

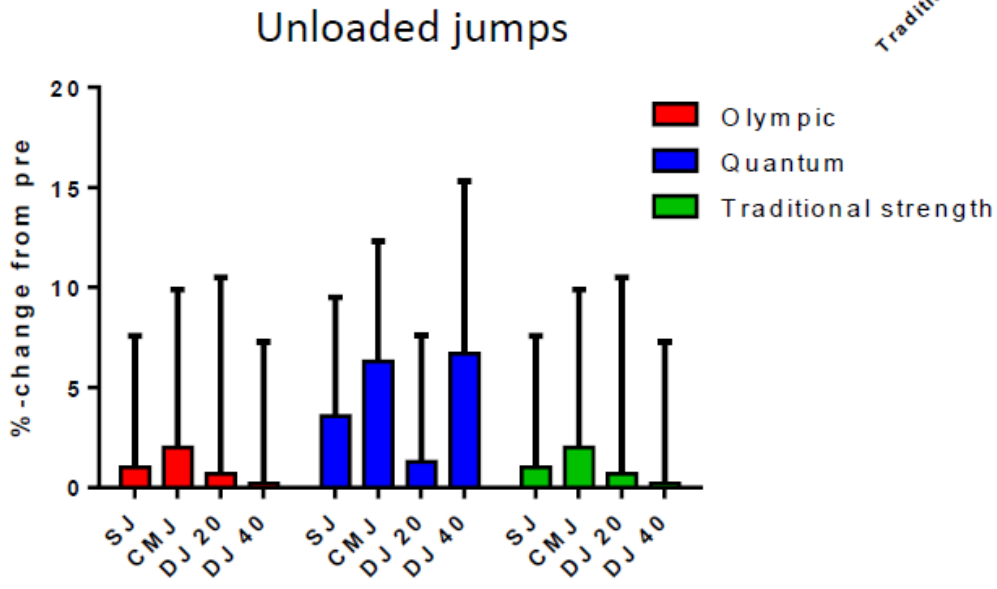
[a]All variables are adjusted to baseline mean, bodyweight and total training volume

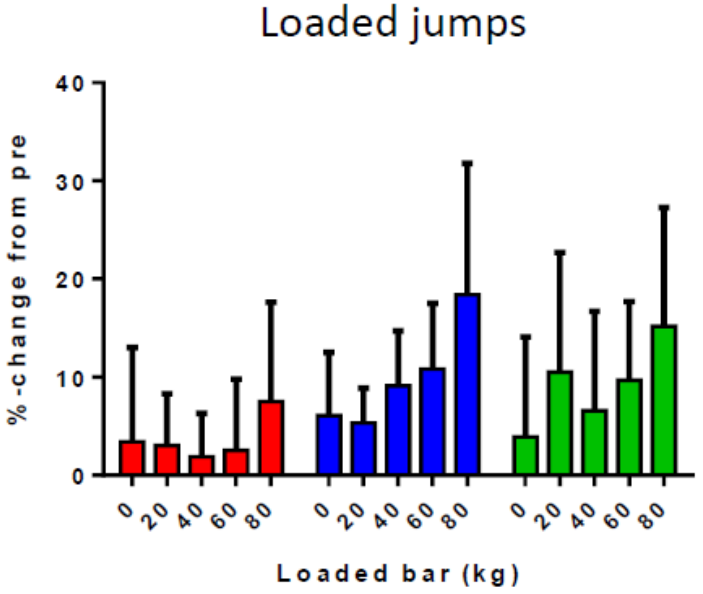
[1] Different to Olympic strength training

[2] Different to Classic strength training

[3] Different to Quantum


1RM
%-change from pre
25
20
15
10
5
0
Olympic
Quantum
Traditional strength


Unloaded jumps
%-change from pre
20
15
10
5
0
SJ
CMJ
DJ 20
DJ 40
Olympic
Quantum
Traditional strength


Loaded jumps
%-change from pre
40
30
20
10
0
0
20
40
60
80
Loaded bar (kg)

Conclusion

- Strength-/power training with Olympic lifts yielded no or minimal effect on jumping, power and speed in well trained young athletes (ice hockey, volleyball and badminton)
- Heavy/maximum isokinetic strength training with additional eccentric load in power training seems to yield better effect than traditional strength training (1080 Quantum vs. free weights)
  - Training time was significantly shorter with 1080 Quantum

Summary

- Power training is essential in many sports. Important both for strength and endurance dependent athletes.
- Olympic lifts can be effective power training, simpler variations of lifts are generally better.
  - Dependent on technique/form
  - Technique training from young age

- Feedback on form and power output (power, watts) is essential to effective power training
  - Individual force-velocity relationship in each exercise