

Research Alerts

APRIL EDITION: ISSUE #7

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



RUGBY



FOOTBALL (SOCCER)



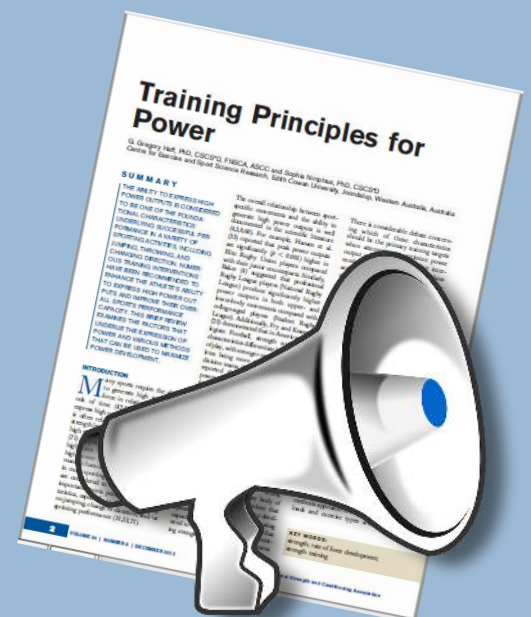
CRICKET



AMERICAN FOOTBALL



AUSTRALIAN RULES FOOTBALL



Foreword

An introductory word from the chief editor.

Issue #7 - April 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. May 2017 issue will be published on the 31st May 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

SCIENCE for
SPORT



Strength & Conditioning

This month's top research in strength & conditioning.

FEATURE

THE OPTIMAL LOAD FOR MAXIMAL POWER PRODUCTION DURING UPPER-BODY RESISTANCE EXERCISES: A META-ANALYSIS

Soriano MA, Suchomel, TJ, and Marin PJ. Sports Med (2017) 47:757–768.

2

VARIABLE RESISTANCE TRAINING PROMOTES GREATER STRENGTH AND POWER ADAPTATIONS THAN TRADITIONAL RESISTANCE TRAINING IN ELITE YOUTH RUGBY LEAGUE PLAYERS

Riviere, M, Louit, L, Strokosch, A, and Seitz, LB. J Strength Cond Res 31(4): 947–955, 2017.

3

EFFECTS OF DIFFERENT STRENGTH TRAINING FREQUENCIES DURING REDUCED TRAINING PERIOD ON STRENGTH AND MUSCLE CROSS-SECTIONAL AREA

Tavares LD, de Souza EO, Ugrinowitsch C, Laurentino GC, Roschel H, Aihara AY, Cardoso FN & Tricoli V (2017) European Journal of Sport Science.



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THE OPTIMAL LOAD FOR MAXIMAL POWER PRODUCTION DURING UPPER-BODY RESISTANCE EXERCISES: A META-ANALYSIS

OBJECTIVE: The aim of this study was to determine the optimal load, as a percentage of 1RM, for maximising power during the bench press and the bench press throw.

WHAT THEY DID:

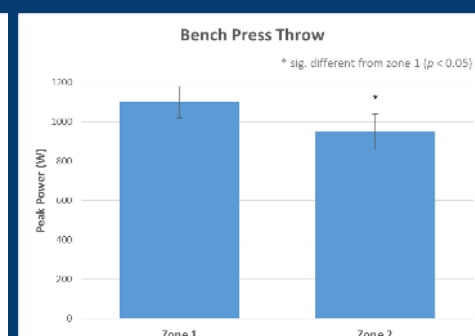
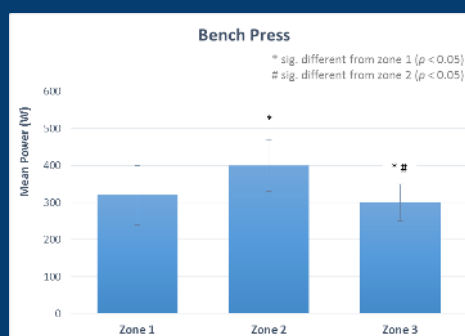
After searching through several databases, a total of 11 studies containing 434 subjects and 7680 effect sizes met the inclusion criterion and were included in the study. The loads used in each study were separated into three categories: Zone 1 (Light loads: 0-30% of 1RM), Zone 2 (Moderate loads: 30-70% of 1RM), and Zone 3 (Heavy loads: \geq 70% of 1RM).

MEASUREMENTS:

- Mean power output
- Peak power output

WHAT THEY FOUND:

- Light loads from 0-30% of 1RM appear to provide the optimal load range for mean and peak power production during the bench press throw.
- Moderate loads from 30-70% of 1RM appear to provide the optimal load range for mean and peak power production during the bench press exercise.
- Optimal load ranges for mean and peak power production are different for each exercise.



WHAT THIS MEANS:

This meta-analysis sums up the current body of evidence regarding which training loads are best for maximising power during the bench press and the bench press throw, and what they found is very clear.

It is useful for the strength and conditioning coach to understand which load range produces optimal power outputs, but the reasons the range differs from, for example, 30-70% of 1RM, is simply because some athletes are stronger than others, some are weaker, some have higher rates of force development (read about that [HERE](#)) amongst many other reasons.

This means that when analysing a group, there can be no specific % of 1RM which is best for maximising power—every athlete is different. However, if training for peak power, the coach can be certain that these ranges will produce the highest outputs.

LIMITATIONS:

A meta-analysis is only as good as the studies it contains, if the analysed studies are poor, the meta-analysis will also be poor. The study weaknesses are:

- Only 11 studies were included, not many for a meta-analysis.
- Of those studies, there was a lot of heterogeneity, meaning the studies were very different from one another.

FUTURE RESEARCH:

Future research should report the individual performances and not just the group averages. It should also replicate this meta-analysis, and the studies contained within it, for a variety of different exercises. This will give practitioners to more information regarding optimal ranges for a variety of exercises.

ARTICLE TITLE

VARIABLE RESISTANCE TRAINING PROMOTES GREATER STRENGTH AND POWER ADAPTATIONS THAN TRADITIONAL RESISTANCE TRAINING IN ELITE YOUTH RUGBY LEAGUE PLAYERS



OBJECTIVE:

The aim of this study was to examine the strength, velocity, and power adaptations using variable resistance training (VRT) with elastic bands or a traditional free-weight resistance training (TRAD) intervention on young rugby players.

WHAT THEY DID:

16 elite youth rugby league players (age: 17.8 ± 0.9 years; Relative bench press 1RM 1.2 ± 0.2 kg·kg⁻¹) were assigned to one of two interventions: VRT or TRAD. The elastic bands used in the VRT group represented 20% of the prescribed load. The participants completed 2 weekly upper- and lower-body strength and power sessions for 6-weeks. Bench press 1RM and bench press mean velocity and mean power at 35, 45, 65, 75, and 85% of 1RM were measured before and after the training intervention. The magnitude of the changes was determined using effect sizes (ESs).

WHAT THEY FOUND:

Despite not reaching any statistical significance, the researchers reported that both groups experienced large increases in absolute (ES = 0.46 vs. 0.20 [VRT vs. TRAD]) and relative (ES = 0.41 vs. 0.19 [VRT vs. TRAD]) bench press 1RM. Similar results were observed for mean velocity as well as both absolute and relative mean power at 35, 45, 65, 75, and 85% of 1RM.

It was also reported that both groups experienced large improvements in both velocity and power in the heavier loads, but small improvements in the lighter loads. Lastly, they also found that the improvements in heavy-load velocity and power were larger for the VRT group, and that smaller differences existed between the two groups in the lighter loads.

Reference:

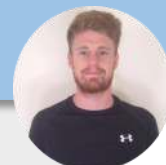
Riviere, M, Louit, L, Strokosch, A, and Seitz, LB. Variable resistance training promotes greater strength and power adaptations than traditional resistance training in elite youth rugby league players. *J Strength Cond Res* 31(4): 947–955, 2017.

[Link]

EDITORS COMMENTS:

"Firstly, it's important to highlight that this study found no statistical significance and the difference in effect sizes between the two groups was small (0.46 vs. 0.20 and 0.41 vs. 0.19). If the effect size difference was larger, perhaps by >0.5 , then we could assume there was a meaningful difference between these groups. But there wasn't, so arguably neither VRT or TRAD was more effective in this study. If you wish too, you can read an easy and very applicable explanation on this topic [HERE](#). Either way, the researchers are suggesting that VRT was more effective for improving strength and power compared to the TRAD programme.

Despite the issues with this study, to the best of our current knowledge, elastic-resistance training is an effective tool for improving strength and power, and these improvements are likely due to neural adaptations rather than structural (i.e. muscle growth). You can read our full article on elastic-resistance training [HERE](#)."



Owen Walker

Reference:

Tavares LD, de Souza EO, Ugrinowitsch C, Laurentino GC, Roschel H, Aihara AY, Cardoso FN & Tricoli V (2017): Effects of different strength training frequencies during reduced training period on strength and muscle cross-sectional area, *European Journal of Sport Science*. [Link]

ARTICLE TITLE

EFFECTS OF DIFFERENT STRENGTH TRAINING FREQUENCIES DURING REDUCED TRAINING PERIOD ON STRENGTH AND MUSCLE CROSS-SECTIONAL AREA



EDITORS COMMENTS:

"To conclude, this study found that both RST frequencies were able to maintain strength and muscle size just as well as each other. It also suggests that training volume-load (load * reps * sets) and intensity, not training frequency, are the important factors during periods of RST—at least in untrained populations.

These findings are in-line with previous research ([HERE](#), [HERE](#) and [HERE](#)) which collectively found in various populations that when training volume-load is reduced by 30-50%, and providing intensity is maintained, strength and muscle size can be preserved. This may be different for highly-trained athletes, but we will need to wait for that data."



Owen Walker

OBJECTIVE:

The purpose of this study was to examine the effects of different reduced strength training frequencies, including training cessation, on maximal strength and muscle size.

WHAT THEY DID:

33 untrained males (aged: 24.7 ± 3.9 years) took part in this 16-week study consisting of 8-weeks of strength training (ST) followed by 8-weeks of reduced strength training (RST). The ST programme consisted of three sessions per week, performing 3-4 sets of 6-12 RM in the half-squat and knee extension exercises. Maximal strength was measured using a half-squat 1RM, while muscle size was measured using quadriceps cross-sectional area (QCSA). After the ST programme, the participants were randomly allocated to one of three groups: reduced strength training with one (RST1) or two sessions per week (RST2), and ceased training (CT). The training frequency and the total training volume-loads in both the RST1 and RST2 groups were reduced (RST1 = 50.3% and RST2 = 57.1%), while the CT group stopped training completely. During the RST period, the training intensity remained the same, and the volume-loads of the RST1 and RST2 groups were equated.

WHAT THEY FOUND:

Maximal strength (Half-squat 1RM: RST1 = 27.9%; RST2 = 26.7%; and CT = 28.4%) and muscle size (QCSA: RST1 = 6.1%; RST2 = 6.9%; and CT = 5.8%) significantly increased ($p < 0.05$) in all groups after the 8-weeks of ST. However, whilst the RST1 and RST2 groups showed no significant decrease in maximal strength or muscle size after the RST period, the CT group demonstrated a significant ($p < 0.05$) decrease in maximal strength (22.6%) and muscle size (5.4%) - almost a complete reversal.



Technology & Monitoring

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

FEATURE

PREDICTING THE MAXIMUM DYNAMIC STRENGTH IN BENCH PRESS: THE HIGH PRECISION OF THE BAR VELOCITY APPROACH

Loturco, I, Kobal, R, Moraes, JE, Kitamura, K, Cal Abad, CC, Pereira, LA, and Nakamura, FY. *J Strength Cond Res* 31(4): 1127– 1131, 2017.

2

CONCURRENT VALIDITY OF WEARABLE ACTIVITY TRACKERS UNDER FREE-LIVING CONDITIONS

Brooke, SM, An, H-S, Kang, S-K, Noble, JM, Berg, KE, and Lee, J-M. *J Strength Cond Res* 31(4): 1097–1106, 2017.

3

THE RELIABILITY AND VALIDITY OF A FOUR-MINUTE RUNNING TIME-TRIAL IN ASSESSING VO₂MAX AND PERFORMANCE

McGawley K. (2017) *Front. Physiol.* 8:270.



PREDICTING THE MAXIMUM DYNAMIC STRENGTH IN BENCH PRESS: THE HIGH PRECISION OF THE BAR VELOCITY APPROACH

OBJECTIVE: The objective of this study was to determine the force-velocity relationship and test the possibility of determining the 1-repetition maximum (1RM) in “free weight” and Smith machine bench presses.

WHAT THEY DID:

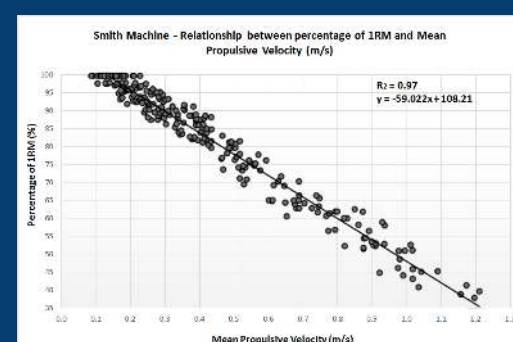
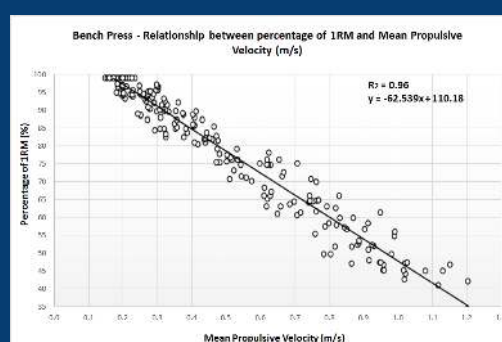
In a randomised order, 36 top-level male athletes from three different sports performed a standardised 1RM assessment either using a free-weight or a Smith machine bench press. The load-velocity profiling protocol was also collected during the 1RM assessment by measuring the mean propulsive velocity (MPV) during all lifts. A linear regression was performed to establish the relationships between bar velocities and 1RM percentages. The actual and predicted 1RM for each exercise were compared using a paired t-test.

MEASUREMENTS

- Percentage of 1RM
- Mean propulsive velocity (MPV)

WHAT THEY FOUND:

- The actual (1RM assessment) and predicted (velocity-based estimation) 1RMs were the same, with an overall accuracy of $\geq 95\%$.
- Participants' were able to produce 10% more force during the Smith machine compared to the bench press.



WHAT THIS MEANS:

The results from this study suggest that there is a near perfect relationship ($\geq 95\%$) between load and velocity during a free-weight and Smith machine bench press. Previous research ([HERE](#)) has also found a near perfect relationship between load and velocity during a 1RM half-squat.

The information provided by this study can help coaches determine their athletes 1RM without having to perform a time-consuming, physically and mentally demanding 1RM test. It can also help them accurately monitor their athletes physical ‘readiness/freshness’ on a daily basis.

LIMITATIONS:

- The heterogeneity of the participants; that being, a combination from several different sports. Although there was still a near perfect relationship, this relationship may have been even stronger if athletes from the same sport, and even the same position, were used.
- Use of a linear position transducer. In most applied settings, accelerometry-based devices are most commonly used, and both of which have different levels of accuracy which limits the transference of this data.

FUTURE RESEARCH:

Future studies should attempt to identify the load-velocity relationship in a variety of others strength-based exercises, such as: the deadlift, rows, overhead pressing and pull-ups. It should also try and determine the load-velocity relationships in power-based movements, such as: the clean, snatch, CMJ and squat jump.

ARTICLE TITLE

CONCURRENT VALIDITY OF WEARABLE ACTIVITY TRACKERS UNDER FREE-LIVING CONDITIONS



OBJECTIVE:

The aim of this investigation was to determine the concurrent validity of various popular wearable activity trackers by monitoring energy expenditure (EE) and sleep period time (SPT) under free-living conditions.

WHAT THEY DID:

95 healthy males (n = 34) and females (n = 61) monitored their sleep period time (SPT) and had their energy expenditure (EE) monitored using eight popular monitors: Nike+ FuelBand SE (NFB), Garmin VivoFit (VF), Misfit Shine (MF), Fitbit Flex (FF), Jawbone UP (JU), Polar Loop (PL), Fitbit Charge HR (FC), and the SenseWear Armband Mini (SWA). The SWA was used as the criterion measure for EE as it has been widely validated, whilst a sleep log was used for SPT.

WHAT THEY FOUND:

For EE, the mean absolute percent errors were 13.0, 15.2, 15.5, 16.1, 16.2, 22.8, and 24.5% for PL, MF, FF, NFB, FC, JU, and VF, respectively. For SPT, the mean absolute percent errors were 4.0, 8.8, 10.2, 11.5, 12.9, 13.6, 17.5, and 21.6% for VF, FF, JU, FC, MF, SWA laying down, PL, and SWA, respectively. The concurrent validity was analysed using equivalence testing on EE (equivalence zone: 2,889.7–3,531.9 kcal); two trackers underestimated EE: PL (2,714.4–3,164.8 kcal) and FC (2,473.8–3,066.5 kcal). For SPT (equivalence zone: 420.6–514.0 minutes), several monitors underestimated SPT: PL (448.3–485.6 minutes), MS (442.8–492.2 minutes), and FF (427.7–486.7 minutes).

The results suggest that the PL and FC provide a reasonable estimate of EE under free-living conditions. And for SPT, the PL, FC, and MF were the most valid monitors.

Reference:

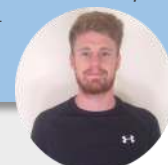
Brooke, SM, An, H-S, Kang, S-K, Noble, JM, Berg, KE, and Lee, J-M. Concurrent validity of wearable activity trackers under free-living conditions. *J Strength Cond Res* 31(4): 1097–1106, 2017. [\[Link\]](#)

EDITORS COMMENTS:

“Taken collectively, these results suggest that the Polar Loop (PL) and Fitbit Charge HR (FC) may be the best trackers for monitoring EE and SPT compared to the others tested in this study.

However, in a study published in December 2016 and reviewed in our December issue (#3: [HERE](#)), we reported how the PL was poor for measuring step count. On the other hand, a study published just this month ([HERE](#)) reported that the FC was one of the best for step counting. Based on these variables (EE, SPT and steps), the FC may be the best all-rounder.

At this point more research is needed, including a comprehensive review of the current monitors, but since activity trackers are quite literally shaping the world we live in, you can certainly expect this to happen soon-ish.”



Owen Walker

Reference:

McGawley K. (2017) The reliability and validity of a four-minute running time-trial in assessing VO₂max and performance. *Front. Physiol.* 8:270. [\[Link\]](#)

EDITORS COMMENTS:

“The information presented from this study suggests that a 4-minute running time trial on the likes of a Woodway treadmill can be used to predict Vo₂max with a relatively high degree of certainty.

For coaches working with running athletes, this is therefore an ecological test for predicting Vo₂max. Better still, the distance obtained during the RunTT is a more reliable measure of performance than time to exhaustion.

All in all, coaches can use this test to measure aerobic power (Vo₂max) and track performance using a simple performance metric (distance).”



Owen Walker

ARTICLE TITLE

THE RELIABILITY AND VALIDITY OF A FOUR-MINUTE RUNNING TIME-TRIAL IN ASSESSING VO₂MAX AND PERFORMANCE

OBJECTIVE:

The aim of this study was to examine the validity and reliability of a 4-min running time-trial (RunTT) for measuring maximal oxygen uptake (VO₂max) and performance.

WHAT THEY DID:

10 recreational runners (aged: 32 ± 7 years; body mass: 69 ± 10 kg) completed a traditional incremental step test (STEP) to volitional exhaustion with a verification phase (VER) and a self-paced RunTT. Both the STEP and RunTT were performed on a self-paced treadmill with a gradient of 1%. Each participant was required to perform each of these tests five times in a counterbalanced design in order to determine the repeatability of the test. Performance was measured as time to exhaustion for STEP and VER and distance covered for RunTT, while v_{o2}max was calculated as mL/kg/min.

WHAT THEY FOUND:

For VO₂max, the coefficient of variation was similar between STEP, VER and RunTT (1.9 ± 1.0, 2.2 ± 1.1 and 1.8 ± 0.8%, respectively). For performance (time and distance), the coefficient of variation differed between the three types of test (4.5 ± 1.9, 9.7 ± 3.5 and 1.8 ± 0.7% for STEP, VER and RunTT, respectively). In terms of statistical agreement, the results showed VO₂max to be 1.6 ± 3.6 mL/kg/min higher for STEP versus RunTT. Peak heart rate was also significantly higher during STEP compared with RunTT (p = 0.019). The RunTT also showed strong test reliability (ICC = 0.97).

To summarise, the RunTT may slightly underestimate VO₂max, but it does provide more reliable performance data (time and distance) in comparison to an incremental test to exhaustion.



Fatigue & Recovery

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

FEATURE

THE EFFECTS OF COLD WATER IMMERSION AND ACTIVE RECOVERY ON INFLAMMATION AND CELL STRESS RESPONSES IN HUMAN SKELETAL MUSCLE AFTER RESISTANCE EXERCISE

Peake JM, Roberts LA, Figueiredo VC, Egner I, Krog S, Aas SN, Suzuki K, Markworth JF, Coombes JS, Cameron-Smith D & Raastad T (2017). *J Physiol* 595, 695–711.

2

ACUTE EFFECTS OF LATERAL THIGH FOAM ROLLING ON ARTERIAL TISSUE PERFUSION DETERMINED BY SPECTRAL DOPPLER AND POWER DOPPLER ULTRASOUND

Hotfiel, T, Swoboda, B, Krinner, S, Grim, C, Engelhardt, M, Uder, M, and Heiss, R. *J Strength Cond Res* 31(4): 893–900, 2017.

3

ACUTE EFFECTS OF DEEP TISSUE FOAM ROLLING AND DYNAMIC STRETCHING ON MUSCULAR STRENGTH, POWER, AND FLEXIBILITY IN DIVISION I LINEMEN

Behara, B and Jacobson, BH. *J Strength Cond Res* 31(4): 888–892, 2017.



THE EFFECTS OF COLD WATER IMMERSION AND ACTIVE RECOVERY ON INFLAMMATION AND CELL STRESS RESPONSES IN HUMAN SKELETAL MUSCLE AFTER RESISTANCE EXERCISE

OBJECTIVE: The aim of this study was to compare the effects of post-exercise cold water immersion (CWI) versus active recovery (AR) on skeletal muscle inflammatory response and cellular stress.

WHAT THEY DID:

9 active males (aged: 22.1 ± 2.2 years) performed a series of lower-body resistance exercises to promote exercise-induced muscle damage on two different occasions separated by a minimum of 7-days. In a randomised and counterbalanced fashion, the participants either completed CWI or AR immediately after exercise. The CWI protocol consisted of 10-minutes of immersion at 10°C, whilst the AR protocol consisted of cycling at a low-intensity for 10-minutes. Muscle biopsies were collected from the exercised leg before, 2, 24 and 48 h after exercise in both trials.

MEASUREMENTS:

- Serum creatine kinase
- Plasma cytokine concentrations
- Modulation of various skeletal muscle markers related to cell damage and inflammation

WHAT THEY FOUND:

- The exercise protocol led to the infiltration of inflammatory cells, with increased mRNA expression of pro-inflammatory cytokines and neurotrophins, and the subcellular translocation of heat shock proteins in muscle.
- There was no significant difference in these responses between CWI and AR.

WHAT THIS MEANS:

These results suggest that CWI is no more effective than AR for minimizing the inflammatory and stress responses in muscle tissue after resistance exercise.

Unfortunately, as there was no control group, it is unclear if both CWI and AR were just as effective as each other at altering the inflammatory response and reducing cellular stress, or whether either of them had any effect whatsoever.

Regardless, this landmark study offers huge value to our understanding of CWI and AR and their effects, if any, on localised inflammation and cellular stress. All previous human research on this topic has only ever looked at indirect blood markers of muscle damage, such as creatine kinase.

LIMITATIONS:

Several primary limitations of this study are:

1. Small sample size ($n = 9$).
2. No inclusion of a control group.
3. Only “active” male participants. Considering the modality is arguably most important for elite/professional athletes, research should be conducted on them.
4. No report of individual responses, only grouped data was reported.

FUTURE RESEARCH:

Future research should look to replicate this research but also include: a control group, more participants, and report individual responses.

It would also be very useful to investigate whether CWI and AR have any affect on inflammatory response and cellular stress in elite/professional athletes.

ARTICLE TITLE

ACUTE EFFECTS OF LATERAL THIGH FOAM ROLLING ON ARTERIAL TISSUE PERFUSION DETERMINED BY SPECTRAL DOPPLER AND POWER DOPPLER ULTRASOUND



OBJECTIVE:

The purpose of this study was to examine the effect of foam rolling on arterial blood flow and tissue perfusion on the lateral aspect of the thigh.

WHAT THEY DID:

21 healthy males ($n = 12$) and females ($n = 9$) aged between 23-31 years performed foam rolling for 3 sets of 45-seconds on the lateral thigh in the sagittal plane. Each set was separated by 20 seconds of rest. Arterial tissue perfusion was determined by spectral Doppler and power Doppler ultrasound, represented as peak flow (Vmax), time average velocity maximum (TAMx), time average velocity mean (TAMn), and resistive index (RI), and with semi-quantitative grading that was assessed by 4 blindfolded investigators. Measurements were taken during resting conditions and twice after foam rolling (0 and 30-minutes).

WHAT THEY FOUND:

Arterial blood flow of the lateral thigh increased significantly after foam rolling compared with baseline ($p < 0.05$). Relative increases in Vmax at 0-minutes (74%) and 30-minutes (53%) were observed, as well as increases in TAMx at 0-minutes (53%) and 30-minutes (38%). Relative increases in TAMn were also observed at 0-minutes (85%) and 30-minutes (68%) were observed. At all portions of the lateral thigh, semi-quantitative power Doppler scores reported an increased average grading of 1.96 after foam rolling, and a 2.04 increase after 30-minutes compared with 0.75 at baseline.

Collectively, these results suggest that foam rolling can significantly increase blood flow to the lateral thigh for up to 30-minutes afterwards.

Reference:

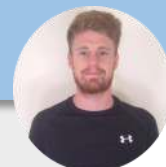
Hotfiel, T, Swoboda, B, Krinner, S, Grim, C, Engelhardt, M, Uder, M, and Heiss, R. Acute effects of lateral thigh foam rolling on arterial tissue perfusion determined by spectral Doppler and power Doppler ultrasound. *J Strength Cond Res* 31(4): 893–900, 2017. [\[Link\]](#)

EDITORS COMMENTS:

"It's finally nice to see a study look at the effects of foam rolling on localised blood flow. Better still, they even used Doppler ultrasound—currently considered the gold standard.

Combine these results with an older study which looked at systemic (whole body) blood flow alterations after foam rolling ([HERE](#)), and we may be developing a picture that this recovery/warm-up tool may be effective for increasing systemic and localised blood flow, including reducing arterial stiffness.

If this is the case, then great, but are the effects any larger than simply doing dynamic stretching? *We currently don't know.*"



Owen Walker

Reference:

Behara, B and Jacobson, BH. Acute effects of deep tissue foam rolling and dynamic stretching on muscular strength, power, and flexibility in Division I linemen. *J Strength Cond Res* 31(4): 888–892, 2017. [\[Link\]](#)

ARTICLE TITLE

ACUTE EFFECTS OF DEEP TISSUE FOAM ROLLING AND DYNAMIC STRETCHING ON MUSCULAR STRENGTH, POWER, AND FLEXIBILITY IN DIVISION I LINEMEN



OBJECTIVE:

The aim of this study was to compare the effects of foam rolling vs. dynamic stretching on power, strength, and flexibility.

WHAT THEY DID:

15 NCAA Division 1 American footballers (age: 20.04 ± 1.41) performed either a foam rolling (FR), dynamic stretching (DS), or no-intervention (CONT) in a randomised crossover order on separate testing days. Performance measures, consisting of vertical jump (VJ) power and velocity, knee isometric torque (KT), and hip range of motion (ROM) were recorded at baseline and after the interventions.

WHAT THEY FOUND:

For the strength and power measures (VJ peak and mean power, VJ peak and mean velocity, peak and mean KT), no significant differences were observed between any of the groups before or after the interventions. However, hip ROM was significantly ($p = 0.0001$) higher in both the FR and DS groups post-intervention.

As such, this study suggests that both FR and DS are effective modalities for improving acute flexibility, but not power or strength.

EDITORS COMMENTS:

"Keeping with the foam rolling theme, we thought we'd share this little gem with you as well. The findings here are in keeping with previous research which basically report that foam rolling is not effective for improving performance, but it can increase flexibility.

From the best current evidence available, it appears that foam rolling is useful for increasing flexibility and blood flow, and decreasing muscle soreness.

Would I keep it in my warm-up and recovery strategies? *Yes I would.*"



Owen Walker



Youths

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

FEATURE

SPECIALIZATION PATTERNS ACROSS VARIOUS YOUTH SPORTS AND RELATIONSHIP TO INJURY RISK

Pasulka J, Jayanthi N, McCann A, Dugas LR & LaBella C (2017): *The Physician and Sports Medicine*.

2

EFFECTS OF A SIX-WEEK HIP THRUST VS. FRONT SQUAT RESISTANCE TRAINING PROGRAM ON PERFORMANCE IN ADOLESCENT MALES: A RANDOMIZED CONTROLLED TRIAL

Contreras, B, Vigotsky, AD, Schoenfeld, BJ, Beardsley, C, McMaster, DT, Reyneke, JHT, and Cronin, JB. *J Strength Cond Res* 31(4): 999–1008, 2017.

3

VALIDITY OF DAILY AND WEEKLY SELF-REPORTED TRAINING LOAD MEASURES IN ADOLESCENT ATHLETES

Phibbs, PJ, Roe, G, Jones, B, Read, DB, Weakley, J, Darrall-Jones, J, and Till, K. *J Strength Cond Res* 31(4): 1121–1126, 2017.



SPECIALIZATION PATTERNS ACROSS VARIOUS YOUTH SPORTS AND RELATIONSHIP TO INJURY RISK

OBJECTIVE: The aim of this study was to identify relationships between single-sport specialization and injury risk, including how these injuries vary by sports type (i.e. team sports vs. individual sports).

WHAT THEY DID:

Using a clinical case-control study design, injured athletes, aged between 7-18 years, were compared with likewise uninjured athletes. The participants were required to complete a questionnaire consisting of their: age, gender, sport type (team vs. individual), specialization patterns, and information regarding any sports-related injuries in the past 6-months. Clinical diagnoses of their injuries were collected from their medical records and injuries were classified as acute, overuse, or serious overuse. Sports specialization was classified as playing a single-sport and participating in that sport for >8 months per year.

MEASUREMENTS:

- Personal information
- Specialization classification
- Injury history
- Injury classification

WHAT THEY FOUND:

- Of the 1,190 athletes included within the study, 26% (313) were specialized (i.e. single-sport athletes).
- Tennis (46.7%), gymnastics (30.1%), and dance (26.3%) had the highest-levels of sport specialization.
- Specialized athletes participating in individual sports reported specializing at a younger age (11.2 vs. 12.0), albeit not tremendously different, and reported higher training volumes (11.8 vs. 10.3 hrs/week) than those in team sports.
- Gymnastics (8.9 ± 1.7 years), dance (10.8 ± 3.0 years), and soccer (10.9 ± 2.4 years) all had the youngest specialization ages.
- Specialized athletes in individual sports had the highest proportion of overuse injuries (44.3% vs 32.2%) and serious overuse injuries (23.4% vs 11.6%).
- However, specialized athletes participating in individual sports also had the lowest proportion of acute injuries (28.8% vs 13.8%) compared to specialized team sport athletes.

WHAT THIS MEANS:

The findings from study suggest that athletes who participate in individual sports may be more likely to specialize in one sport compared to team sport athletes. It also suggests that specialized athletes who participate in individual sports are also more likely to have higher training volumes and experience more overuse injuries compared to specialized team sport athletes. On the other hand, specialized team sport athletes are more likely to sustain acute injuries.

Couple the findings from this study with the Feature Article from last month's Youth section of the Research Alerts, and it appears that not only does early sports specialization lead to an increased injury risk, but individual sports appear to have even higher rates than team sports. Perhaps young athletes should play a minimum of two sports, one being individual and the other team-based.

LIMITATIONS:

This study was not population-based (e.g. specifically assessing one sport), and therefore cannot accurately estimate population-based injury incidence.

Additionally, participants were sourced from sports medicine clinics, suggesting the possibility of a selection bias. For example, perhaps individual sport athletes are typically wealthier than team sport athletes and can therefore afford to visit a sports medicine clinic for injury diagnoses/treatment.

FUTURE RESEARCH:

Due to these weaknesses, future research could replicate the procedures of this study, but instead gather data directly from sports teams/clubs with integrated sports medicine practitioners to improve the accuracy of the data collection. It would also be interesting to track these relationship longitudinally and also see injury risk in amateur sports vs. elite sports where athletes also participate in routine strength and conditioning.

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ARTICLE TITLE

EFFECTS OF A SIX-WEEK HIP THRUST VS. FRONT SQUAT RESISTANCE TRAINING PROGRAM ON PERFORMANCE IN ADOLESCENT MALES



OBJECTIVE:

The aim of this study was to compare the effects of a 6-week front squat vs. hip thrust training programme on measures of strength, power and speed in adolescent male athletes.

WHAT THEY DID:

28 adolescent male rugby and rowing athletes aged between 14-17 years were assigned to either a front squat (FS) or hip thrust (HT) training programme in a single-centre, investigator-blinded, parallel-group, randomised controlled trial with equal randomisation (1:1). Each group trained twice per week for 6-weeks, equating to a total of 12 sessions. Vertical jump (VJ) height, horizontal jump (HJ) distance, 10- and 20m sprint times, isometric mid-thigh pull (IMTP) peak force, and both FS and HT 3-repetition maximum (3RM) tests were measured before and after the interventions.

WHAT THEY FOUND:

When compared to the HT group, the FS programme showed potentially beneficial effects in both the FS 3RM and VJ height. For HJ distance, neither programme appeared to have any clear benefit. When compared to the FS group, the HT programme showed potentially beneficial effects for both 10- and 20-m sprint times. The HT programme was likely superior for improving relative IMTP peak force, and very likely superior for improving HT 3RM and absolute IMTP peak force.

In summary, although the results from this research do not completely match the hypothesized findings, they do still support the force-vector theory.

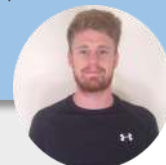
Reference:

Contreras, B, Vigotsky, AD, Schoenfeld, BJ, Beardsley, C, McMaster, DT, Reyneke, JHT, and Cronin, JB. Effects of a six-week hip thrust vs. front squat resistance training program on performance in adolescent males: A randomized controlled trial. *J Strength Cond Res* 31(4): 999– 1008, 2017 [\[Link\]](#)

EDITORS COMMENTS:

"As covered in our February issue (Issue #5) of the Research Alerts, horizontally-loaded vs. vertically-loaded movements are gaining a lot of attention in both research and applied settings. The current situation goes: horizontal force production is very important, but is often neglected in comparison to vertical force production. E.g. vertically-loaded movements include squats and Olympic lifts. This study is yet another to support the force-vector theory, which if you're unfamiliar with, you can read about [HERE](#).

A useful excerpt from this study which appears to be consistent with others, is that horizontally-loaded exercises, in this case the HT, are effective for improving sprint speed."



Owen Walker

Reference:

Pibbs, PJ, Roe, G, Jones, B, Read, DB, Weakley, J, Darrall-Jones, J, and Till, K. Validity of daily and weekly self-reported training load measures in adolescent athletes. *J Strength Cond Res* 31(4): 1121–1126, 2017. [\[Link\]](#)

EDITORS COMMENTS:

"Although this study may come across as a little complicated, it is actually very simple. The authors simply wanted to know if a post-training questionnaire—completed by the players using Google Forms—was reliable for measuring the session duration and intensity (i.e. TL). They also wanted to see which questionnaire, if any, was most accurate (the one completed within 24hrs, or the one completed at the end of the week). The results suggest the one completed within 24hrs is best.

This study demonstrates that coaches can obtain accurate TL data from their players by sending them a simple and free questionnaire to complete within 24hrs post-training."



Owen Walker

ARTICLE TITLE

VALIDITY OF DAILY AND WEEKLY SELF-REPORTED TRAINING LOAD MEASURES IN ADOLESCENT ATHLETES



OBJECTIVE:

The aim of this study was two-fold: 1) to assess the reliability of session rating of perceived exertion (sRPE) using a freely accessible, self-reported, Web-based, training-load (TL) questionnaire reported 24-hours after exercise (sRPE24); and 2) to assess the reliability of a weekly training diary collected using a similar Web-based questionnaire (sRPEweekly) and the summated sRPE24h collected daily over the same training week (PsRPE24h).

WHAT THEY DID:

36 adolescent male rugby players (aged: 16.7 ± 0.5 years) from a regional academy took part in this study. Measures of sRPE were collected 30-minutes after a typical field-based training session (sRPE30). After 24hrs, participants were then required to report the sRPE and training minutes of the previous session using an online questionnaire (using Google Forms). In addition to this, and on a subsequent week, the participants were required to complete the sRPE24 on a daily basis and also complete a sRPEweekly diary at the end of the week.

WHAT THEY FOUND:

The results showed that there was a near perfect correlation between sRPE30 and sRPE24 (0.99; TEE = 4.3%). There were also strong correlations between sRPE24 and sRPEweekly for sRPE (0.89), although the TEE was moderately large (28.5%).

Overall, the results from this study suggest that a sRPE24 questionnaire is a valid and reliable tool for quantifying TLs in adolescent athletes.

Nutrition

This month's top research on nutrition.

FEATURE

EFFECT OF PRE-EXERCISE CARBOHYDRATE DIETS WITH HIGH VS LOW GLYCEMIC INDEX ON EXERCISE PERFORMANCE: A META-ANALYSIS

Heung-Sang Wong S, Sun F and Chen Y et al. (2017)
Nutrition Reviews.

2

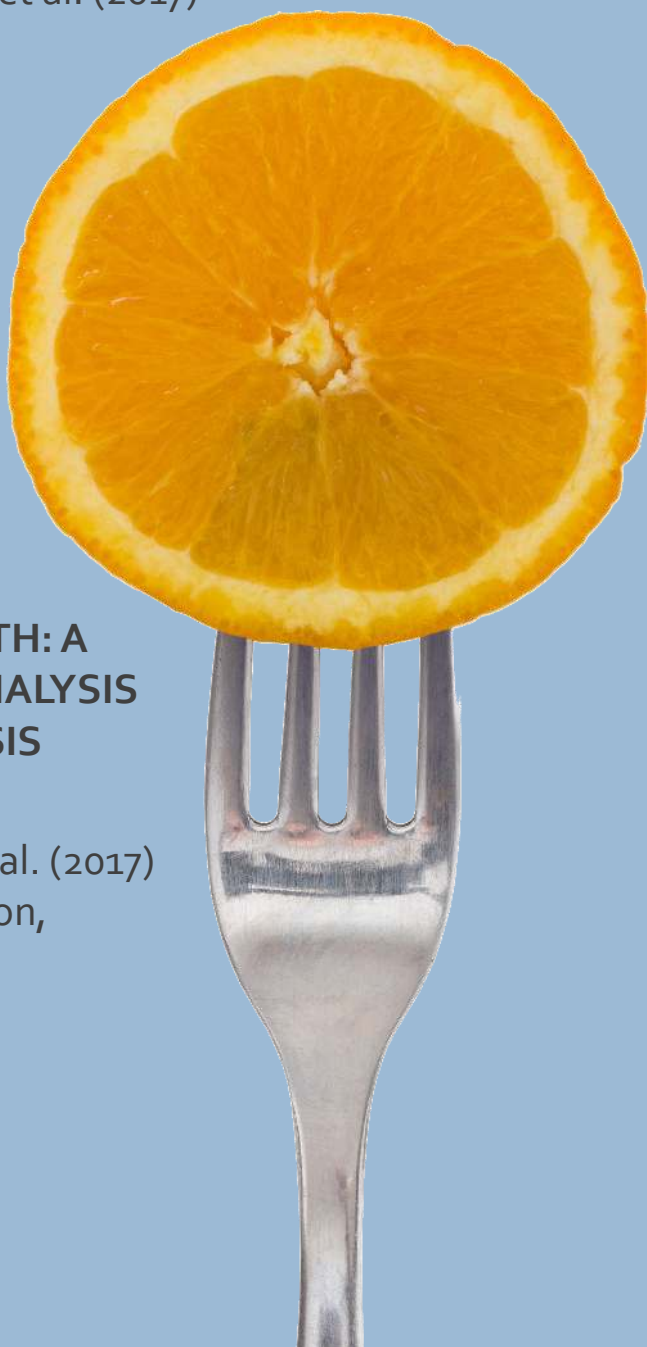
BEETROOT JUICE SUPPLEMENTATION IMPROVES HIGH-INTENSITY INTERMITTENT TYPE EXERCISE PERFORMANCE IN TRAINED SOCCER PLAYERS

Nyakayiru J, Jonvik K and Trommelen J et al. (2017) *Nutrients*, 9(3), 314.

3

DIETARY PROTEIN AND BONE HEALTH: A SYSTEMATIC REVIEW AND META-ANALYSIS FROM THE NATIONAL OSTEOPOROSIS FOUNDATION

Shams-White M, Chung M and Du M et al. (2017)
The American Journal of Clinical Nutrition,
ajcn145110.



EFFECT OF PRE-EXERCISE CARBOHYDRATE DIETS WITH HIGH VS LOW GLYCEMIC INDEX ON EXERCISE PERFORMANCE: A META-ANALYSIS

OBJECTIVE: To determine whether a pre-exercise low glycaemic-index (LGI) carbohydrate meal leads to superior endurance performance than a pre-exercise high glycaemic-index (HGI) carbohydrate meal.

WHAT THEY DID:

The authors conducted a meta-analysis of all studies looking at the effect of HGI meals consumed up to 4hr before exercise compared to LGI meals consumed up to 4hr before exercise on exercise performance in healthy adults. Importantly, energy and macronutrient contents had to be similar between the HGI and LGI meals in order to be included in the analysis. Furthermore, only randomised controlled trials and crossover trials were included in the analysis.

MEASUREMENTS:

- Exercise performance – measured through time trial, exercise to exhaustion or work output during fixed exercise time.

WHAT THEY FOUND:

According to analysis at the individual study level, only 1 of the included studies showed a statistically significant improvement in exercise performance after consumption of an LGI meal than after consumption of an HGI meal, whereas the remaining 14 studies reported no difference in exercise performance between the 2 groups.

However, the non-significant effect in individual studies could be partially attributed to low statistical power (included studies had small sample sizes ranging from 8-14). On the other hand, this meta-analysis with higher statistical power revealed that exercise performance following consumption of an LGI meal is superior to that following consumption of an HGI meal.

WHAT THIS MEANS:

This study helps clarify whether differences in the glycaemic index of meals consumed before exercise affect subsequent exercise performance. Although several narrative reviews have summarised information regarding previous research in this area, no consistent conclusion about the role of the glycaemic index of pre-exercise meals on subsequent exercise performance was reached.

Therefore, this study shows that compared with a HGI carbohydrate meal, an LGI carbohydrate meal with similar macronutrient content consumed before exercise appears to enhance subsequent exercise performance.

LIMITATIONS:

- Included studies were of low research quality.
- Other potential confounding factors, such as sex difference and training status of participants, may have affected the final results.
- Only articles published in English were included, and a few articles were excluded because of insufficient information for calculation of the effect size.

FUTURE RESEARCH:

As only 1 of the 15 studies included in the analysis was conducted with female-only participants, more research on females is warranted. Furthermore, due to a lack of high-quality studies, more high-quality research (for example studies which include reporting of randomisation methods and use of double blinding) is needed. Finally, the potential mechanisms of the beneficial effect after LGI meal consumption should be further explored.

ARTICLE TITLE

BETROOT JUICE SUPPLEMENTATION IMPROVES HIGH-INTENSITY INTERMITTENT TYPE EXERCISE PERFORMANCE IN TRAINED SOCCER PLAYERS



OBJECTIVE:

To investigate whether six days of nitrate-rich beetroot juice (BR) supplementation improves high-intensity intermittent running performance in trained soccer players.

WHAT THEY DID:

Thirty-two trained amateur male soccer players (age: 23 ± 1 years, playing experience: 15.2 ± 0.5 years) participated in this randomised, double-blind, placebo-controlled, cross-over study. All subjects participated in two test days in which high-intensity intermittent running performance was assessed using the Yo-Yo IR1 test. Subjects ingested nitrate-rich (140 mL; ~ 800 mg nitrate/day) or nitrate-depleted beetroot juice for six subsequent days, with at least eight days of wash-out between trials. Distance covered during the Yo-Yo IR1 was the primary outcome measure, while heart rate was measured continuously throughout the test.

WHAT THEY FOUND:

Six days of beetroot juice ingestion improved high-intensity intermittent type exercise performance in trained soccer players. Specifically, beetroot juice supplementation enhanced Yo-Yo IR1 test performance by $3.4 \pm 1.3\%$. Mean heart rate was also lower in the beetroot juice (172 ± 2) vs. placebo trial (175 ± 2).

Reference:

Nyakayiru J, Jonvik K and Trommelen J et al. (2017) Beetroot Juice Supplementation Improves High-Intensity Intermittent Type Exercise Performance in Trained Soccer Players. *Nutrients*, 9(3), 314. [\[Link\]](#)

EDITORS COMMENTS:

"Beetroot juice is a good source of nitrate. Previous studies have shown that nitrate can decrease the oxygen cost of exercise and improve endurance performance. Nitrate ingestion has also been shown to increase muscle blood flow and contractility in type II fibre's. Therefore, this study assessed whether nitrate ingestion might also be effective in high-intensity exercise where type II fibres are strongly recruited, and ultimately confirmed this hypothesis.

This study adds to the growing list of studies demonstrating the beneficial effects of beetroot juice supplementation on exercise performance. For events lasting over 3-4 min this supplement is worth trying out!"



Tim Rowland

Reference:

Shams-White M, Chung M and Du M et al. (2017) Dietary protein and bone health: a systematic review and meta-analysis from the National Osteoporosis Foundation. *The American Journal of Clinical Nutrition*, ajcn145110. [\[Link\]](#)

ARTICLE TITLE

DIETARY PROTEIN AND BONE HEALTH: A SYSTEMATIC REVIEW AND META-ANALYSIS FROM THE NATIONAL OSTEOPOROSIS FOUNDATION



OBJECTIVE:

To conduct a systematic review and meta-analysis evaluating the effects of dietary protein intake alone and with calcium, with or without vitamin D ($Ca \pm D$), on bone health measures in adults.

WHAT THEY DID:

The authors conducted searches across 5 databases for randomised controlled trials and prospective cohort studies published to October 2016 examining: 1) the effects of "high versus low" protein intake; or 2) dietary protein's synergistic effect with $Ca \pm D$ intake on bone health outcomes. Sixteen randomised controlled trials and 20 prospective cohort studies were included in the review.

WHAT THEY FOUND:

The major finding was that there is no evidence that higher protein intake has adverse effects on bone health. In fact, moderate evidence suggested that higher protein intake may have a protective effect on lumbar spine bone mineral density compared with lower protein intake, and there were positive trends on bone mineral density at most other bone sites too.

EDITORS COMMENTS:

"It is quite a widely-held belief that high protein intakes are detrimental to bone health. Proponents of this belief state that the acidity produced from high protein intakes leeches calcium from the bones and erodes them over time.

While this systematic review certainly suggests this to not be the case, high-quality, long-term studies are needed to confirm dietary protein's role in bone health."



Tim Rowland



Team Sports

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

FEATURE

RESISTANCE TRAINING PRIMING ACTIVITY IMPROVES UPPER-BODY POWER OUTPUT IN RUGBY PLAYERS: IMPLICATIONS FOR GAME DAY PERFORMANCE

Mason, B. R., Argus, C. K., Norcott, B., & Ball, N. B. (2017). *The Journal of Strength & Conditioning Research*, 31(4), 913-920.

2

EFFECTS OF LONG-HAUL TRAVEL ON PLAYER PREPAREDNESS: CASE STUDY OF A NATIONAL TEAM AT THE 2014 FIFA WORLD CUP

Fowler PM, McCall A, Jones M, Duffield R. *Journal of Science and Medicine in Sport*, 2017 (20) 322-327.

3

EFFECT OF BALL WEIGHT ON SPEED, ACCURACY, AND MECHANICS IN CRICKET FAST BOWLING

Wickington, K. L. & Linthorne, N. P. (2017). *Sports*, 5 (18).

4

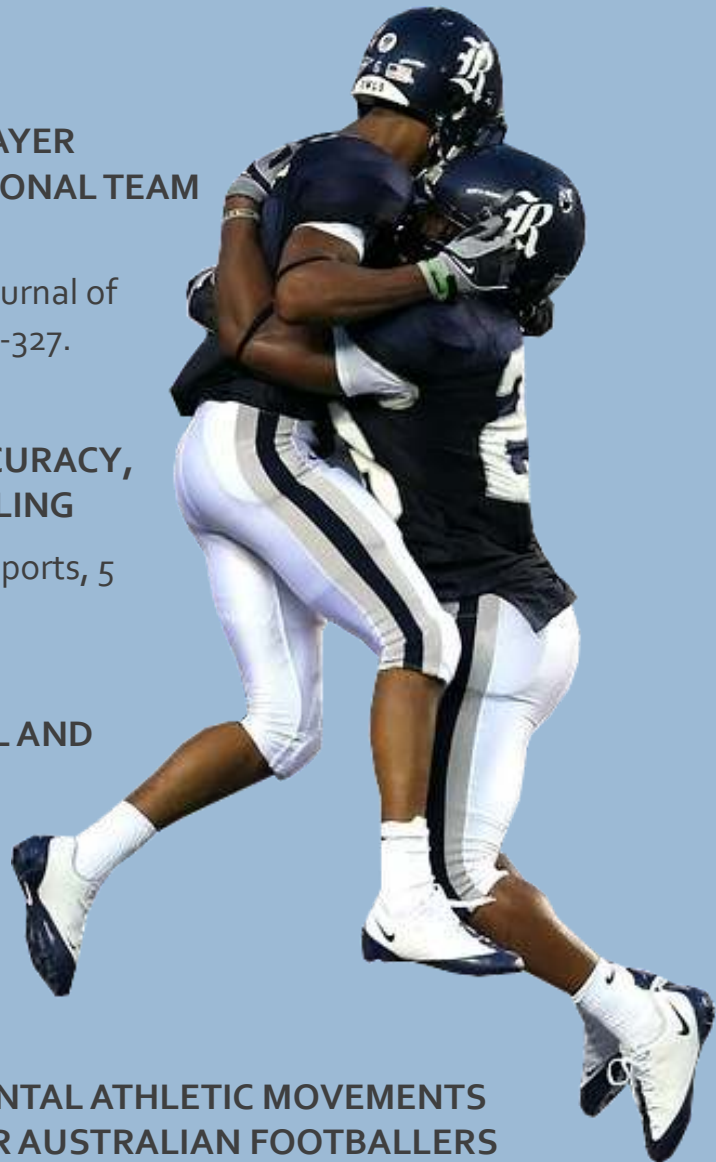
EPIDEMIOLOGICAL PATTERNS OF INITIAL AND SUBSEQUENT INJURIES IN COLLEGIATE FOOTBALL ATHLETES

Williams JZ, Singichetti B, Li H, Xiang H, Klingele KE, and Yang J. (2017) *The American Journal of Sports Medicine*.

5

THE ASSOCIATION BETWEEN FUNDAMENTAL ATHLETIC MOVEMENTS AND PHYSICAL FITNESS IN ELITE JUNIOR AUSTRALIAN FOOTBALLERS

Woods, C. T., McKeown, I., Keogh, J., & Robertson, S. (2017). *Journal of Sports Sciences*, 1-6.



RESISTANCE TRAINING PRIMING ACTIVITY IMPROVES UPPER-BODY POWER OUTPUT IN RUGBY PLAYERS: IMPLICATIONS FOR GAME DAY PERFORMANCE

OBJECTIVE: The goal of the study was to investigate the effectiveness of a resistance training “priming activity” on eliciting changes in lower- and upper-body power output and perceptual measures.



WHAT THEY DID:

In a counterbalanced order, thirteen state-level rugby players had their power output and perceptual measures taken before and 1h45 after completing a control or priming activity separated by 7 days. The priming activity consisted of a 30-minute training session in which 4 sets of 3 banded back squats and 4 sets of 3 banded bench presses were completed.

MEASUREMENTS:

Before and after both trials, athletes completed a readiness to perform 4-item questionnaire (mood, muscle soreness, fatigue, and aggression) to assess perceptual responses and 2 maximal-effort 20-kg countermovement jumps (CMJ) and 2 maximal-effort 20-kg bench throws (BPT) measuring peak force (N), power (W) and velocity (m.s⁻¹) with a linear-position transducer.

WHAT THEY FOUND:

- Significant changes in the mood item were observed only after the priming activity.
- BPT peak force and power increased significantly in the priming group, but not the control group.
- There was a small, but non-significant, decrease in CMJ peak power in the priming activity group when compared to the control group.
- No changes were observed for peak velocity or peak force during the CMJ for either groups.

WHAT THIS MEANS:

This study demonstrates that a priming activity 1 hour and 45 minutes before competition is shown to improve upper-body power output, but not lower-body power output. It also suggests that a pre-competition priming activity can increase mood and the readiness to perform, although this increase was not related to an increase in power output.

Take home message: although more research is needed, as always, priming activities may be a useful pre-competition tool.

LIMITATIONS:

The different force production levels between the lower body in comparison to upper body observed in this study, suggests that the lack of changes observed in lower body may be linked to the insufficient lower body stimulus from the priming activity (e.g. same bands were used for lower body and upper body, yet the lower body can produce way more force).

FUTURE RESEARCH:

Future research should explore different loads (e.g. thicker bands) for both exercises. In addition, the effect of a priming activity in other testing times (e.g. 30, 60, 90 minutes' post-intervention) should also be explored.

ARTICLE TITLE

EFFECTS OF LONG HAUL TRANSMERIDIAN TRAVEL ON PLAYER PREPAREDNESS: CASE STUDY OF A NATIONAL TEAM AT THE 2014 FIFA WORLD CUP



OBJECTIVE:

Provide insights on the effects of long-haul, transmeridian (east to west) air travel on the sleep patterns, jet-lag and wellness of international football players. Travel was in an eastward direction and expanded across 11 time-zones.

WHAT THEY DID:

Monitored 22 male international footballers across a number of subjective, self-reported assessments.

Week prior to travel: Training Load (AU; sRPE x Duration) and Wellness Questionnaire (Fatigue, Sleep, Muscle Soreness, Stress).

Day prior to travel: Jet Lag Questionnaire (Liverpool John Moore's University) and Sleep Questionnaire.

Day of arrival: Jet Lag Questionnaire (Liverpool John Moore's University) and Sleep Questionnaire.

Week prior to travel: Training Load (AU; sRPE x Duration), Wellness Questionnaire (Fatigue, Sleep, Muscle Soreness, Stress) and Jet Lag Questionnaire (Liverpool John Moore's University).

WHAT THEY FOUND:

Self-reported measures of jet lag severity were significantly greater on the 4 days following travel, when compared to pre-travel testing. Self-reported measures of wellness were significantly lower than pre-travel results during the week following travel. This is despite no significant changes in training load during the week prior and following travel. There was a large, negative correlation between player international experience (no. games) and self-reported 'function' on the day following travel (i.e. more experience = better function).

Reference:

Fowler PM, McCall A, Jones M, Duffield R. Effects of long-haul travel on player preparedness: Case study of a national team at the 2014 FIFA World Cup. *Journal of Science and Medicine in Sport*, 2017 (20) 322-327. [\[Link\]](#)

EDITORS COMMENTS:

"The research definitely has its limitations, which is acknowledged by the authors. However, the research does provide an informative insight into the extent of physical disturbances following long-haul travel.

Based on this research, a minimum of 4 days looks to be necessary for physical recovery following this type of travel. In this case, sleep patterns and mental/physical function seem to be significantly affected, particularly in less experienced athletes. The travel demands in football are specific to each club, country, and situation, it is therefore recommended that coaches monitor their own athletes thoroughly to assess recovery status following travel."



Greg King

Reference:

Wickington, K. L. & Linthorne, N. P. (2017). Effect of ball weight on speed, accuracy, and mechanics in cricket fast bowling. *Sports*, 5 (18). [\[Link\]](#)

EDITORS COMMENTS:

"The combination of a small increase in bowling speed within a limited number of participants combined with no significant changes to bowling accuracy or technique, suggests the use of varying ball weights to improve these measures may not be the most appropriate method for improving these factors which are so important to fast bowling performance.

Practitioners may simply be able to see improvements in speed, accuracy and technique with more traditional cricket training methods that are currently and regularly used (e.g. game-based scenarios and net-based training)."



Will Vickery

ARTICLE TITLE

EFFECT OF BALL WEIGHT ON SPEED, ACCURACY, AND MECHANICS IN CRICKET FAST BOWLING



OBJECTIVE:

The aim of this study was to firstly measure the effects of under- and over-weight cricket balls on the ball release speed, accuracy and bowling technique of fast-medium bowlers.

Following this, a training study was implemented to determine the effect of sustained training with these modified cricket balls on the same initial measures.

WHAT THEY DID:

Firstly, each bowler completed thirteen deliveries (first three with a standard weight ball, the following ten using a randomised selection of balls weighing 71-213 g) each time trying hit the top of off-stump. Following this, bowlers were split into two groups to complete an eight-week training programme where those in the 'intervention' group used a range of ball weights each session whereas the 'control' group only used a standard-weight ball. The ball speed, accuracy scores, and bowling technique of each bowler were measured the same way during all sessions.

WHAT THEY FOUND:

Results suggest that only the ball release speed was effected by changes in ball weight, with speed decreasing as weight increased. Both accuracy and bowling mechanics were not affected by the weight of the ball. Following the training programme, again only ball speed showed a minor increase, with no changes in accuracy or bowling technique detected in either the 'intervention' or 'control' groups.

ARTICLE TITLE

EPIDEMIOLOGICAL PATTERNS OF INITIAL AND SUBSEQUENT INJURIES IN COLLEGIATE FOOTBALL ATHLETES



OBJECTIVE:

The aim of this study was to determine and rates of initial and subsequent injury among collegiate Division 1 American football players.

WHAT THEY DID:

From 2007-2011, data regarding athlete exposure* (AE) and injuries from two Division 1 universities were analysed. Initial injury rates were calculated as the number of initial injuries divided by the total number of athlete exposure AEs. Subsequent injury rates were calculated as the number of subsequent injuries divided by the total number of AEs. The injury rate ratio (initial vs. subsequent) was determined using Poisson regression with adjustment for other covariates.

*One AE was defined as attending 1 coach-directed session (either game or practice).

WHAT THEY FOUND:

A total of 67,564 AEs were recorded, with an overall injury rate of 35.2 per 10,000 AEs. Initial and subsequent injury rates were 31.7 and 45.3 per 10,000 AEs, respectively. Rate of injury appeared to increase with each successive injury. Subsequent injury rate to the head, neck and face was 10.9 per 10,000 AEs, almost double the rate of initial injuries to the same body locations. 63% of which were concussions. Subsequent injury in wide receivers was 2.2 times higher than the rate on initial injury. Subsequent injury in defensive lineman was 2.1 times higher than the rate on initial injury.

The results show that subsequent injury rates are almost 1.5 times higher than those for initial injuries, with an alarming 2.1-2.2 times greater risk of subsequent injury to the head, neck and face for wide receivers and defensive linemen.

Reference:

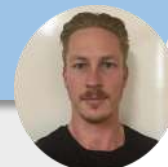
Williams JZ, Singichetti B, Li H, Xiang H, Klingele KE, and Yang J. (2017) Epidemiological Patterns of Initial and Subsequent Injuries in Collegiate Football Athletes. The American Journal of Sports Medicine. [\[Link\]](#)

EDITORS COMMENTS:

"The findings from this study are consistent with previous research which has reported that subsequent injury rates are higher than initial injury rates (i.e. athletes are more likely to get injured after they've been injured).

Understanding initial vs. subsequent injury rates is the first step towards reducing them. Although it is still unclear why re-injury rates are so high, experts have suggested that altered risk-taking behaviours, premature return-to-play, and altered joint biomechanics may heavily contribute to this issue. As such, research should now focus on why (i.e. the risk factors) subsequent injury rates are so high.

On an additional note, it is concerning that 63% of subsequent injuries to the head, neck and face were concussions."



Toby Edwards

Reference:

Woods, C. T., McKeown, I., Keogh, J., & Robertson, S. (2017). The association between fundamental athletic movements and physical fitness in elite junior Australian footballers. Journal of Sports Sciences, 1-6. [\[Link\]](#)

EDITORS COMMENTS:

"To my knowledge, this is one of the first studies to review the relationship between movement attributes and physical qualities in junior Aussie Rules players. While low to moderate relationships were observed, it can be difficult to interpret the 'true' relationship between these variables as several factors may have influenced the results (e.g. maturational status and gym training age).

Although more research is needed, this study suggests that training with a focus not only on physical capacity measures (e.g. aerobic power), but also on the development of movement qualities (e.g. squats and lunges), could potentially improve the performance of youth ARF players."



Dean Norris

ARTICLE TITLE

THE ASSOCIATION BETWEEN FUNDAMENTAL ATHLETIC MOVEMENTS AND PHYSICAL FITNESS IN ELITE JUNIOR AUSTRALIAN FOOTBALLERS



OBJECTIVE:

To investigate the associations between fundamental athletic movement qualities and physical fitness tests in junior Australian Rules football players. It was hypothesized that superior physical fitness would be associated with superior athletic movement skill.

WHAT THEY DID:

Forty-four under-18 players performed a range of athletic movement assessments including overhead squat (OHS), double lunge, single-leg Romanian deadlift and a push up test. Participants also performed five physical fitness test; 20m sprint, Multistage fitness test, Agility test, dynamic vertical jump (DVJ) on the left and right leg, and a squat vertical jump test (SVJ). Relationships between athletic movement tests and physical capacity tests were assessed via spearman correlation coefficients.

WHAT THEY FOUND:

Score on the overhead squat (OHS) showed a positive association with DVJ ability on both the left and right legs (L: 0.40 & R: 0.30, $p < 0.05$) and SVJ ability (0.32, $p < 0.05$). A negative association (performance increase) was observed with both the OHS and double lunge on the 20m sprint test (-0.35, $p < 0.05$ & -0.41, $p < 0.05$). Finally, a positive association was observed between the double lunge (left and right leg) movement test and the DVJ (0.42, $p < 0.05$), SVJ (0.44, $p < 0.01$), and the Multistage fitness test performance (0.37, $p < 0.01$).

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Editors

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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.

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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



Greg King MSc L2 ASCA

Greg is currently the High Performance Manager at Adelaide United Football Club (A-League). He has previously worked in the AFL with Port Adelaide Football Club as a strength and conditioning coach, and has completed a Master of Exercise Science (Strength and Conditioning) at Edith Cowan University and is also a qualified ASCA Level 2 Coach.

FOOTBALL



Francisco Tavares MSc CSCS PhD Candidate

Francisco is a PhD candidate at the Waikato University. He is also the Head of S&C at the Portuguese Rugby Union, a S&C Coach at the Chiefs Super Rugby in New Zealand and a guest lecturer for various universities in Portugal and Waikato University.

RUGBY



Will Vickery PhD BSc (Hons)

Will is a Lecturer of Sport Coaching at the University of Northumbria: Newcastle Upon Tyne. Prior to this he has worked with Cricket NSW and Cricket Australia in an array of roles ranging from a sport scientist, development coach and a strength and conditioning coach.

CRICKET



Dean Norris MSc PhD Candidate

Dean is currently working as the strength and power scientist at the GWS Giants. He has bachelor in Exercise and Sport Science and Masters in High Performance Sport. Dean is also completing his PhD assessing the influence of strength qualities on recovery of neuromuscular function.

AUSTRALIAN FOOTBALL



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