# Best Research Evidence Summary

## *Dynamic versus static stretching exercises for increasing muscular power and strength in adult recreational or professional athletes.*

**Students: Bryce Williams, Jonathon Windsor, Vanessa Wittwer, James Wundke, Tskwan Wong.**

**Course: Evidence Based Practice 3**

**Period conducted: First half of 2013**

**Question:** What is the evidence that dynamic stretching (DS) exercises are effective in increasing muscular strength and power in adult recreational or professional athletes, compared with static stretching (SS) exercises?

**Search Strategy:** The databases searched were MEDLINE, Embase, CINAHL, The Cochrane Library, SportDiscus , PEDro and Allied and Complementary Medicine. The table below summarizes the search strategy.

| Search terms | | | | Limits |
|---|---|---|---|---|
| **P[+]** | **I** | **C** | **O** | |
| Athlet*<br>OR<br>Athlete/<br>OR<br>Sport*<br>Or Recreational<br>OR<br>Activ*<br>OR<br>Player* | Dynamic stretch*<br>OR<br>Activ* stretch*<br>OR<br>Active warm up<br>OR<br>pre-exercise stretch*<br>OR<br>Function* stretch | Static stretch*<br>OR<br>Passive stretch*<br>OR<br>isometric stretch* | Musc* Strength<br>OR<br>Strength<br>OR<br>Strength/<br>OR<br>Musc* contract*<br>OR<br>Power<br>OR<br>Athletic performance/<br>OR<br>Performance/<br>OR<br>Performance | English language<br><br>Humans<br><br>Adult (Person aged >18yo)<br><br>RCT's |

* Truncation symbol / MESH heading



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**Clinical effects of the intervention on outcomes**

There is some evidence to suggest DS undertaken by professional athletes prior to exercise may elicit a small increase in performance of activities that require higher levels of muscular power and strength. However, the evidence to suggest DS is more effective than SS in the recreational athlete population is inconsistent. This is an important clinical finding that clinicians need to consider in the context of their patient population (elite vs. recreational athletes). Therefore, we recommend physiotherapists remain aware of the small benefits DS may provide in certain clinical situations to judge whether it may be a suitable replacement for SS.

The inconsistency in the evidence may be due to the differences in physical activity regimes of the two different populations. While some primary research supported a slight increase in both muscular power and strength immediately following brief bouts of DS for professional athletes, the effects of DS were more variable when performed by recreational athletes. This could be due to the differences in regular physical activity and stretching that may be seen between the two populations. It may also be due to the differences in how the DS movements were delivered as interventions across the seven included studies. Furthermore, the crossover designs that were used in the research also do not mention any potential carry-over effect of receiving DS on more than one muscle group prior to testing. This makes it difficult to draw any conclusions on how the intervention is best delivered and how this could influence muscular power and strength.



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## Summary of the best research evidence

| Study | Research design and level of evidence (CEBM) | McMaster CAT score | n | Participant type and age (years) | Intervention | Comparator(s) | Outcome(s) | Main findings |
|---|---|---|---|---|---|---|---|---|
| Aguilar et. al 2012 | Randomized cross over design (RCT-II) | 10 | 45 | Recreational male and female soccer players (ages 19-26) | DWU | Control | Peak torque (ecc. & conc. quadriceps and hamstrings) | Significant acute effects on ecc. quadriceps (p=0.012) & conc. quadriceps (p=0.034) peak torque. Nil significant differences observed for other outcomes (p>0.05) |
| Beedle et al. 2008 | Randomized cross over design (RCT-II) | 8 | 51 | Healthy adults (mean age 20.4) | DS | Control | H:Q ratio | Nil significant difference (p>0.05) for outcomes. |
| Curry et. al 2009 | Randomized cross over design (RCT-II) | 12 | 24 | Recreationally active college age females (age 26 ±3 years) | DWU | General WU | CMJ | Nil significant differences between WU conditions. Non-significant decrease in TPF with DWU (p>0.05) |
| Sekir et. al 2009 | Randomized cross over design (RCT-II) | 10 | 10 | Elite, competitive female athletes (20±2 years) | DWU | Control | 1RM bench and leg press. | Significant improvements in outcomes with DS (p=0.0001). Significant decreases with SS (p<0.001) |
| Vanderka 2008 | Randomized cross over design (RCT-II) | 6 | 24 | Recreationally active, male university students (22.4±2.5 years) | DS before SS | SS before DS | CMJ | SS before DS significantly decreases CMJ height (p<0.05). Nil differences for SJ. DS before SS significantly increases CMJ (p<0.01) & SJ (p<0.05). |
| Vetter 2007 | Randomized cross over design (RCT-II) | 9 | 26 | Male and female college age students (20-26 years) | DWU | Vetter 2007 | TPF | General Warm up & DWU+ exercise series produced significantly higher jump scores than SWU (p<0.001). Nil significant difference for the sprint run test (p<0.21). |
| Werstein & Lund 2012 | Randomized cross over design (RCT-II) | 8 | 15 | Elite, female soccer and rugby players (20.1±5.9 years) | DWU | General WU | Isokinetic strength | DWU resulted in a statistically significant greater RSI (p=0.002) and FT (p=0.003) when compared to SWU |

DWU - Dynamic warm up
SWU - Static warm up
CMJ - Countermovement jump
CT - Contact time
ecc. - Eccentric
HS - Hamstring
DS - Dynamic stretching
Conc. – Concentric
SS - Static stretching
1RM - 1 repetition maximum
TPF - Time to peak force
SJ - Standing jump
RSI - Reactive strength index
FT - Flight time
H:Q - Hamstring to quadriceps.

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