

STRENGTH AND CONDITIONING SESSION

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Introduction

A little about me:

- Miriam Rivotti, Physiotherapist at Fitzwilliam Hospital (Orthopaedics, MSK, Hand therapy)
- Graduated in Lisbon (2007)
- MSc in Management (2015, Lisbon)
- Worked as an Occupational Health Physiotherapist for Honda (Swindon, UK) and Heineken (Portugal)
- Previously in MSK, Neurology and Paediatrics clinics
- Worked with the Portuguese National Trampoline Gymnastics Elite team
- Background in different sports, gymnastics and trampolines competition in the past; enjoy figure skating at present

Why is S&C important?

Getting the most from your training!

Running economy

Number of calories expended over an exercise session (efficiency of use of oxygen)

- Endurance training (improves metabolic activity)
- Strength and power training (↑ muscle stiffness, ↑ energy returned on each step)
- Plyometric training (↑ RE and ↓ running times)

- Endurance exercise performance



Aerobic metabolism over a prolonged period of time (Coyle, 2007)

- High intensity interval training



More effective in improving VO₂max compared to training at approximately 75% of Max HR (Helgerud et al, 2007)

Ideally, sessions should last 3 to 5 minutes with recovery periods equal to or slightly less than the work periods and the work rate should be at an intensity close to your maximum heart rate – i.e. 95-100% of Max HR.

(e.g. 4x4 minutes at 95-100% of Max HR with 3 min recovery jog)

Why to do Resistance training?

- The National Strength and Conditioning Association (NSCA) recommends resistance training for endurance athletes
 - ✓ Faster running times
 - ✓ Reduce injury risk
- Strengthen areas of weakness (calf, quads, hamstrings, glutes)
- Introducing a resistance training program: slowly, with gradual increase in load and frequency;
- Ideally twice a week
- Allow at least 8 hours between running and resistance training, ideally 24-48h gap

Example of a weeks schedule

Mon	Tue	Wed	Thu	Fri	Sat	Sun
rest	run	RT	run	RT	rest	long run

Rep Max: Lifting the heaviest load you can manage for the amount of reps you're doing, while maintaining a good pain free technique.

RUNNING INJURIES

Based on Physio Edge podcast 059 with Tom Goom (@tomgoom), Dr Christian Barton (@DrChrisBarton) & Greg Lehman (@greglehman)



Load tolerance

1 Runners become injured because they exceed their tissue capacity to tolerate load



2 A runner needs to be strong enough to manage the load experienced when running. Ground reaction force when running is 2.5-3x body weight and peak muscle load of soleus is 6-7x body weight.



3 Strength and conditioning in runners may improve load tolerance, improve performance and reduce injury risk.



Continue running

4 Running should be stopped when it will have a negative long term impact on recovery eg bony stress injuries or highly reactive tendinopathies. The length of time out of running should be kept as short as possible



5 Use the 24 hour pattern to monitor the runners reaction to load. If the pain is does not settle within 24 hours then the running volume should be reduced



Biomechanics



6 Changing foot strike pattern may be appropriate in anterior compartment syndrome, chronic degenerative knees and achilles tendinopathy



7 Running retraining should start simple and expand over a period of time. Changes to running technique do not need to be permanent. A temporary change in style may let symptoms settle and allow continued running




8 Running shoes are less important than load management & biomechanics



9 Periods of stress or lack of sleep may delay healing by up to 60%

Warm up!

- Warm-up
- reduce the risk of injury and enhance performance.
- increased muscle temperature and associated effects, increased neural activation and joint range of motion as well as reduced musculotendinous stiffness.
- It has been argued that the injury prevention benefit of warm-up may reside in a reduction in active stiffness caused by increased muscle temperature, rather than from the effect of stretching.
- Static stretching  shift to the use of dynamic stretching
- static stretching without an aerobic component may actually hinder performance
- studies that show that increased flexibility (practiced through static stretching alone) does not necessarily correlate to fewer injuries or improved performance in sports. More research is required to define the precise role of flexibility training in the prevention of injuries and muscle performance.
- Dynamic warm-up exercises (a series of exercises incorporating sport-specific movement which prepares the athlete's body for activity) provide the athlete with an optimal environment of increased neuromuscular function which then results in a greater force production.

Remember!



- The Fitzwilliam Hospital has an amazing team of experienced Physiotherapists who can help you make the best out of your running experience! Contact us on 01733 842319.

References

- Behm, D. and Young, W., 2003, *Effects of Running, Static Stretching and Practice Jumps on Explosive Force Production and Jumping Performance*, J Sports Med Phys Fitness (43:21-27).
- English Institute of Sports, *STRENGTH & CONDITIONING* (<http://www.eis2win.co.uk/expertise/strength-conditioning/>).
- Feeney, J., 2012, *Getting the Most from your Training* (<http://www.running-physio.com/training/>).
- Frontera, W., 2003 *Rehabilitation of Sports Injuries: Scientific Basis*, Blackwell Science Ltd.
- Goom, T., 2003, *Strength training for runners – recent research findings* (<http://www.running-physio.com/strength-review/>).
- Heimbürg, E., Tillaar, R. and Vatten, T., 2016, *Effects of Short or Long Warm-up on Intermediate Running, Performance*, Journal of Strength and Conditioning Research.
- Jamieson, J. *Strength and Conditioning: 3 Rules For Combining Both Into a Single Program That Gets Results* (<http://www.8weeksout.com/2017/04/18/combining-strength-and-conditioning/>).
- Shrier, I., 2004, *Does Stretching Improve Performance? A Systematic and Critical Review of the Literature*, J Sport Med (14:267–273).
- Wunderlich, A., 2012, *Dynamic Warm-up Effect on 5-KM Performance and Running Economy in Collegiate Cross-Country Runners - A Thesis Presented to The College of Graduate and Professional Studies Department of Kinesiology, Recreation and Sport*. Indiana State University Terre Haute.
- Ylinen J. et al., 2009, *Effect of Stretching on Hamstring Muscle Compliance*. J Rehabil Med (41: 80–84).