

# Research Alerts

MAY EDITION: ISSUE #8

Your monthly roundup of the **LATEST RESEARCH** across the following topics.  
(click a heading to jump straight to the topic)

- 1 STRENGTH & CONDITIONING
- 2 TECHNOLOGY & MONITORING
- 3 FATIGUE & RECOVERY
- 4 YOUTHS
- 5 NUTRITION
- 6 TEAM SPORTS



CRICKET



FOOTBALL (SOCCER)



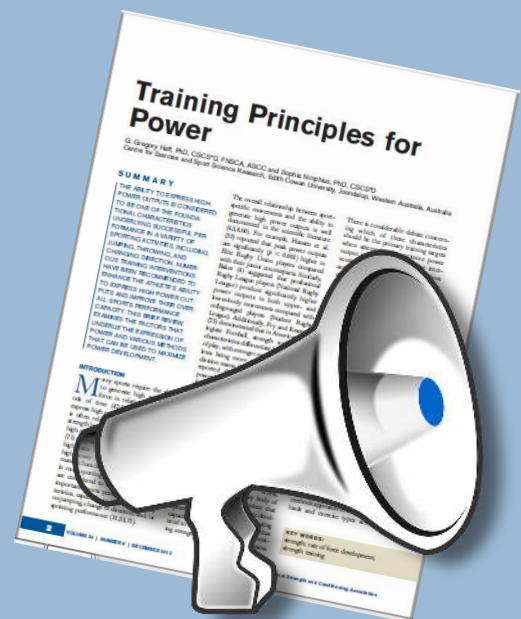
RUGBY



AUSTRALIAN RULES FOOTBALL



AMERICAN FOOTBALL



SCIENCE for  
SPORT

# Foreword

An introductory word from the chief editor.

**Issue #8 - May 2017**

Welcome to Science for Sport's monthly *Research Alerts*. These monthly issues are a gathering of the latest, and best, research published in that month from peer-reviewed journals. For example, research published within October 2016 will be included within the October 2016 issue - this ensures you're up-to-date with the most recent and talked about research. When there is not enough relevant research published in that month, studies published in the preceding month(s) will be used to supplement the topic. Each new issue will be published on the last day of the month (e.g. June 2017 issue will be published on the 30th June 2017).

With hundreds of studies published every month across the realms of sports science, the primary motivation of the *Research Alerts* is to help students, practitioners, researchers and educators alike keep up-to-date with the latest peer-reviewed research—which otherwise is a seemingly impossible task. The secondary motivation is to facilitate education within the global sports science community by critiquing the studies and displaying the information in a refreshingly digestible format.

With so much positive feedback from the Science for Sport members regarding all the content (i.e. articles, videos, jobs, research and so much more) currently delivered, we felt these *Research Alerts* were a very important addition—and one we hope will be well received.

I would also like to take this opportunity to sincerely thank all the editors for their contributions and reviewing of these documents, as for without them, these would not be so valuable. It is an absolute pleasure working alongside such fantastic practitioners and academics, and I hope to see these relationships continue to develop and prosper.

Last, but by no means least, I hope you find these *Research Alerts* very helpful in your daily practice, and I'm sure you can appreciate just how much work goes into them every month. As a matter of courtesy, though we cannot always prevent you distributing these documents with other professionals, we kindly ask and hope for you to respect our work and refrain from sharing them freely.

*Yours Sincerely,*

Owen Walker



Owen Walker MSc\*D CSCS

Founder, author and director of Science for Sport

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SPORT



# Strength & Conditioning

This month's top research in strength & conditioning.

## FEATURE

### IS FREQUENCY THE KEY TRAINING VARIABLE FOR GAINING MUSCLE?

Dankel SJ, Mattocks KT, Jessee MB, Buckner SL, Mouser JG, Counts BR, Laurentino GC, Loenneke JP. Sports Med. 2017. May;47(5):799-805.

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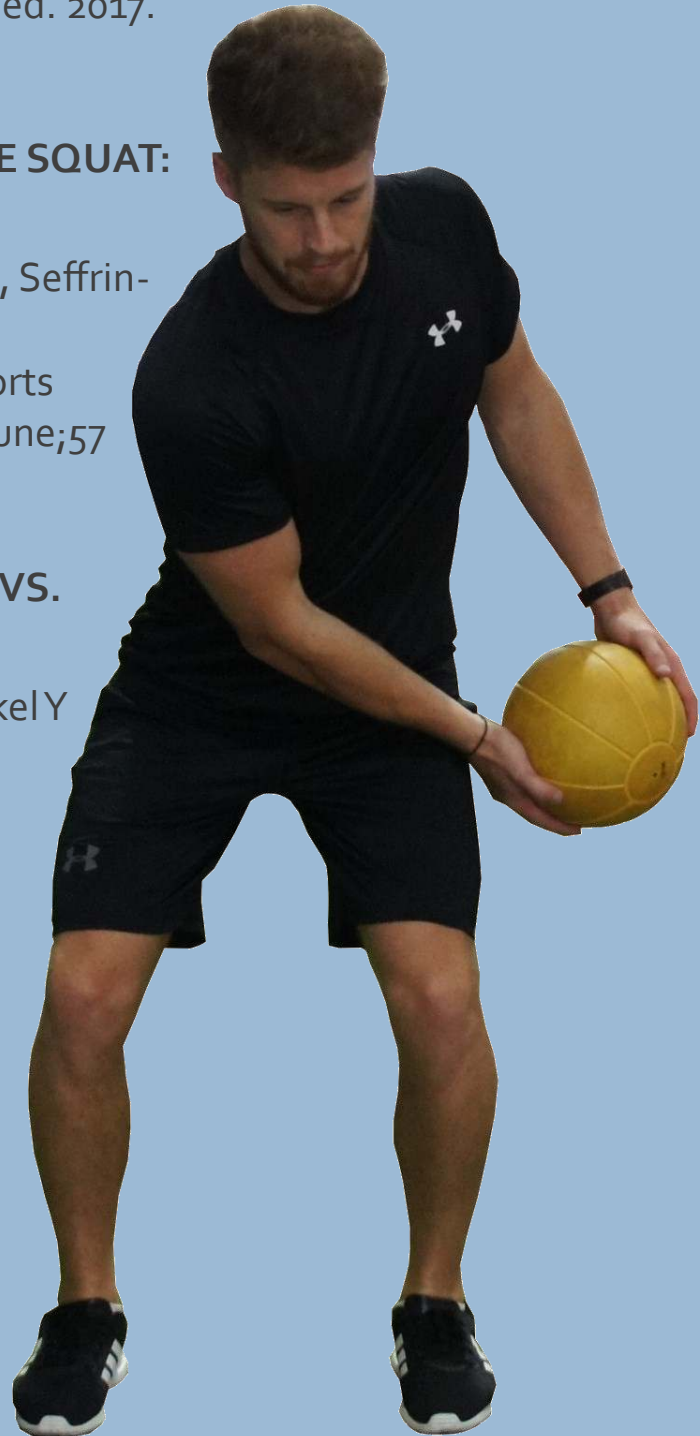
### KNEES PAST THE TOES DURING THE SQUAT: IS IT BAD FOR YOUR BACK?

Hebling Campos M, Furtado Alaman L, Seffrin-Neto Aa, Vieira Ca, Costa De Paula M, Barbosa De Lira Ca. The Journal of Sports Medicine and Physical Fitness. 2017. June;57(6):773-81.

3

### INTERVAL TRAINING: INCREASING VS. DECREASING DISTANCES

Sindiani M, Eliakim A, Segev D & Meckel Y (2017) European Journal of Sport Science.



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# IS FREQUENCY THE KEY TRAINING VARIABLE FOR GAINING MUSCLE?

**OBJECTIVE:** The aim of this study was to highlight and discuss why training frequency may be the most effective variable for trained individuals to make increases in muscle size.

## WHAT THEY DID:

In a literature review fashion, the authors examined the current research in an attempt to highlight the importance of training frequency and how it has often been disregarded (i.e., not investigated) in the majority of the research which focuses on muscle hypertrophy.

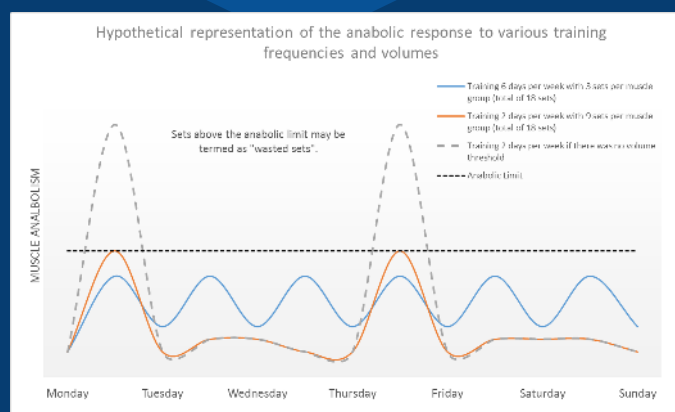
## WHAT THEY PROPOSE:

The authors believe that TRAINED individuals should reduce the number of sets performed in a given training session, but train those muscle groups more frequently (up to 6 times per week; See the figure to the right). Their justification is based on the following:

1. Increasing the number of sets beyond a certain point (i.e., anabolic limit) has no additional effects on muscle protein synthesis, and therefore, hypertrophy.
2. The time period in which muscle protein synthesis is elevated in trained individuals is shorter than it is for untrained individuals, suggesting they can recover from training stimuli quicker.

## MEASUREMENTS:

The primary physiological component their argument was based upon was maximising muscle protein synthesis and the net protein balance.



## WHAT THIS MEANS:

The authors propose that individuals are likely completing a volume of resistance exercise above that which is beneficial for muscle hypertrophy, and instead they should distribute the volume across more sessions (e.g., 6 sessions p/w).

Although muscle protein synthesis has not been previously well correlated with hypertrophy in the past, this is likely due to the 'snapshot' nature in which muscle protein synthesis is measured (i.e., muscle biopsies).

In summary, whilst there is novel principles supporting the use of higher training frequencies with lower volumes on each session, with some athletes, very high training frequencies (e.g., 6 sessions p/w) are often just not feasible. If anything, this paper signifies the importance of training frequency and educates the reader as to how it could be manipulated to maximise gains in muscle size.

## LIMITATIONS:

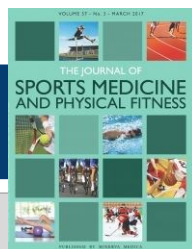
The significant lack of studies which have investigated the impact of training frequency on muscle hypertrophy is obviously a big weakness of this paper. However, this was also the primary reason for writing it in the first place—to draw attention to the lack of consideration placed upon this variable within the research.

## FUTURE RESEARCH:

Future studies should compare different training frequencies (e.g., 1 vs. 6 days p/w) on muscle hypertrophy, whilst equating the total training volume. Future studies should also compare the effects of different training volumes on the anabolic response to identify the anabolic limit. Of course this will invariably differ for every individual, but there may be an approximate 'sweet spot'.

## TITLE

## KNEES PAST THE TOES DURING THE SQUAT: IS IT BAD FOR YOUR BACK?



## OBJECTIVE:

The aim of this study was to examine the effects of restricted vs. unrestricted squats (i.e., knees not past the toes vs. knees past the toes) on the lumbar spine.

## WHAT THEY DID:

19 participants (11 males, 8 females) performed both restricted and unrestricted squats whilst spine motion was collected via stereo-photogrammetric analysis. The reconstructed spine points at the upright neutral position and at the deepest position of the squat exercise were projected onto the sagittal plane of the trunk, a polynomial was fitted to the data, and were quantified the two-dimensional geometric curvature at lower, central and higher lumbar levels, besides the inclination of trunk and lumbosacral region, the overall geometric curvature and overall angle of the lumbar spine. The mean values for each variable were analysed with paired t-test ( $p < 0.05$ ).

## WHAT THEY FOUND:

From the upright neutral position to the deepest point of the squat, the lumbar spine appears to always experience some degrees of flexion. There was less spinal flexion during unrestricted squats when the knees were allowed to travel anteriorly past the toes. Although the trunk and lumbosacral region leant forward during both types of squats, the amount of forward lean was also reduced during unrestricted squats; allowing the squatter to stay more upright.

In summary, the lumbar spine appears to be less overloaded from flexion moments during unrestricted squats.

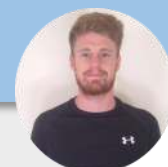
## Reference:

Hebling Campos M, Furtado Alaman L, Seffrin-Neto Aa, Vieira Ca, Costa De Paula M, Barbosa De Lira Ca. The geometric curvature of the lumbar spine during restricted and unrestricted squats. The Journal of Sports Medicine and Physical Fitness. 2017. June;57(6):773-81. [\[Link\]](#)

## EDITORS COMMENTS:

"This is yet another study supporting the premise that allowing the knees to track anteriorly past the toes is not harmful for the athlete. In fact, it suggests quite the opposite. That being, not letting the knees go past the toes may be bad for spinal health due to increased flexion moments at the lumbar spine).

Combine this study with a great literature review by Hartmann and colleagues in 2013 ([HERE](#)), and it can be suggested, with substantial evidence, that allowing the knees to travel anteriorly past the toes during the squat does not only have no harmful effects on the knees and the spine, but may in fact be healthier for you than restricted squats (not letting the knees travel past the toes)".



Owen Walker

## Reference:

Sindiani M, Eliakim A, Segev D & Meckel Y (2017): The effect of two different interval-training programmes on physiological and performance indices, European Journal of Sport Science. [\[Link\]](#)

## EDITORS COMMENTS:

"I found the findings from this study really quite interesting to be honest, and when you dig a little deeper, similar findings appear to be consistent throughout the research. That being, decreasing -distance, interval training appears to be more effective for improving both aerobic and anaerobic fitness. Perhaps this is to do with the oxygen debt associated with the beginning the session with a 500m interval instead of a 100m.

I'm particularly interested in these findings because personally I will often programme more anaerobic dominant exercises (e.g. repeated 20m sprints with short rest) before more aerobic dominant exercises (e.g. 3-min runs), but perhaps it's more beneficial to flip this the opposite way.

And a question I leave you with: Do you think the same apply for energy system development work conducted on the VersaClimber etc?"



Owen Walker

## TITLE

## INTERVAL TRAINING: INCREASING VS. DECREASING DISTANCES



## OBJECTIVE:

The purpose of this study was to find out which form of interval training (increasing-distance or decreasing-distance) is most beneficial for aerobic and anaerobic adaptations.

## WHAT THEY DID:

After being matched for aerobic and anaerobic performances, 40 physically active male students (aged 22-25) were randomly assigned to either the increasing- or decreasing-distance, interval-training group (ITG and DTG, respectively). The ITG programme consisted of increasing-distance interval-training (100–200–300–400–500 m), whilst the DTG group were exposed to a decreasing-distance interval training programme (500–400–300–200–100 m). Both groups were matched for distance and recovery periods and performed their programmes twice weekly for 6-weeks. Aerobic power ( $VO_2$  max) was measured using an incremental maximal running test on a motor-driven treadmill, while anaerobic power was measured using the Wingate Anaerobic Test.

## WHAT THEY FOUND:

Although both groups significantly improved their  $VO_2$  maxes ( $ES = 0.83$ – $1.25$ ), the DTG experienced a 15% improvement compared to ITG who improved by 8% ( $p < 0.05$ ). Furthermore, while both groups led to a significant improvement in all anaerobic indices ( $ES = 0.83$ – $1.63$ ), again, the DTG experienced the greatest improvements in peak power ( $15.7 \pm 7.8$  vs.  $8.9 \pm 4.7$ ), mean power ( $10.6 \pm 5.4$  vs.  $6.8 \pm 4.4$ ), and fatigue index ( $18.2 \pm 10.9$  vs.  $7.0 \pm 14.2$ ).

The findings from this study suggest that interval training strategies which use decreasing-distances may be more effective for improving aerobic and anaerobic fitness compared to increasing-distances.



# Technology & Monitoring

This month's top sports science research on technology and monitoring.

## FEATURE

### THE BALLISTIC PUSH-UP: THE ONE-HIT WONDER FOR EVALUATING STRENGTH AND POWER?

Wang, R, Hoffman, JR, Sadres, E, Bartolomei, S, Muddle, TWD, Fukuda, DH, and Stout, JR. *J Strength Cond Res* 31 (5): 1338–1345, 2017.

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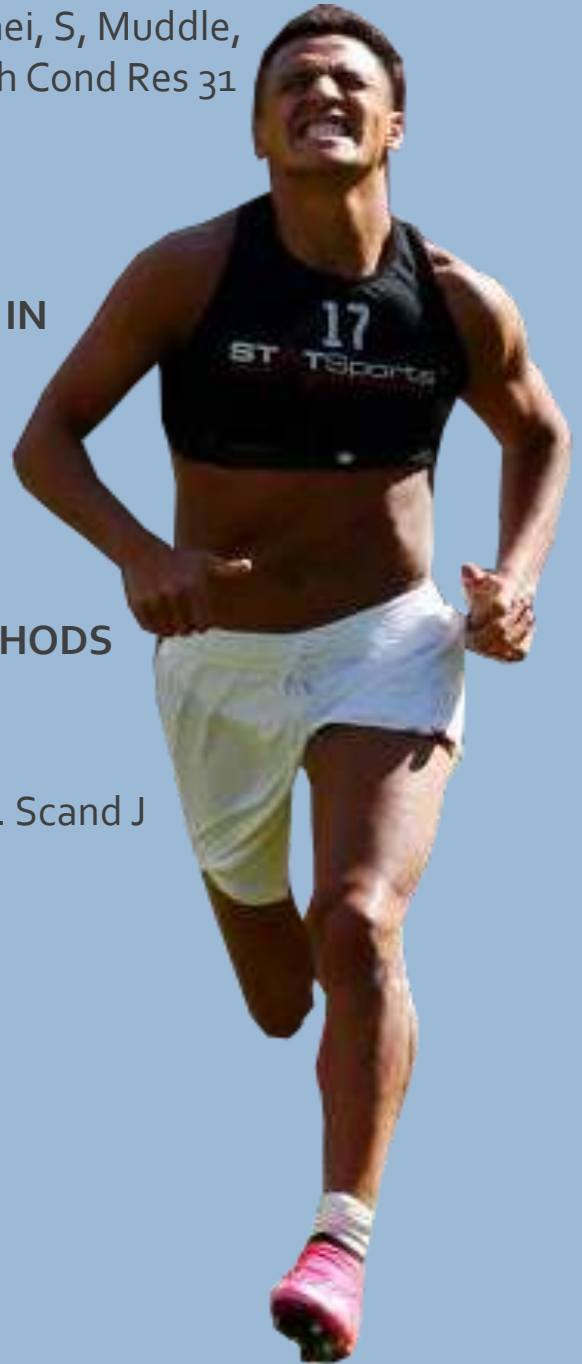
### COOLING DURING EXERCISE: A GREAT TOOL FOR IMPROVING PERFORMANCE IN THE HEAT?

Stevens CJ, Taylor L, Dascombe BJ. *Sports Med.* 2017 May;47(5):829-841.

## 3

### DO TRADITIONAL ACL SCREENING METHODS ACTUALLY ASSESS THE ATHLETES ACL INJURY RISK DURING THEIR SPORT?

Fox AS, Bonacci J, McLean SG, Saunders N. *Scand J Med Sci Sports* 2016.



# THE BALLISTIC PUSH-UP: THE ONE-HIT WONDER FOR EVALUATING STRENGTH AND POWER?

**OBJECTIVE:** The aim of this study was to test the reliability of the ballistic push-up (BPU) exercise and to develop a prediction model to calculate both maximal strength (1RM) in the bench press and upper-body power.

## WHAT THEY DID:

60 recreationally active males (age:  $24.5 \pm 4.3$  years) completed a 1RM bench press and 2 BPU assessments in 3 separate testing sessions. Intraclass correlation coefficients (ICC) were used to examine the reliability of the BPU, and stepwise linear regression was used to develop 1RM bench press and power prediction equations.

## MEASUREMENTS

- Peak force
- Mean force
- Peak rate of force development (RFD)
- Mean RFD
- Net impulse
- Peak velocity
- Flight time
- Peak power
- Mean power

## WHAT THEY FOUND:

For all the measurements mentioned above, the ICCs ranged from 0.849 to 0.971, suggesting the BPU has high-levels of reliability.

The multiple regression analysis provided the following predictive equations:

- **Bench Press 1RM** =  $0.31 \times \text{Mean Force} - 1.64 \times \text{Body Mass} + 0.70$  ( $R^2 = 0.837$ , SEE = 11 kg).
- **Peak Power (time-based)** =  $11.0 \times \text{Body Mass} + 2012.3 \times \text{Flight Time} - 338.0$  ( $R^2 = 0.658$ , SEE = 150 W).
- **Mean Power (time-based)** =  $6.7 \times \text{Body Mass} + 1004.4 \times \text{Flight Time} - 224.6$  ( $R^2 = 0.664$ , SEE = 82 W).
- **Peak Power (velocity-based)** =  $8.1 \times \text{Body Mass} + 818.6 \times \text{Peak Velocity} - 762.0$  ( $R^2 = 0.797$ , SEE = 115 W).
- **Mean Power (velocity-based)** =  $5.2 \times \text{Body Mass} + 435.9 \times \text{Peak Velocity} - 467.7$  ( $R^2 = 0.838$ , SEE = 57 W).

## WHAT THIS MEANS:

The results from this study suggest that the ballistic push-up is a reliable exercise for evaluating strength and power in the upper-body. It also provides the equations for how to calculate whichever of the variables you'd like too (e.g., peak power; see equations above).

Some variables appear to be more accurate than others. For example, the SEE (standard estimate of error) for the bench press 1RM is 11kg, whilst the SEE for mean power when it is calculated using velocity-based data is just 57 W. An 11 kg variation in predicted bench press 1RM could be seen too large and not sensitive enough, but 57 W is most certainly more acceptable.

Considering that calculating the power variables using velocity-based data appears to be more accurate than using time-based data, it's interesting to know that this, therefore, lends itself to potentially using velocity-based training devices to calculate mean and peak power with ease and on a regular basis to assess improvements.

## LIMITATIONS:

The key limitation to this study was the fact the researchers did not normalise the BPU hand position. Participants were allowed to select any bench press grip width they wished and were then asked to replicate this on the BPU, but the actual standardised procedure of measuring shoulder width was not conducted to normalise bench press grip width. Therefore, the individual variations in technique may have affected the accuracy of the power predictions.

## FUTURE RESEARCH:

Future research should try and determine whether these predictive equations could be used to accurately track changes in strength and power during a training intervention in both men and women. It should also compare the accuracy of velocity-based measuring devices (accelerometers and linear position transducers) to the gold-standard force plate for predicting power-based variables (e.g., mean power).



## TITLE

**COOLING DURING EXERCISE: A GREAT TOOL FOR IMPROVING PERFORMANCE IN THE HEAT?****OBJECTIVE:**

The aim of this study was to summarise the current research on using cooling strategies during exercise (typically known as 'mid-cooling'), which mechanisms are believed to lead to performance improvements, and how practitioners can use it during competition.

**WHAT THEY DID:**

After searching PubMed and MEDLINE up until 2016 and filtering articles through their inclusion-exclusion criterion, the authors narrowed the review down to just 13 relevant studies.

**WHAT THEY FOUND:**

Mid-cooling (cooling the body during exercise) is beneficial for endurance performance in the heat. Several strategies have been shown to provide performance improvements, including: the ingestion of cold fluids or an ice slushy (with or without a menthol additive), and cooling the face and neck using a cooling collar or water spray.

Given the current evidence, it has been suggested that mid-cooling improves performance by reducing cardiovascular strain, lowering skin temperature, enhancing nervous system function and improving the athletes perception of thermal sensation, comfort and exertion.

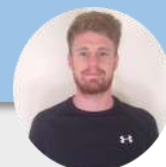
**Reference:**

Stevens CJ, Taylor L, Dascombe BJ. Cooling During Exercise: An Overlooked Strategy for Enhancing Endurance Performance in the Heat. *Sports Med.* 2017 May;47(5):829-841. [\[Link\]](#)

**EDITORS COMMENTS:**

"I find this stuff fascinating. The fact we can improve performance by anywhere between 3-51% using simple cooling strategies such as a wearing cold collar on the neck or pouring water on the head and face during exercise is brilliant, and the practicality of it is simple. Because of that, it is also very easy to develop athlete buy-in to the protocol. I can only imagine there will be several mid-cooling strategies in place for the 2022 Football World Cup in Qatar.

Simple, but effective, mid-cooling strategies include spraying the face with water and/or wearing cooling collars."

*Owen Walker***Reference:**

Fox AS, Bonacci J, McLean SG, Saunders N. Efficacy of ACL injury risk screening methods in identifying high-risk landing patterns during a sport-specific task. *Scand J Med Sci Sports* 2016. [\[Link\]](#)

**EDITORS COMMENTS:**

"In a way, this study sits under the remit of 'predictive validity'. This simply refers to how valid a test is for predicting something, and in this case, it's an ACL injury. In issue #6 of the Research Alerts (March 17), I reviewed the predictive validity of the FMS and clearly described why it should NOT be used as a predictive tool. So if you missed it, make sure you go check it out because it relates to this too.

Although this study only looked at one movement associated with netball, which may not align with your sport(s) and its associated movements characteristics, the take home message is still very important. The LESS and TJA tests 'may' not be useful predictors of ACL injury risk because they simply do not replicate the typical movements associated with ACL. That being, unilateral landing and changing of direction. Instead, both the LESS and TJA are bilateral jump and land only tasks.

This is the first study to use 3-D biomechanical analysis to examine a high-risk movement and compare it to commonly used screening methods (LESS and TJA). The good news is, our knowledge of this injury is growing and so is our understanding of assessing an athlete's risk via tests such as the LESS and TJA."

*Owen Walker*

## TITLE

**DO TRADITIONAL ACL SCREENING METHODS ACTUALLY ASSESS THE ATHLETES ACL INJURY RISK DURING THEIR SPORT?****OBJECTIVE:**

The aim of this study was to assess the effectiveness of two traditional anterior cruciate ligament (ACL) injury risk screening methods by comparing them to a high-risk sport-specific landing task (a netball leap landing).

**WHAT THEY DID:**

32 sub-elite female netballers (age: 23.2 ± 3.1 years) were screened using two common ACL injury risk assessment methods (Landing Error Scoring System [LESS] and Tuck Jump Assessment [TJA]). After which, the participants' were then required to complete a sport-specific landing task, during which three-dimensional kinematic and kinetic data were collected. One-dimensional statistical parametric mapping was used to examine the relationships between screening method scores, and the three-dimensional hip and knee joint rotation and moment data from the sport-specific landing.

**WHAT THEY FOUND:**

Higher LESS scores (suggesting higher risk of ACL injury) were associated with reduced knee flexion after initial contact during the high-risk sport-specific landing task (the netball leap landing) ( $p < 0.03$ ). Put simply, this highlights a minor relationship between LESS score and the netball leap landing. However, no other relationships between the LESS and netball leap landing were found.

No relationships were found between the TJA and the netball leap landing task.

The minimal relationship between lower limb mechanics during the high-risk sport-specific landing task (the netball leap landing) and the LESS, but not the TJA, suggests these screening methods may not be applicable for identifying ACL injury risk within a netball-specific context.



# Fatigue & Recovery

This month's top sports science research on fatigue and recovery.

## FEATURE

### ALCOHOL AFTER EXERCISE: DOES IT HURT YOUR RECOVERY?

Levitt DE, Luk HY, Duplanty AA, McFarlin BK, Hill DW, Vingren JL. *Eur J Appl Physiol.* 2017.

2

### ARE COMPRESSION GARMENTS JUST FOR COMFORT AND STYLE, OR DO THEY ALSO HELP RECOVERY?

Brown F, Gissane C, Howatson G, van Someren K, Pedlar C, Hill J. *Compression Sports Med.* 2017.

3

### MEASURING RECOVERY: ARE WE ON THE BRINK OF A NEW HORIZON?

Shearer DA, Sparkes W, Northeast J, Cunningham DJ, Cook CJ, Kilduff LP. *J Sci Med Sport.* 2017 May;20(5):512-517.



## ALCOHOL AFTER EXERCISE: DOES IT HURT YOUR RECOVERY?

**OBJECTIVE:** The aim of this study was to examine the effects of post-exercise alcohol consumption on the recovery of muscular performance and the inflammatory response.

### WHAT THEY DID:

13 recreationally resistance-trained women completed two identical exercise bouts (300 maximal single-leg eccentric leg extensions) followed by alcohol (1.09 g ethanol kg<sup>-1</sup> fat-free body mass; Vodka, The Smirnoff Co.) or placebo ingestion. Blood was collected before (PRE), and 5 (5 hrs), 24 (24 hrs), and 48 (48 hrs) hours after exercise and analysed for LPS-stimulated cytokine production (TNF- $\alpha$ , IL-1 $\beta$ , IL-6, and IL-8 and IL-10). Maximal torque production (concentric, eccentric, isometric) was measured for each leg at PRE, 24 hrs, and 48 hrs after exercise.

### MEASUREMENTS:

- Maximal torque production (concentric, isometric, eccentric)
- LPS-stimulated cytokine production (TNF- $\alpha$ , IL-1 $\beta$ , IL-6, and IL-8 and IL-10) [LPS = Lipopolysaccharide].

### WHAT THEY FOUND:

- Alcohol consumption did not affect LPS-stimulated cytokine production.
- Alcohol consumption had no effect on the recovery of muscle performance.

### WHAT THIS MEANS:

The results of this study suggest that alcohol consumption (1.09 g ethanol kg<sup>-1</sup> fat-free body mass; Vodka, The Smirnoff Co.) after muscle-damaging resistance exercise does not appear to affect the inflammatory capacity or the recovery of muscular performance in resistance-trained women.

This is, however, the first study of its kind on resistance-trained females and it doesn't agree with the findings in males, which found that post-exercise alcohol consumption does affect the inflammatory capacity ([HERE](#)). This does not necessarily mean the findings from this paper are incorrect, females may respond differently to males, but it does provide you with more knowledge regarding this topic.

In fact, to add to this, another recent study ([HERE](#)) found that post-exercise alcohol consumption had no impact on recovery in untrained females. Given this, it has been suggested that perhaps females can tolerate post-exercise alcohol consumption better than males without it affecting their recovery; however, much more research is needed before this conclusion is made.

### LIMITATIONS:

Several key limitations of this study are:

1. Small sample size ( $n = 13$ ).
2. No control, or even report, of the participants' menstrual cycle phases which is known to impact the magnitude of muscle damage.
3. No examination of muscle protein synthesis.

### FUTURE RESEARCH:

Future research should look to replicate this study with a larger sample size and report individual responses.

It should also take the participants' menstrual cycle into consideration and also analyse the impact of post-exercise alcohol consumption on muscle protein synthesis.

**TITLE**

**ARE COMPRESSION GARMENTS JUST FOR COMFORT AND STYLE, OR DO THEY ALSO HELP RECOVERY?**



**OBJECTIVE:**

The purpose of this meta-analysis was to review the effects of compression garments for exercise recovery. Particular attention was paid to the type of exercise (e.g. strength training, running, cycling), the duration and timing of the compression garment application, the pressure gradient of the garments, and the training status of the participants.

**WHAT THEY DID:**

After searching through the academic databases SPORTDiscus, Web of Science and PubMed, the authors then filtered the returned articles through their inclusion-exclusion criterion. The filtration process left them with 23 relevant articles to review for this analysis, which included 348 participants (256 males and 92 females), 136 data points, and were all published between 1995 and 2015. Recovery was reported using standardised mean effect sizes. The effects of time (0–2, 2–8, 24, [24 h), pressure (<15 vs. ≥15 mmHg) and training status (trained vs. untrained) were also assessed.

**WHAT THEY FOUND:**

Compression garments significantly improved recovery in both trained and untrained participants, with no significant difference observed between the two populations. The pressure gradient of the compression garments appeared to have no effect on the magnitude of the recovery. Compression garments appear to have little effect on short-term recovery (0-2 hrs), but does appear to significantly accelerate recovery between 2-8 hrs after exercise. Strength, power and endurance recovery were all positively affected by the use of compression garments, with the greatest effects being observed on strength recovery 2-8 hrs post-exercise. The effects on compression garments on recovery were significantly greater following resistance exercise compared with running and cycling.

**Reference:**

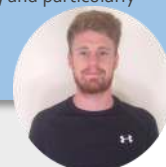
Brown F, Gissane C, Howatson G, van Someren K, Pedlar C, Hill J. Compression Garments and Recovery from Exercise: A Meta-Analysis. Sports Med. 2017. [Link]

**EDITORS COMMENTS:**

"Some of the key take home messages from this study are that compression garments would be recommended for strength and power recovery following resistance training and next day cycling performance.

However, there are a couple of important points to note here: 1) surprisingly, pressure gradients have been rarely reported in the current research, meaning conclusions regarding the importance of pressure are very difficult to draw; 2) despite there being a lot of research on this topic, the majority of it is, unfortunately, very poor.

**My final message:** wearing compression garments during and after, or just after exercise, does appear to improve recovery, especially the recovery of strength, and particularly after resistance-based exercise."



*Owen Walker*

**Reference:**

Shearer DA, Sparkes W, Northeast J, Cunningham DJ, Cook CJ, Kilduff LP. Measuring recovery: An adapted Brief Assessment of Mood (BAM+) compared to biochemical and power output alterations. J Sci Med Sport. 2017 May;20 (5):512-517. [Link]

**TITLE**

**MEASURING RECOVERY: ARE WE ON THE BRINK OF A NEW HORIZON?**



**OBJECTIVE:**

The aim of this study was to assess the development of a new self-reporting scale (Brief Assessment of Mood Plus [BAM+]) used to measure the recovery status of athletes.

**WHAT THEY DID:**

11 elite under-21 football players were monitored across 5 games. BAM+, creatine kinase (CK) using blood samples, and peak power output (PPO) from the countermovement jump were all measured before each game and 24- and 48-hrs afterwards. Game activity data for each participant was also collected using GPS monitors on players.

**WHAT THEY FOUND:**

BAM+, CK and PPO had significant ( $p < 0.05$ ) linear and quadratic growth curves across time and games that matched the known time reports of fatigue and recovery. Multi-level linear modelling with random intercepts for 'participant' and 'game' indicated only CK significantly contributed to the variance of BAM+ scores ( $p < 0.05$ ). Significant correlations ( $p < 0.01$ ) were found between changes in BAM+ scores from baseline at 24- and 48-hrs post-match for total distance covered per minute, high-intensity distance covered per minute, and the total number of sprints per minute.

In conclusion, the visual and inferential results from this study indicate that the BAM+ appears effective for monitoring longitudinal recovery cycles in elite level athletes.

**EDITORS COMMENTS:**

"Although this study may be somewhat difficult to understand, the underlying principle is this..."

Sports scientists often attempt to measure recovery and fatigue using various methods. However, the common methods used to measure biochemical (e.g. creatine kinase) and neuromuscular (e.g. peak power output) markers of recovery are expensive and require specialist equipment. This study attempted to develop a simple, cost-effective and practical scale which can be used as an alternative to measuring CK and PPO without using various pieces of expensive equipment.

The investigation found that this scale (BAM+) is effective for monitoring longitudinal recovery (over several weeks). Having said this, this paper does not validate this scale, future research is need for that. Instead, what it does do, is provide us with a glimpse of what could be on the horizon with regards to measuring recovery, which could replace the costly and labour-intensive strategies currently employed."



*Owen Walker*





# Youths

This month's top sports science research on youth populations.

## FEATURE

### INJURY AND CONCUSSION PREVENTION: HOW EFFECT IS EXERCISE FOR YOUTHS?

Hislop MD, Stokes KA, Williams S, McKay CD, England ME, Kemp SPT, Trewartha G. Br J Sports Med 2017;0:1.

2

### PHYSICAL FITNESS AND ACADEMIC PERFORMANCE IN YOUTHS: IS THERE A LINK?

Santana CCA, Azevedo LB, Cattuzzo MT, Hill JO, Andrade LP, Prado WL. Scand J Med Sci Sports. 2017. Jun;27(6):579-603.

3

### RESISTANCE TRAINING IN YOUTH: LAYING THE FOUNDATION FOR INJURY PREVENTION AND PHYSICAL LITERACY

Zwolski C, Quatman-Yates C, Paterno MV. Sports Health. 2017.



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# INJURY AND CONCUSSION PREVENTION: HOW EFFECT IS EXERCISE FOR YOUTHS?

**OBJECTIVE:** The aim of this study was to examine the effectiveness of an exercise programme for reducing both concussion and musculoskeletal injury rates in schoolboy rugby players. To supplement this, the researchers also assessed the programme dose on injury measures (i.e., programme frequency and injury rates).

## WHAT THEY DID:

3,188 players (118 teams), aged 14-18 years, from 40 independent UK schools were allocated with either an intervention or a reference programme in a cluster-randomised controlled trial. Both programmes were 20-minutes long and delivered by the school coaches at the start of sessions. The intervention programme comprised of balance training, whole-body resistance training, plyometric training, and controlled rehearsal of landing and cutting manoeuvres. Injuries which occurred during school rugby matches and resulted in a time-loss of greater than 24-hours were recorded by coaches and medical staff.

## MEASUREMENTS:

- Injuries which occurred in school rugby matches and resulted in a time-loss of > 24-hrs.

## WHAT THEY FOUND:

- 441 injuries (intervention = 233; control = 208) which resulted in > 24 hours of time-loss were reported out of the total 15,938 match exposure-hours.
- The intention-to-treat results suggested it was unclear whether the intervention reduced overall match injury rates, but the results did show significant reductions in concussion rates.
- It was also reported that when intervention sessions were performed  $\geq 3$  times per week, overall match injury rates and concussion incidence were significantly reduced.

## WHAT THIS MEANS:

A well-designed exercise programme which focusses on improving movement control via various modes of training (resistance and balance training, plyometrics, and controlled rehearsal of landing and cutting manoeuvres) can not only reduce musculoskeletal injury rates, but also reduce concussions in schoolboy rugby players.

It also suggests that in order to realise the greatest effects of such a training programme, it should be completed at least three times per week.

## LIMITATIONS:

There were a few key weaknesses to this study:

1. The programmes were delivered by the school coaches, so the quality of the exercise delivery is questionable.
2. Individual compliance to the programmes were not assessed - some participants may have rarely completed it.
3. The different medical staff at each school may have lead to inconsistencies with regards to reporting injury severity and time-loss.

## FUTURE RESEARCH:

Future research should attempt to figure out how such interventions are capable of reducing musculoskeletal and concussion injury rates. It should also look into the best strategies towards implementing these interventions in the 'real world'.

## TITLE

## PHYSICAL FITNESS AND ACADEMIC PERFORMANCE IN YOUTHS: IS THERE A LINK?



## OBJECTIVE:

The purpose of this systematic review was to assess the relationship between various components of physical fitness (e.g., cardiorespiratory fitness) and academic performance in youths.

## WHAT THEY DID:

The authors first searched several databases (PubMed, Medline, ERIC, LILACS, SciELO, and Web of Science) to source relevant articles, and then filtered those articles using their inclusion-exclusion criteria. Cross-sectional and longitudinal studies published between 1990 and 2016 which examined the link between at least one component of physical fitness (PF) and academic performance (AP) in children and adolescents were sought. A total 45 met the inclusion-exclusion criterion and were included in this review.

## WHAT THEY FOUND:

31 studies reported a positive relationship between AP and CRF, 6 studies with muscular strength, 3 with flexibility, and 7 showed a positive link between a cluster of PF components and AP. However, the magnitude of the associations is weak to moderate ( $b = 0.10-0.42$  and odds = 1.01–4.14).

In summary, there is strong evidence to suggest a positive association between CRF and a cluster of PF components with AP in cross-sectional studies; and evidence from longitudinal studies for a positive association between a cluster of PF components and AP; the relationship between muscular strength and flexibility with AP remains uncertain.

## Reference:

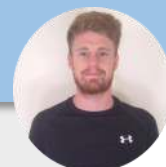
Santana CCA, Azevedo LB, Cattuzzo MT, Hill JO, Andrade LP, Prado WL. Physical fitness and academic performance in youth: A systematic review. *Scand J Med Sci Sports*. 2017. Jun;27(6):579-603. [\[Link\]](#)

## EDITORS COMMENTS:

"Recently, there has been many studies attempting to find an association between physical fitness, in one form or another, and academic performance—hence the reason for this systematic review.

Whilst this study does not suggest cause and effect (i.e., if you get fitter, you'll also get smarter), it does suggest there is a strong link between cardiorespiratory fitness and academic performance. Perhaps this is due to several neurophysiological adaptations such as angiogenesis in the motor cortex, and thus increased vascularisation of the brain, but for now we're unsure. Intervention studies are now needed to determine if increasing PF could also improve AP in youths.

Around the World, PE classes are being reduced to make time for more 'academic' subjects, but given this information, is this a big step in the wrong direction?"



Owen Walker

## Reference:

Zwolski C, Quatman-Yates C, Paterno MV. Resistance Training in Youth: Laying the Foundation for Injury Prevention and Physical Literacy. *Sports Health*. 2017. [\[Link\]](#)

## ARTICLE TITLE

## RESISTANCE TRAINING IN YOUTH: LAYING THE FOUNDATION FOR INJURY PREVENTION AND PHYSICAL LITERACY



## EDITORS COMMENTS:

"If you haven't read this article yourself, I strongly suggest you do—it's excellent! The link is provided above.

Combine the information from this study with the previous two reviewed in this Youth section and you'll see just how important and effective a well-balanced physical development training programme can be for youngsters. It has the ability to improve short- and long-term health, wellbeing, academic performance, sports performance and even reduce injury rates (inc. concussions).

**What's needed now?** I believe there is a huge call for after school physical literacy classes (i.e., youth fitness/multisport classes). Why just play 1 sport after school when you can play multiple, play other games and even some other fun stuff? So, set up some classes and go make some money. "



Owen Walker

## OBJECTIVE:

The aim of this study was to review the current literature regarding youth resistance training and physical literacy and how it relates to overall physical development.

## WHAT THEY DID:

Topical articles were sourced by searching through PubMed and Sports Discus from 1982-2016. This included positions statements, consensus guidelines and empirical studies.

## WHAT THEY FOUND:

Resistance training and integrated neuromuscular programmes (a combination of training components aimed at improving health- and skill-related components of physical fitness) are extremely potent methods for improving physical literacy, fitness, health and wellbeing in addition to reducing injury rates in young populations.

It also highlights adolescents who are not satisfying current health-related physical activity recommendations, early sport specialisers and young adolescent girls as "priority" populations.

# Nutrition

This month's top research on nutrition.

## FEATURE

### **DOES HABITUAL CAFFEINE CONSUMPTION ACTUALLY INFLUENCE THE PERFORMANCE BENEFITS OF ACUTE CAFFEINE SUPPLEMENTATION**

Gonçalves L, Painelli V and Yamaguchi G et al. (2017)  
Journal of Applied Physiology, 2017.

2

### **DXA SCANS FOR FAT LOSS: DOES MUSCLE GLYCOGEN AND CREATINE SKEW THE RESULTS?**

Bone J, Ross M and Tomcik K et al.  
(2017). Medicine & Science in Sports & Exercise, 49(5), 1029-1035.

3

### **ALTERNATE-DAY FASTING: A FAT LOSS BIOHACK, OR JUST ANOTHER FAD?**

Trepanowski J, Kroeger C and Barnosky A et al.  
(2017) JAMA Internal Medicine.



# DOES HABITUAL CAFFEINE CONSUMPTION ACTUALLY INFLUENCE THE PERFORMANCE BENEFITS OF ACUTE CAFFEINE SUPPLEMENTATION

**OBJECTIVE:** To investigate whether the long-standing belief that habitual intake of caffeine reduces the effects of acute caffeine supplementation on exercise performance holds true.

## WHAT THEY DID:

A double-blind, randomised, crossover study was performed. Forty well-trained male cyclists were divided into three groups according to their habitual caffeine intake: low ( $58 \pm 29$  mg/day), moderate ( $143 \pm 25$  mg/day), and high consumers ( $351 \pm 139$  mg/day). Participants completed three trials in which they performed simulated cycling time-trials in the fastest time possible following ingestion of: caffeine (CAF: 6 mg/kg body mass), placebo (PLA, in the form of dextrose), and no supplement (CON).

## MEASUREMENTS:

- Time trial performance
- Blood lactate
- Subjective RPE

## WHAT THEY FOUND:

There were three main findings from the study. Firstly, time-trial performance was significantly improved in CAF compared to PLA and CON (29.92 min vs 30.81 and 31.14 min). Secondly, ANCOVA (mixed-model analysis of covariance) revealed no influence of habitual caffeine intake as a covariate on exercise performance.

Furthermore, no correlation was observed between habitual caffeine intake and absolute changes (CAF – CON) in time-trial performance with caffeine. Finally, blood lactate and ratings of perceived exertion were not different between trials and groups.

## WHAT THIS MEANS:

This study shows that performance benefits with acute caffeine supplementation during a ~30 min cycling time trial were not influenced by the level of habitual caffeine consumption. Therefore, this study refutes the long-standing notion that habitual caffeine intake may negatively affect exercise performance in response to caffeine supplementation.

## LIMITATIONS:

- Did not measure blood caffeine concentrations
- Findings are confined to male participants
- Exercising in a fasted state (which the time trials were performed in) does not represent the recommendations of current sports nutrition guidelines or the real life practices of cyclists

## FUTURE RESEARCH:

Future research should investigate this topic using female participants to see if the same response is observed, and also with subjects in a fed state which is a more realistic condition for competing cyclists. Furthermore, future research investigating the effects of habitual caffeine consumption should perhaps record, and not prohibit, caffeine consumption in the 24hrs preceding exercise, which this study enforced.

Gonçalves L, Painelli V and Yamaguchi G et al. (2017) Dispelling the myth that habitual caffeine consumption influences the performance response to acute caffeine supplementation. *Journal of Applied Physiology*, 2017. [\[Link\]](#)

**TITLE**

**DXA SCANS FOR FAT LOSS: DOES MUSCLE GLYCOGEN AND CREATINE SKEW THE RESULTS?**



**OBJECTIVE:**

To investigate the effects of manipulating muscle glycogen and creatine content independently and additively on DXA estimates of lean mass, with the aim of further refining best practice protocols for body composition assessment by DXA and/or allowing better interpretation of DXA results.

**WHAT THEY DID:**

Eighteen well-trained male cyclists (mean body mass 78.2kg) undertook a parallel group application of creatine loading (20 g/day for 5 d loading; 3 g/day maintenance) or placebo with crossover application of glycogen loading (12 v 6g/kg body mass per day for 48hrs). Body composition, total body water, muscle glycogen and creatine content were assessed via DXA, bioelectrical impedance and standard biopsy techniques. Changes in the mean were assessed using the following effect-size scale: >0.2 small, >0.6, moderate, >1.2 large and compared with the threshold for the smallest worthwhile effect of the treatment.

**WHAT THEY FOUND:**

Glycogen loading, both with and without creatine loading, resulted in substantial increases in estimates of lean body mass and leg lean mass. A substantial decrease in leg lean mass was observed after the glycogen depleting condition. A mean 1.7kg increase in leg lean mass was seen after the glycogen loading treatment, and the glycogen depleting exercise resulted in a mean decrease of 0.8kg of leg lean mass.

**Reference:**

Bone J, Ross M and Tomcik K et al. (2017) Manipulation of Muscle Creatine and Glycogen Changes Dual X-ray Absorptiometry Estimates of Body Composition. *Medicine & Science in Sports & Exercise*, 49(5), 1029-1035. [\[Link\]](#)

**EDITORS COMMENTS:**

"This is the first study to investigate the effect of glycogen and creatine loading on DXA estimates of body composition. This is significant because standardising a DXA protocol is essential in order to provide a reliable measurement of body composition. Therefore, the findings from this study need to be considered in interpreting DXA-derived body composition results in athletes.

For example, athletes getting a DXA scan after a fat loss phase should consider that their lean mass results may come up lower than expected due to a reduction in muscle glycogen/water content, and not actual muscle protein."



*Tim Rowland*

**Reference:**

Trepanowski J, Kroeger C and Barnosky A et al. (2017) Effect of Alternate-Day Fasting on Weight Loss, Weight Maintenance, and Cardioprotection Among Metabolically Healthy Obese Adults. *JAMA Internal Medicine*. [\[Link\]](#)

**ARTICLE TITLE**

**ALTERNATE-DAY FASTING: A FAT LOSS BIOHACK, OR JUST ANOTHER FAD?**



**OBJECTIVE:**

To compare the effects of alternate-day fasting (ADF) vs daily calorie restriction on weight loss, weight maintenance, and risk indicators for cardiovascular disease (CVD).

**WHAT THEY DID:**

The authors conducted a randomised clinical trial of 100 metabolically healthy obese adults (18 to 64 years of age; mean body mass index, 34). Participants were randomised to 1 of 3 groups for 1 year: alternate-day fasting (25% of energy needs on fast days; 125% of energy needs on alternating "feast days"), calorie restriction (75% of energy needs every day), or a no-intervention control. The trial involved a 6-month weight-loss phase followed by a 6-month weight-maintenance phase. The primary outcome examined was change in body weight. Secondary outcomes were adherence to the dietary intervention and risk indicators for CVD.

**WHAT THEY FOUND:**

Alternate-day fasting (ADF) did not appear to result in any superior outcomes. Weight loss after 1 year in the ADF group (6.0%) was not significantly different from that of the daily calorie restriction group (5.3%), relative to the no-intervention control group. Furthermore, the dropout rate was highest in the ADF group (38%), vs the daily calorie restriction group (29%), suggesting that adherence may be more difficult on an ADF diet. Finally, there were no significant differences between the intervention groups in blood pressure, heart rate, triglycerides, fasting glucose, fasting insulin, insulin resistance, C-reactive protein, or homocysteine concentrations at 6 or 12 months.

**EDITORS COMMENTS:**

"Alternate-day fasting has been promoted as a potentially superior alternative to daily caloric restriction, and has become increasingly popular in recent years. However, to date, no long-term randomised clinical trials have evaluated its efficacy.

This study shows that ADF is not superior to daily calorie restriction for weight loss or risk of CVD, and instead supports the notion that a caloric deficit is the most important variable for weight loss. Overall, fasting appears to be a potential tool in your weight loss toolbox, but it is not a magic bullet or "biohack" as sometimes suggested."



*Tim Rowland*





# Team Sports

This month's top sports science research in team sports.

## FEATURE

### COMPARISON OF THE PHYSICAL AND TECHNICAL DEMANDS OF CRICKET PLAYERS DURING TRAINING AND MATCH-PLAY

Vickery W, Duffield R, Crowther R, Beakley D, Blanch P, Dascombe BJ. The Journal of Strength & Conditioning Research. In Press; Publish Ahead of Print.

2

### GROIN PROBLEMS IN MALE SOCCER PLAYERS ARE MORE COMMON THAN PREVIOUSLY REPORTED

Haroy J, Clarsen B, Thorborg K, Holmich P, Bahr R and Andersen TE. The American Journal of Sports Medicine 48: 2017.

3

### TECHNICAL DETERMINANTS OF TACKLE AND RUCK PERFORMANCE IN INTERNATIONAL RUGBY UNION

Hendricks, S, van Niekerk, T, Sin, D, Lambert, M, den Hollander, S, Brown, J, Maree, W, Treu, P, Till, K, & Jones, B. (2017): 8, 1-7.

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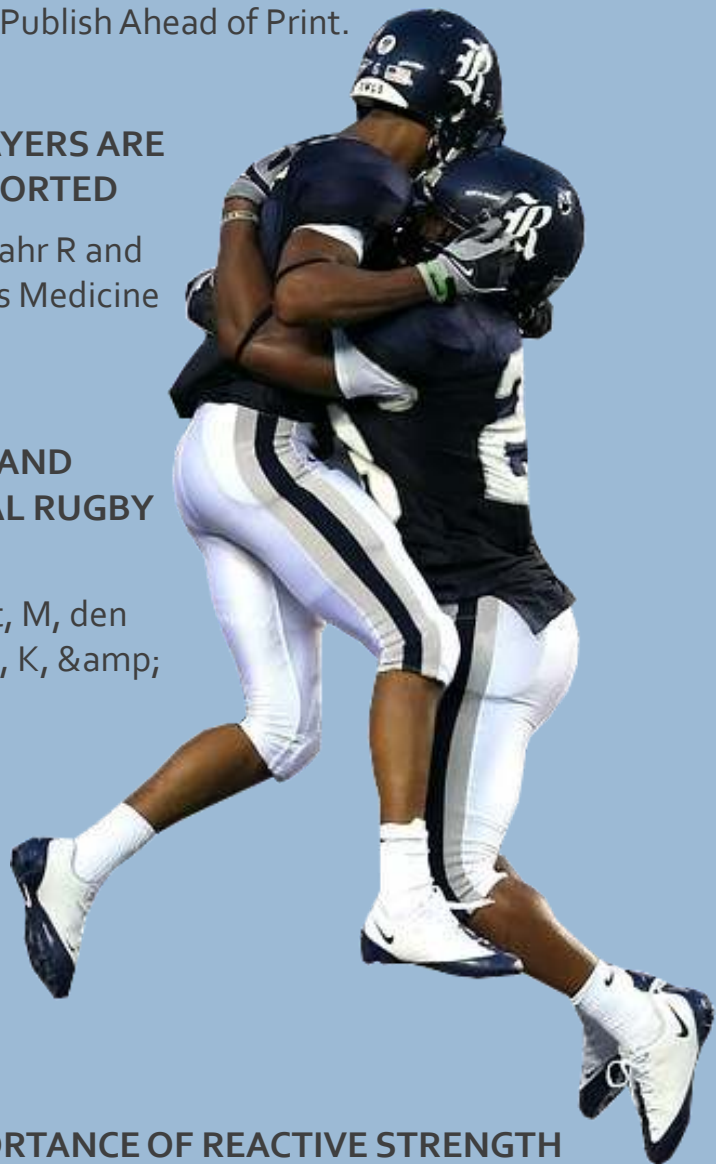
### MUSCLE-SPECIFIC VIBRATION: CAN IT IMPROVE JUMP PERFORMANCE?

Jacobson, BH, Monaghan, TP, Sellers, JH, Conchola, EC, Pope, ZK, and Glass, RG. J Strength Cond Res 31(5): 1259–1264, 2017.

5

### A NEW TEST FOR AGILITY AND THE IMPORTANCE OF REACTIVE STRENGTH

Young, WB and Murray, MP. J Strength Cond Res 31(2): 509–516, 2017.





# PHYSICAL AND TECHNICAL DEMANDS OF CRICKET PLAYERS DURING TRAINING AND MATCH-PLAY

**OBJECTIVE:** The purpose of this manuscript was to quantify and compare the physiological, physical, and technical demands of cricket players within respective playing positions during traditional net based and centre-wicket game simulation training sessions. Comparisons were made to a typical 50-over cricket match.



## WHAT THEY DID:

National level cricket players (n = 42) participated in 14 traditional net based and 5 centre-wicket simulations during an 8 week period. Movement patterns (measured via GPS), HR, RPE and number of technical skills (i.e. balls faced and bowled) were recorded for each training session across all playing positions (batsmen, medium-fast bowlers, spin bowlers, fielders). Effect sizes and confidence intervals (90%) were used to assess the difference between both training formats and a 50-over cricket match (n = 5) played by the Australian U19 squad.

## MEASUREMENTS:

**Heart rate** (Mean HR and the percentage of time >75% HRmax)

(high intensity = >0.2 s at  $\geq 3.5\text{ms}^{-1}$ ) per hour, number of high-intensity efforts, and high intensity-low intensity ratio)

**Training load** (RPE)

**Movement demands** (Total distance per hour, high-intensity distance)

**Technical skills** (Counts)

## WHAT THEY FOUND:

- Traditional net based training provided substantially greater technical skill volume than match play and centre-wicket training
- Medium-fast bowlers experienced greater physiological and physical demands during traditional cricket training sessions than match-play and centre-wicket simulations.
- Centre-wicket training more closely replicated the physical demands of match-play than traditional net-based training for batsmen.

## WHAT THIS MEANS:

This study is one of the few studies which quantifies the demands of various training methods in cricket and is the only study to date to look at positional differences. Not surprisingly, this study outlines that the most beneficial training stimulus will depend on the objective of the training session.

For example, regardless of playing position, a greater technical skill volume is present during traditional net based training. While for batsmen, a greater physical load and training environment, more representative of match play, is evident during centre-wicket simulation training. Therefore, a combination of the two training modalities would likely elicit the most optimal training environment.

## LIMITATIONS:

- The limited number of centre-wicket simulations (n = 5) in comparison to traditional net-based training (n = 14) may have influenced the results. However, this is a reflection of the distribution between traditional and centre-wicket skill training sessions in elite cricket.
- The use of Australian U19 50-over matches as a representation of match-play would have influenced the results. As training sessions involved adult elite level male cricketers, and this may explain as to why medium-fast bowlers experienced greater physiological and physical demands during net-based training than during a match-play.

## FUTURE RESEARCH:

It would be fantastic if future research determined the distribution of various training methods, as well as the physical, physiological and technical demands imposed on cricketers throughout the various phases of a complete season. This would be particularly interesting with respect to the in-season phase, due to the unique requirement of match play which can last up to four days.

## TITLE

## GROIN PROBLEMS IN MALE SOCCER PLAYERS ARE MORE COMMON THAN PREVIOUSLY REPORTED



## OBJECTIVE:

To investigate the prevalence of groin problems among soccer players of both sexes, and among male soccer players of different levels of play.

## STUDY DESIGN:

Descriptive epidemiology study

## WHAT THEY DID:

Monitored groin problems of 240 players from 15 teams across different levels of play and from both sexes over a 6-week period of match congestion. Groin problems were registered using the Oslo Sports Trauma Research Centre Overuse Injury Questionnaire.

## WHAT THEY FOUND:

A high prevalence of groin problems among male soccer players during a period of match congestion. Time-loss definition captured only one-third of the male groin problems as registered with the new method. Elite male players had 3 times higher risk of reporting groin problems as compared with elite female players. Playing level did not influence the risk of reporting a groin problem among males.

## Reference:

Haroy J, Clarsen B, Thorborg K, Holmich P, Bahr R and Andersen TE. Groin Problems in Male Soccer Players Are More Common Than Previously Reported. *The American Journal of Sports Medicine* 48: 2017. [\[Link\]](#)

## EDITORS COMMENTS:

"The current study investigates an interesting and relevant topic for practitioners due to the high prevalence of groin injuries in football. More needs to be done to lower this frequency and therefore novel studies of this nature are important.

Many groin injuries occur due to overuse and thus methods which can help to identify symptoms early (such as the questionnaire in the current study), may help to reduce time-loss injuries in the long run. This highlights the importance of communication with players on a regular basis to identify any soreness/problems which may be beginning to develop. It is important however, that practitioners find a balance between educating athletes on pain whilst also maintaining high levels of player care."



Liam Mason

## Reference:

Hendricks, S, van Niekerk, T, Sin, D, Lambert, M, den Hollander, S, Brown, J, Maree, W, Treu, P, Till, K, & Jones, B. (2017). Technical determinants of tackle and ruck performance in international rugby union: 8, 1-7. [\[Link\]](#)

## EDITORS COMMENTS:

"The importance of having good tackle technique, evasive/off-loading skills, and strong fundamentals in ruck situations is paramount to dominating a rugby match. In this case, working with the skills and other assistant coaches to design training sessions that cover the technical aspects, then using various timed parameters that puts the skill into an aerobic or lactic training environment may be a way of implementing specific energy system development.

**Example:** 40-secs of sub-maximal work of pummelling or tackle hit and stick, followed by 20-secs of passive rest for 10-sets may be useful for improving aerobic capacity. Another great example can be seen [HERE](#).

Additionally, improving leg drive in the tackle may be developed through horizontal strength exercises such as heavy prowler pushes and hip thrusts."



James de Lacey

## TITLE

## TECHNICAL DETERMINANTS OF TACKLE AND RUCK PERFORMANCE IN INTERNATIONAL RUGBY UNION



## OBJECTIVE:

The purpose of this study was to identify technical determinants of tackle and ruck performance at the highest level of rugby union.

## WHAT THEY DID:

Retrospective video analysis to determine the relationship between technical actions and performance outcomes of all matches in the 2014 Six Nations and 2014 Championship competitions.

## WHAT THEY FOUND:

Being tackled in front reduced the likelihood of offloads and tackle breaks, while fending during contact increased the chances of offloading and breaking the tackle. Strong ball carrier leg drive increased the probability of offloading in the tackle and breaking the tackle. For the ruck, actively placing the ball increased likelihood of maintaining possession.

## TITLE

## MUSCLE-SPECIFIC VIBRATION: CAN IT IMPROVE JUMP PERFORMANCE?



## OBJECTIVE:

The objective of this study was to assess peak and average power before and after an acute bout of vibration of selected lower-body sites in division I athletes.

## WHAT THEY DID:

In a randomised, cross-over design, 21 college-level American football players (age:  $20.33 \pm 1.28$ ) were assigned to either stationary cycling (70 rpm) or localised vibration prior to performing a countermovement jump (CMJ). The localised vibration intervention consisted of 4-minutes of vibration to selected lower-body areas (glutes, quadriceps, hamstrings and calves), with each muscle group being exposed to vibration for 1-minute at 30 Hz.

## WHAT THEY FOUND:

Repeated measures analysis of variance yielded no significant differences ( $p < 0.05$ ) in either peak power or peak velocity. Similarly, no significant differences were found for average power and velocity between conditions. However, it should be noted that, while not significant, the vibration condition demonstrated an increase in peak power and velocity while the bike condition registered slight decreases.

## Reference:

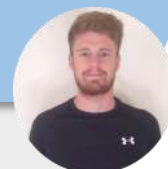
Jacobson, BH, Monaghan, TP, Sellers, JH, Conchola, EC, Pope, ZK, and Glass, RG. Acute effect of biomechanical muscle stimulation on the counter-movement vertical jump power and velocity in division I football players. *J Strength Cond Res* 31(5): 1259–1264, 2017. [\[Link\]](#)

## EDITORS COMMENTS:

"The premise of this study was to examine whether muscle-specific vibration could elicit a post-activation potentiation (PAP) response. In other words, whether vibration could excite the neuromuscular system and improve the following jump performance.

The effects of PAP are well known, and it does appear to be very effective for improving subsequent performance; however, it was, unfortunately, unsuccessful in this instance. To elicit a PAP response, sufficient rest is needed between the stimulating exercise and the subsequent exercise (roughly 4-6mins). However, in this case no rest was provided, suggesting a potential flaw in the study design.

Future research should definitely continue to look into this topic, but perhaps pay more attention to the study procedures."



Owen Walker

## Reference:

Young, WB and Murray, MP. Reliability of a field test of defending and attacking agility in Australian football and relationships to reactive strength. *J Strength Cond Res* 31(2): 509–516, 2017. [\[Link\]](#)

## EDITORS COMMENTS:

"The lead author of this study (Warren Young) is very much a pioneer in the field of agility, and has done a great job with this study.

Firstly, the authors have managed to develop a 'live' (not video-based), and reliable, agility test for both the attacking and defensive components in one simple test. They have also demonstrated that both attacking and defensive agility have different characteristics, but at the same time share a single commonality—reactive strength.

Practitioners can take a couple of things away from this study: 1) defensive and attacking agility are not the same thing; 2) here's a reliable test to measure both; and 3) reactive strength is an important quality to develop if you wish to see improvements in agility."



Lachlan Wilmot

## TITLE

## A NEW TEST FOR AGILITY AND THE IMPORTANCE OF REACTIVE STRENGTH



## OBJECTIVE:

The aim of this study was three-fold: 1) to develop field tests of defending and attacking agility for Australian Rules football; 2) determine the reliability of the tests; and 3) identify the relationship between the tests and the athletes reactive strength.

## WHAT THEY DID:

Developed new defensive and offensive agility tests and used 19 recreational male Australian Rules football players to test both the reliability of the tests and their relationship with reactive strength (RS) using a drop jump test. The agility tests involved performing 10 trials of one-on-one agility tasks against 2 opponents (testers), in which the objective was to be in a position to tackle (defending) or to evade (attacking) the opponent.

## WHAT THEY FOUND:

Both tests appeared to have good reliability (ICC > 0.8, %CV, 3, and no significant differences between test occasions [ $p < 0.05$ ], and interrater reliability was very high [ $r = 0.997, p < 0.001$ ]). Given that the common variance between the agility tests was 45%, it suggests that both of these tests represent relatively independent skills. RS was shown to have a large ( $r = 0.625, p = 0.004$ ) and very large correlation ( $r = 0.731, p < 0.001$ ) with defending and attacking agility, respectively.

In summary, it appears that defending and attacking agility have different characteristics, possibly related to the footwork, physical, and cognitive demands of each. Nonetheless, RS seems to be important for agility, especially for attacking agility.



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# Editors

The column editors for the Science for Sport monthly Research Alerts.



**Owen Walker** MSc\*D CSCS

Owen is the founder, author and director of Science for Sport. He was formerly the Head of Academy Sports Science and Strength & Conditioning at Cardiff City Football Club, and an interim Sports Scientist for the Welsh FA. He also has a master's degree in strength and conditioning and is a NSCA certified strength and conditioning coach.

**STRENGTH & CONDITIONING**



**Samuel Callaghan** PhD Candidate

Sam is a PhD Candidate at Edith Cowan University, investigating the influence of strength training upon the biomechanics and performance of cricket fast bowlers. Sam is currently a strength and conditioning coach at the Western Australian Cricket Association.

**CRICKET**



**Lachlan Wilmot** BSc ASCA L2

Lachlan is the Head Strength & Power Coach at the GWS Giants and has been for the past 6 years. He is also completing an MSc in High Performance Sport at Australian Catholic University.

**AUSTRALIAN FOOTBALL**



**Tim Rowland** MSc ASCA L2

Tim is the Head Strength and Conditioning Coach at Asquith Rugby League Football Club, and currently assists at the Australian Rugby Sevens. He has a Bachelor of Physiotherapy (1st Class Honours), Master of High Performance Sport and ASCA Level 2.

**NUTRITION**



**Toby Edwards** PhD Candidate

Toby is PhD candidate at the University of Notre Dame, Australia. His research focus is on quantifying training load and fatigue in collegiate American Football. Toby has bachelor in exercise and sport science with honours and is an ASCA accredited strength and conditioning coach.

**AMERICAN FOOTBALL**



**Liam Mason** BSc CSCS

Liam is currently the Senior Athletic Performance Coach at Blackburn Rovers Football Club for the U23's. He also has a bachelor's degree in sport and exercise science and is a NSCA certified strength and conditioning coach.

**FOOTBALL**



**James de Lacey** MSc

James is currently the Head Strength & Conditioning Coach with Austin Huns Rugby. He has previously worked in professional rugby in Romania and with the NZ Women's National Rugby League Team. He is a published author and has completed a MSc in Sport & Exercise Science from AUT, Auckland, NZ.

**RUGBY**