Research Alerts

DECEMBER EDITION: ISSUE #3

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

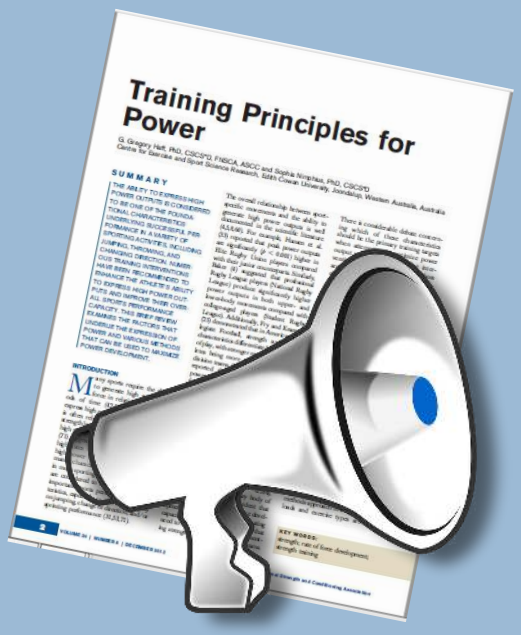
CRICKET

FOOTBALL (SOCCER)

RUGBY

AUSTRALIAN RULES FOOTBALL

AMERICAN FOOTBALL



SCIENCE for SPORT

Foreword

An introductory word from the chief editor.

Issue #3 - December 2016

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. January 2017 issue will be published on the 31st January 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

DIFFERENTIAL EFFECTS OF HEAVY VERSUS MODERATE LOADS ON MEASURES OF STRENGTH AND HYPERTROPHY IN RESISTANCE-TRAINED MEN

Schoenfeld BJ, Contreras B, Vigotsky AD, and Peterson M. Journal of Sports Science and Medicine (2016) 15, 715-722.

2

CHANGES IN JOINT RANGE OF MOTION AND MUSCLE–TENDON UNIT STIFFNESS AFTER VARYING AMOUNTS OF DYNAMIC STRETCHING

Takamasa Mizuno (2016): Journal of Sports Sciences.

3

ABDOMINAL CRUNCHES ARE/ARE NOT A SAFE AND EFFECTIVE EXERCISE

Schoenfeld BJ, and Kolber MJ. (2016). Strength and Conditioning Journal, 38 (6), pp 61–64.

SCIENCE for SPORT

DIFFERENTIAL EFFECTS OF HEAVY VERSUS MODERATE LOADS ON MEASURES OF STRENGTH AND HYPERTROPHY IN RESISTANCE-TRAINED MEN

OBJECTIVE: The aim of this study was to evaluate muscular adaptations between heavy- and moderate-load training in resistance-trained men whilst controlling all other resistance training (RT) variables (including nutrition).

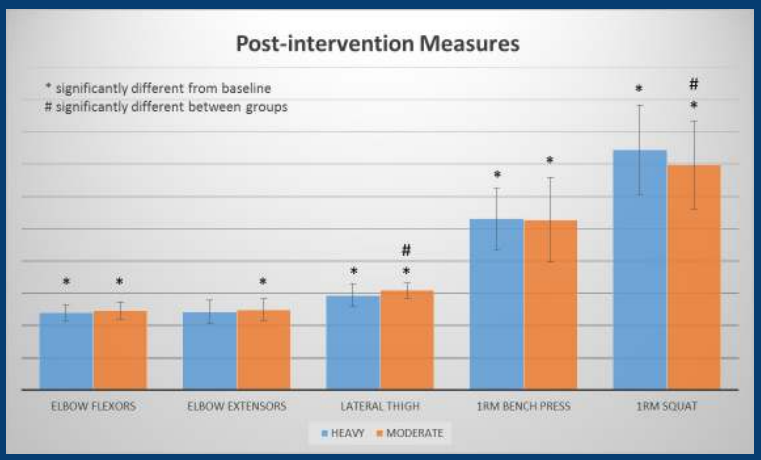
WHAT THEY DID:

19 resistance-trained male university students (age: 23.2 ± 4.2 years) were randomly allocated to either a strength-type RT routine (HEAVY) that trained in a loading range of 2-4 repetitions per set (n = 10), or a hypertrophy-type RT routine (MODERATE) that trained in a loading range of 8-12 repetitions per set (n = 9). Participants trained 3 days a week for 8 weeks, and both groups performed 3 sets of 7 exercises for the major muscle groups of the upper and lower body.

MEASUREMENTS:

- 1RM Bench Press
- 1RM Back Squat
- Upper body muscular endurance using Bench Press @ 50% 1RM until failure.
- Muscle thickness: elbow flexors, elbow extensors and lateral thigh

WHAT THEY FOUND:



- All measures, apart from HEAVY elbow extensors, significantly increased from baselines measures.
- Statistically greater increase in 1RM Squat (i.e. strength) for the HEAVY group.
- Statistically greater increase in lateral thigh girth (i.e. hypertrophy) for the MODERATE group.

WHAT THIS MEANS:

This study showed that training with heavy vs. moderate loads elicits differential effects on muscular strength and hypertrophy. Although the results from this study are to be somewhat expected, perhaps the most important consideration to take from this study — when it's coupled with previous research — is that strength is perhaps best increased using heavy loads and low rep ranges, whilst hypertrophy appears to be volume-load dependent and may have little relationship with the traditional 8-12 rep range model. It may therefore be suggested, or at least just highlighted, that heavy loads may be best for strength gains, whilst high volume-loads are best for hypertrophy, regardless of the classical 8-12 rep range model.

LIMITATIONS:

An interesting limitation of this study was the potential impact of changing programmes. The authors noted that 16/19 participants regularly perform exercises using ≥8RM, whilst only 1/19 reported to frequently use ≤5RM. Thus, the HEAVY group may have simply benefitted more from the fresh training stimuli.

FUTURE RESEARCH:

Future research should begin to investigate muscular adaptations in low- versus moderate-load resistance training across various populations (e.g. elite athletes and youths etc).

Schoenfeld BJ, Contreras B, Vigotsky AD, and Peterson M. Differential Effects of Heavy versus Moderate Loads on Measures of Strength and Hypertrophy in Resistance-Trained Men. Journal of Sports Science and Medicine (2016) 15, 715-722. [Link]

SCIENCE for SPORT

ARTICLE TITLE

CHANGES IN JOINT RANGE OF MOTION AND MUSCLE–TENDON UNIT STIFFNESS AFTER VARYING AMOUNTS OF DYNAMIC STRETCHING

Reference:

Takamasa Mizuno (2016): Changes in joint range of motion and muscle–tendon unit stiffness after varying amounts of dynamic stretching, Journal of Sports Sciences. [Link]

OBJECTIVE:

The aim of this study was to determine the effects of varying repetitions of dynamic stretching (DS) on joint range of motion (ROM) and stiffness of the muscle–tendon unit (MTU).

WHAT THEY DID:

Fifteen healthy participants (eight males and seven females) volunteered for the study (age: 23 ± 2 years). Participants completed four randomly ordered experimental trials, which involved one (DS1), four (DS4) and seven (DS7) sets of DS, or a control (CON) condition (seated at rest). Each DS set consisted of 15 repetitions of an ankle dorsiflexion–plantarflexion movement. The displacement of the muscle–tendon junction (MTJ) was measured using ultrasonography while the ankle was passively dorsiflexed at 0.0174 rad · s^{-1} to its maximal dorsiflexion angle. Passive torque was also measured using an isokinetic dynamometer.

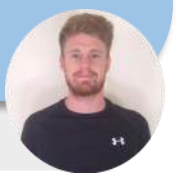
WHAT THEY FOUND:

Ankle ROM was significantly increased after DS4 and DS7 compared with the pre-intervention values ($p < 0.05$), but this plateaued and there were no significant differences in ankle ROM between DS4 and DS7. No other measures reported statistical significance. These results indicate that DS4 increased ankle ROM without changing the mechanical properties of the MTU, and that this increase in ankle ROM plateaued after DS4.

EDITORS COMMENTS:

"Moral of the story, 4 sets of 15 repetitions of DS at the ankle may be optimal for maximising ROM.

This study also demonstrated that DS may not effect 'mechanical' ROM factors (i.e. decrease MTU stiffness), but instead may impact 'neural' processes (i.e. stretch tolerance or pain tolerance threshold); though this was unfortunately not measured in this study. What's interesting though, is static stretching (SS) does appear to change both mechanical and neural process related to ROM. As decreased MTU stiffness is related to a force-deficit, perhaps this explains why DS does not cause a force-deficit but SS does."



Owen Walker

ARTICLE TITLE

ABDOMINAL CRUNCHES ARE/ARE NOT A SAFE AND EFFECTIVE EXERCISE

Reference:

Schoenfeld BJ, and Kolber MJ. (2016). Abdominal Crunches Are/Are Not a Safe and Effective Exercise. Strength and Conditioning Journal, 38(6), pp 61–64. [Link]

OBJECTIVE:

The purpose of this point/counterpoint article was to provide a balanced discussion on the safety and effectiveness of the controversial abdominal crunch exercise.

WHAT THEY DID:

Dr. Schoenfeld (point) and Dr. Kolber (counterpoint) both provided their respected and well-supported discussion on the safety and effectiveness of the abdominal crunch.

WHAT THEY CONCLUDED:

Unlike empirical research, there is no specific outcome with a discussion article like this one, but the following points appear very clear.

The classic *ex vivo* research conducted on the relationship between spinal flexion and disc damage are likely to lack generalisability to *vivo* settings. There is also argument to suggest that crunches may produce an adaptive, and thus positive, effect in *vivo* settings as opposed to *ex vivo* ones.

As many sports involve flexion-based movements, crunches may offer an effective stimulus for functional performance, which other exercises (e.g. isometrics) may not produce. However, firm attention is drawn to the importance of a well-balanced flexor-extensor ratio, as imbalances between these two is a significant risk factor for lower back pain.

Perhaps the strongest point spotlighted by both authors, is the risk factor and concern for individuals with pre-existing low back pain, particularly disc pathologies, to perform crunches. Both authors repeatedly discuss their concern with these individuals performing this exercise due to the risk of aggravation and its potential to encourage further tissue damage.

EDITORS COMMENTS:

"Overall this article provides a very nice and well-balanced view on this controversial topic.

I think the main take home points from this piece are that abdominal crunches can be a safe and potentially effective exercise for improving athletic performance, but context is key! For example, if you have an individual with low back pain, disc pathology or flexor-extensor imbalances, then this may not be the best exercise to use. Basically, it is vital that you extensively, and critically, assess the necessity to do so before prescribing the exercise."

Owen Walker

Technology & Monitoring

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

FEATURE

VALIDITY AND INTRA-RATER RELIABILITY OF MYJUMP APP ON IPHONE 6S IN JUMP PERFORMANCE

Stanton R, Wintour SA, Kean CO. (2016) Journal of Science and Medicine in Sport.

2

HOW VALID ARE WEARABLE PHYSICAL ACTIVITY TRACKERS FOR MEASURING STEPS?

Hyun-Sung An, Gregory C. Jones, Seoung-Ki Kang, Gregory J. Welk & Jung-Min Lee (2016): European Journal of Sport Science.

3

THE ACUTE:CHONIC WORKLOAD RATIO IN RELATION TO INJURY RISK IN PROFESSIONAL SOCCER

Malone S, Owen A, Mendes B, Collins KD, and Gabbett TJ. J Sci Med Sport (2016).

SCIENCE for SPORT

VALIDITY AND INTRA-RATER RELIABILITY OF MYJUMP APP ON IPHONE 6S IN JUMP PERFORMANCE

OBJECTIVE: The aim of this study was to test the concurrent validity and inter-rater reliability of the *MyJump* App on the iPhone 6s.

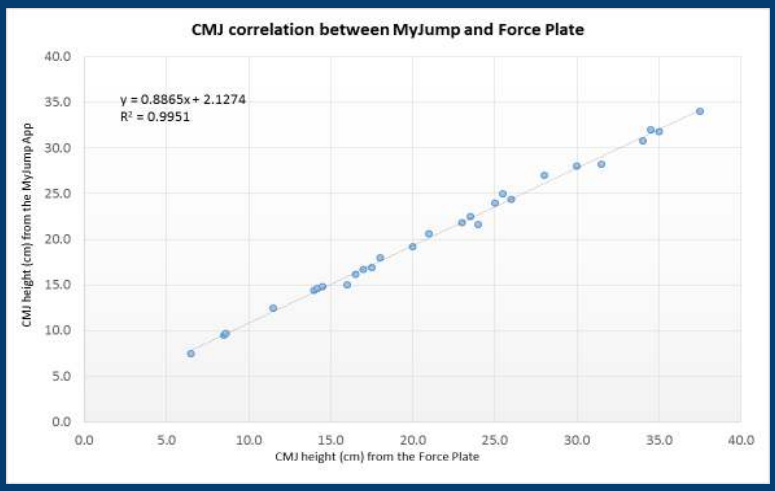
WHAT THEY DID:

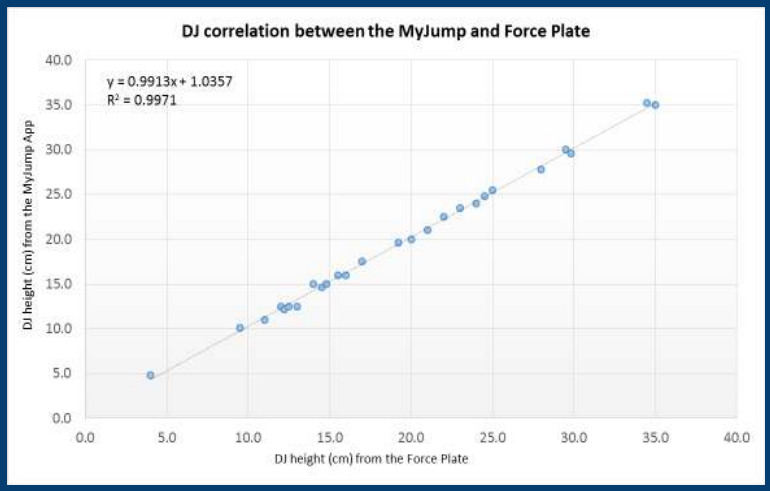
29 recreationally active adults participated in this study. Participants were required to perform countermovement jumps (CMJ) and drop jumps (DJ) from a 30-cm box onto a force plate. The iPhone was fixed on the same level as the force plate and was situated recording in the sagittal plane using a Bluetooth remote control. To assess concurrent validity, jump height, derived from flight time acquired from each device, was compared for each jump type. Intra-rater reliability was determined by replicating data analysis of *MyJump* recordings on two occasions separated by seven days.

MEASUREMENTS

- Flight time
- Jump height

WHAT THEY FOUND:





WHAT THIS MEANS:

The graphs above show strong ($r > 0.99$), statistically significant ($p < 0.001$) correlations between the *MyJump* App and the force plates measures of CMJ and DJ. Also, intra-rater reliability – which is simply the consistency of a test administrator to get the same results – of *MyJump* for both the CMJ and DJ was almost perfect (CMJ ICC = 0.997; DJ ICC = 0.998). This means experienced test administrators can repeat testing on separate occasions with both consistency and confidence.

In conclusion, the *MyJump* App is a valid and reliable tool for assessing VJ and DJ jump height in recreationally active participants and can be used as an alternative to laboratory testing with the likes of a force plate or a jump mat.

LIMITATIONS:

A key limitation to this study was the absence of using an 'inexperienced' test administrator in addition to an 'experience' one. As many coaches/practitioners will be new to this technology, there is likely to be very few individuals who are 'experienced' in this form of testing. Therefore, coaches will be uncertain of their ability to get accurate results until they have gained enough experience with the app.

FUTURE RESEARCH:

Future research should attempt to compare the experience level of test administrators and how that impacts the reliability of the data. From this, research may also be able to highlight a practice-competency relationship between data reliability and the amount of practice the test administrator has.

Stanton R, Wintour SA, Kean CO. (2016). Validity and intra-rater reliability of MyJump app on iPhone 6s in jump performance. Journal of Science and Medicine in Sport. [Link]

SCIENCE for SPORT

ARTICLE TITLE

HOW VALID ARE WEARABLE PHYSICAL ACTIVITY TRACKERS FOR MEASURING STEPS?

Reference:

Hyun-Sung An, Gregory C. Jones, Seoung-Ki Kang, Gregory J. Welk & Jung-Min Lee (2016): How valid are wearable physical activity trackers for measuring steps? European Journal of Sport Science. [Link]

OBJECTIVE:

This study had two objectives. 1) Evaluate the criterion-concurrent mixed validity of 10 commercially available wearable activity trackers; and 2) Compare the performances of these 10 activity trackers using three different conditions.

WHAT THEY DID:

35 healthy participants completed three separate conditions whilst wearing the activity trackers (walking/running on a treadmill [TR], over-ground walking/running on an indoor athletics track [OG] and 24-hour free-living [FL]). Participants wore all 10 activity trackers during the TR and OG protocols, but only wore 3 activity trackers during the FR condition. TR and OG steps were counted using a hand-tally counter, whilst a pedometer was used to count steps during the FL condition.

WHAT THEY FOUND:

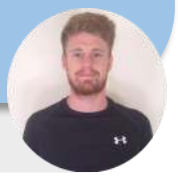
Mean error values (across trackers) were 8.23%, 9.92%, and 18.36% for the TR, OG, and FR condition, respectively. There was considerable variability among the various monitors (ranging from 0.6% to 23.3%) compared to the two criterion measures (hand tally and the pedometer). Overall, the results suggest that the Fitbit Zip and Withings Pulse are the most accurate measures of step count under all three different conditions (TR, OG and FR), and they also suggest that there is large variability in accuracy across the various trackers – some being far better than others.

EDITORS COMMENTS:

"With these activity trackers booming in the market, it's important we answer some fundamental questions—this being one of them.

When it comes to measuring steps, the *Fitbit Zip*, *Withing Pulse* and *Jawbone UP* appear to be the best, respectively. Contrastingly, the *Nike FuelBand*, *Polar Loop* and *Misfit Shine* appear to be the worst, respectively.

Importantly though, this study did not measure the accuracy of these trackers during high-speed running, sprinting or any form of multidirectional movements."



Owen Walker

ARTICLE TITLE

THE ACUTE:CHONIC WORKLOAD RATIO IN RELATION TO INJURY RISK IN PROFESSIONAL SOCCER

Reference:

Malone S, Owen A, Mendes B, Collins KD, and Gabbett TJ. The acute:chonic workload ratio in relation to injury risk in professional soccer. J Sci Med Sport (2016). [Link]

OBJECTIVE:

The aim of the present study was to investigate the relationship between workload measures and injury risk in elite soccer players.

WHAT THEY DID:

48 professional soccer players (age: 25.3 ± 3.1 years) from two top European teams were monitored over one season. Players performed an intermittent aerobic test (Yo-Yo IR1) to assess the relationship between aerobic capacity and injury risk. Weekly workload measures (sRPE * minutes) and time-loss injuries were also recorded during the season.

WHAT THEY FOUND:

Amongst some other very insightful findings, the results from this study suggest that an acute:chronic workload ratio of between 1.00 and 1.25 is protective for professional soccer players. It also reported that athletes with a higher intermittent-aerobic capacity are less likely to sustain an injury when they are exposed to sudden, and large, changes in workload.

EDITORS COMMENTS:

"Although very similar data has been produced for other team sports (Rugby and AFL), this is the first time normative data like this has been presented for Football.

In addition to the importance of a large aerobic capacity, this study also noted significant pre-season injury risk due to the sudden 'spike' in workload following the off-season. Coaches should therefore strategically plan moderate incremental increases in workload during the pre-season."

Owen Walker

Fatigue & Recovery

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

FEATURE

IS THERE EVIDENCE THAT RUNNERS CAN BENEFIT FROM WEARING COMPRESSION CLOTHING?

Engel FA, Holmberg HC, Sperlich B. Sports Med. 2016 Dec;46(12):1939-1952.

2

HEART RATE VARIABILITY AND PSYCHOMETRIC RESPONSES TO OVERLOAD AND TAPERING IN COLLEGIATE SPRINT-SWIMMERS

Flatt AA, Hornikel B, Esco MR. J Sci Med Sport. 2016.

3

PHOTOBIOMODULATION THERAPY IMPROVES PERFORMANCE AND ACCELERATES RECOVERY OF HIGH-LEVEL RUGBY PLAYERS IN FIELD TEST

Pinto, HD, Vanin, AA, Miranda, EF, Tomazoni, SS, Johnson, DS, Albuquerque-Pontes, GM, de Oliveira Aleixo Junior, I, Grandinetti, VdS, Casalechi, HL, de Tarso Camillo de Carvalho, P, and Pinto Leal Junior. J Strength Cond Res 30(12): 3329–3338, 2016.

SCIENCE for SPORT

IS THERE EVIDENCE THAT RUNNERS CAN BENEFIT FROM WEARING COMPRESSION CLOTHING?

OBJECTIVE: In the form of a systematic review, the aim of this study was to assess the effects of compression clothing (socks, calf sleeves, shorts, and tights) on running performance and recovery.

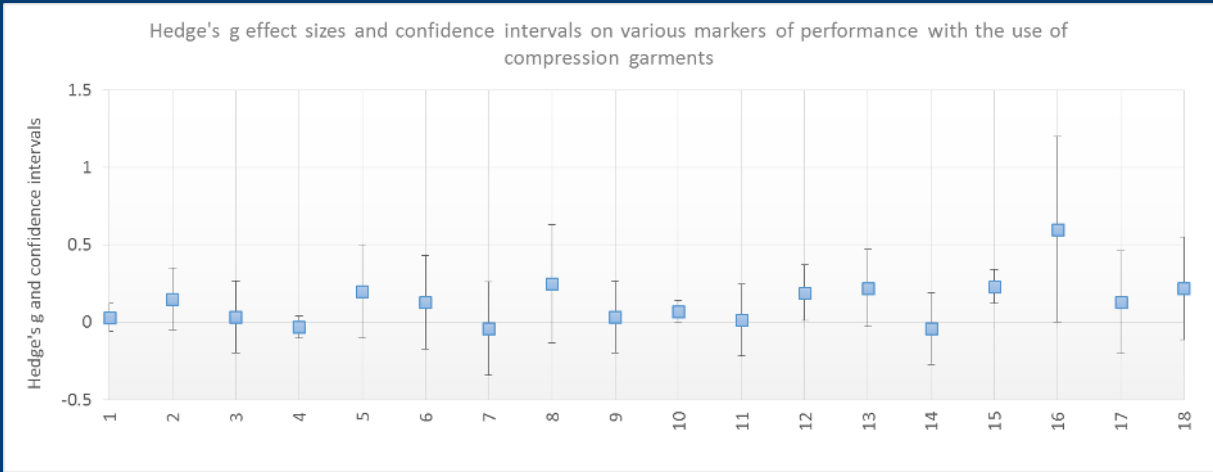
WHAT THEY DID:

After conducting a search of the electronic databases PubMed, MEDLINE, SPORTDiscus, and the Web of Science, each study was then graded using the PEDro Scale. 32 studies published between 1987 and 2015 which investigated physiological, psychological and/or biomechanical parameters during or after running were included in this review. Hedges' g effect sizes and associated confidence intervals were computed.

MEASUREMENTS:

- (1) Running performance
- (2) Time to exhaustion
- (3) Peak oxygen uptake
- (4) Submax. Oxygen uptake
- (5) Running economy
- (6) Biomechanical variables
- (7) Blood lactate concentration
- (8) Blood lactate clearance
- (9) Blood gases
- (10) Cardiac parameters
- (11) Single and repeated jumps
- (12) Strength
- (13) Body temperature
- (14) Perceived temperature
- (15) RPE
- (16) DOMS
- (17) Post-exercise creatine kinase levels
- (18) Post-exercise levels of inflammatory markers

WHAT THEY FOUND:



WHAT THIS MEANS:

The findings from this review on running athletes, suggest that compression garments may slightly improve performance markers related to endurance performance (i.e. time to exhaustion), due to improvements in running economy, biomechanical variables, perceived exertion and muscle temperature. It also reports that they may benefit from reduced muscle pain, damage and inflammation—though these positive effects may be small to minimal.

LIMITATIONS:

It's vital to acknowledge the confidence intervals of these findings and not just the effect sizes. Also, in some performances measures (e.g. biomechanical variables, blood lactate clearance, body temperature and perceived temperature) only two studies were analysed. This lack of research, plus the large confidence intervals means caution should be taken when interpreting these results.

FUTURE RESEARCH:

Future research should focus its attention on the effects of various compression gradients, as well as some of the less studied performance variables (e.g. biomechanical variables, blood lactate clearance, body temperature and perceived temperature).

Engel FA, Holmberg HC, Sperlich B. Is There Evidence that Runners can Benefit from Wearing Compression Clothing? Sports Med. 2016 Dec;46(12):1939-1952. [Link]

SCIENCE for SPORT

ARTICLE TITLE

HEART RATE VARIABILITY AND PSYCHOMETRIC RESPONSES TO OVERLOAD AND TAPERING IN COLLEGIATE SPRINT-SWIMMERS

Reference:

Flatt AA, Hornikel B, Esco MR. Heart rate variability and psychometric responses to overload and tapering in collegiate sprint-swimmers. J Sci Med Sport. 2016. [Link]

OBJECTIVE:

The purpose of this study was: (1) to determine how periods of overload and tapering effect heart rate variability (lnRMSSD) trends preceding competition; and (2) to assess the relationship between average heart rate variability (lnRMSSDmean) and fluctuations in heart rate variability (lnRMSSDcv [coefficient of variation]) at each training phase in collegiate sprint-swimmers.

WHAT THEY DID:

10 Division-1 collegiate sprint-swimmers participated in this 6-week study consisting of: week 1 – baseline recordings, weeks 2-3 – overload training, and weeks 5-6 – tapering period. Participants were required to self-complete heart rate variability recordings and a brief wellness questionnaire with a smartphone application every day after waking.

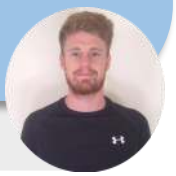
WHAT THEY FOUND:

The results of this study showed that OL training is associated with a reduction and greater daily fluctuation in heart rate variability. Additionally, these reductions and fluctuation increases were matched with concurrent decrements in perceived fatigue and muscle soreness. The results also showed that these effects were reversed during the TP period when these values returned to baseline and even peaked.

EDITORS COMMENTS:

"If you're interested in heart rate variability, then the lead author of this paper (Andrew Flatt) is simply 1-step ahead in this domain, and he's done a fantastic job with this study.

Whilst many people have been tracking lnRMSSDmean, he believed lnRMSSDcv could offer great value as it could detect meaningful daily fluctuations in vagal activity, and he's proven its usefulness in this study. The good news is, this is simple to implement if you've already been collecting lnRMSSDmean data."



Owen Walker

ARTICLE TITLE

PHOTOBIOMODULATION THERAPY IMPROVES PERFORMANCE AND ACCELERATES RECOVERY OF HIGH-LEVEL RUGBY PLAYERS IN FIELD TEST

Reference:

Pinto, HD, Vanin, AA, Miranda, EF, Tomazoni, SS, Johnson, DS, Albuquerque-Pontes, GM, de Oliveira Aleixo Junior, I, Grandinetti, VdS, Casalechi, HL, de Tarso Camillo de Carvalho, P, and Pinto Leal Junior. Photobiomodulation therapy improves performance and accelerates recovery of high-level rugby players in field test: A randomized, crossover, double-blind, placebo-controlled clinical study. J Strength Cond Res 30(12): 3329–3338, 2016.[Link]

OBJECTIVE:

The aim of this study was to assess the effects of photobiomodulation therapy (PBMT), using various wavelengths and light sources, on the performance and recovery of elite Rugby players during an anaerobic field test.

WHAT THEY DID:

12 male elite rugby athletes (age: 23.5 ± 2.3 years) participated in this randomized, crossover, double-blinded, placebo-controlled trial. Participants' were required to complete the Bangsbo sprint test (BST) during week 1 of the 3-week study. During weeks 2 and 3, the players were randomly allocated to either PBMT or a placebo condition. Best time of sprints, average sprint time, fatigue index and a wellness questionnaire were all measured, including blood lactate concentrations at 3, 10, 30, and 60 minutes after the BST.

WHAT THEY FOUND:

PBMT significantly ($p \leq 0.05$) improved the average time of sprints and fatigue index in the BST. PBMT also significantly decreased percentage of change in blood lactate levels ($p \leq 0.05$) and perceived fatigue ($p \leq 0.05$).

EDITORS COMMENTS:

"For those who are not yet familiar with PBMT, it uses lights and/or lasers directed onto the skin and has been shown, many times, to modulate biological processes of cells at a mitochondrial level. This study in particular opens new doors for its use in practical sporting environments.

Will we soon see PBMT beds similar to UV sun beds being used in elite environments? Who knows, but quite possibly."

Owen Walker

Youths

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

FEATURE

THE INFLUENCE OF MATURATION ON SPRINT PERFORMANCE IN BOYS OVER A 21-MONTH PERIOD

Meyers, R. W., J. L. Oliver, M. G. Hughes, R. S. Lloyd, And J. B. Cronin. Med. Sci. Sports Exerc., Vol. 48, No. 12, pp. 2555–2562, 2016.

2

IDENTIFYING TALENTED TRACK AND FIELD ATHLETES: THE IMPACT OF RELATIVE AGE EFFECT ON SELECTION TO THE SPANISH NATIONAL ATHLETICS FEDERATION TRAINING CAMPS

Brazo-Sayavera J, Martínez-Valencia MA, Müller L, Andronikos G & Martindale RJJ (2016): Journal of Sports Sciences.

3

EFFECTS OF AN IN-SEASON PLYOMETRIC TRAINING PROGRAM ON REPEATED CHANGE OF DIRECTION AND SPRINT PERFORMANCE IN THE JUNIOR SOCCER PLAYER

Hammami, M, Negra, Y, Aouadi, R, Shephard, RJ, and Chelly, MS. J Strength Cond Res 30(12): 3312– 3320, 2016.

SCIENCE for SPORT

THE INFLUENCE OF MATURATION ON SPRINT PERFORMANCE IN BOYS OVER A 21-MONTH PERIOD

OBJECTIVE: The purpose of this study was to examine how the characteristics of maximal overground sprint performance are affected by the period of peak height velocity (PHV) in boys.

WHAT THEY DID:

189 school-aged boys participated in this study and were separated into two groups based on maturation testing ("pre-PHV" and "pre-to-post PHV"). Both groups completed two assessments of maximal sprint speed separated by a 21-month period. Participants with a maturity offset between >–0.5 and <0.5 years at the 2nd assessment were removed from analysis (n = 67) to ensure that the entire pre-to-post-PHV group had experienced the PHV spurt.

MEASUREMENTS:

- Maturity offset calculated using the Mirwald predictive equation
- 30m sprint speed

WHAT THEY FOUND:

- The pre-to-post-PHV group experienced significantly greater increases in speed (10.4% vs 5.6%) and relative vertical stiffness (12.1% vs 5.6%) compared with the pre-PHV group.
- Step frequency declined (–2.4%) and contact time increased (2.3%) in the pre-PHV group, whereas step frequency increased (2.7%) and contact time decreased (–3.6%) in the pre-to-post PHV group.
- Changes in relative measures of vertical stiffness, maximal force, and leg stiffness accounted for 79% and 83% of the changes in speed between assessments for the pre-PHV and the pre-to-post PHV groups, respectively.

WHAT THIS MEANS:

These results suggest that the period of PHV can significantly improve maximal sprint speed in boys, and that these improvements are related to increases in relative maximal force and relative vertical stiffness. As such, it may be suggested that practitioners seeking to enhance sprint performance in boys should expose them to strength training and plyometrics to enhance force production and stiffness-related variables.

It also appears the pre-PHV period is characterised by decrements in ground contact time and step frequency, these decrements may be associated with differential growth patterns. This would suggest that pre-PHV may be a good opportunity to focus on the technical aspects of running (i.e. using drills designed to improve running technique) in order to offset any growth-related decrements in performance.

LIMITATIONS:

Firstly, as the participants were derived from a school population, the sample included a diverse range of abilities and training ages. The authors also did not control for any extracurricular athletic activities which may have influenced the performances of individuals, and thus the results.

FUTURE RESEARCH:

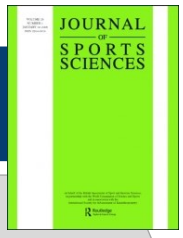
Future research should attempt to replicate this research in school-aged girls to determine how the characteristics of maximal sprint performance are affected by the period of PHV.

Meyers, R. W., J. L. Oliver, M. G. Hughes, R. S. Lloyd, And J. B. Cronin. The Influence of Maturation on Sprint Performance in Boys over a 21-Month Period. Med. Sci. Sports Exerc., Vol. 48, No. 12, pp. 2555–2562, 2016. [Link]

SCIENCE for SPORT

ARTICLE TITLE

IDENTIFYING TALENTED TRACK AND FIELD ATHLETES: THE IMPACT OF RELATIVE AGE EFFECT ON SELECTION TO THE SPANISH NATIONAL ATHLETICS FEDERATION TRAINING CAMPS



OBJECTIVE:

There were two aims of this study: 1) To examine the existence of the relative age effect (RAE) in track and field athletes selected to take part in an official Spanish national training camp; and 2) To examine gender differences in RAE in the training camps.

WHAT THEY DID:

1,334 selected athletes (*n* = 700 males; 634 females) at U15 years and U17 years were compared against 27,711 licensed, but unselected, athletes from the same age groups. Athletes were grouped into four quarters (Q1, Q2, Q3 and Q4) based on a January 1st cut-off date.

WHAT THEY FOUND:

The results found a higher number of 'selected' athletes were born in the first two quarters of the year in comparison to the last two quarters – identifying a "maturation-selection" bias. The authors' then reported that "this effect appeared to be mediated by age and gender, where the effects were stronger for both males and younger athletes (U15), with no evidence of RAE for older (U17) female athletes."

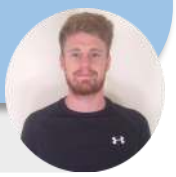
Reference:

Brazo-Sayavera J, Martínez-Valencia MA, Müller L, Andronikos G & Martindale RJJ (2016): Identifying talented track and field athletes: The impact of relative age effect on selection to the Spanish National Athletics Federation training camps, Journal of Sports Sciences. [Link]

EDITORS COMMENTS:

"This study adds to other likewise research which found very similar results in athletes from various other nations—highlighting the issue of the RAE.

One of the difficulties with this though is many track and field sports are typically strength-based, and thus athletes are often selected based on objective performance-based criteria in the first place (e.g. how far they throw). This information questions the current performance grading criteria and potentially highlights the need to reform it to make it more competitive for younger athletes—especially considering younger athletes have been shown to have more successful sporting careers in later life."



Owen Walker

ARTICLE TITLE

EFFECTS OF AN IN-SEASON PLYOMETRIC TRAINING PROGRAM ON REPEATED CHANGE OF DIRECTION AND SPRINT PERFORMANCE IN THE JUNIOR SOCCER PLAYER

OBJECTIVE:

The aim of this study was to examine the effects of plyometric training (PT) on sprint speed, agility, repeated shuttle sprint ability (RSSA), and repeated changes of direction (RCOD) scores.

WHAT THEY DID:

28 soccer players (age: 15.7 ± 0.2 years) were randomly divided into 2 groups: an experimental (*n* = 15) and a control (*n* = 13) group. Both groups performed training exercises and matches as usual, but the experimental group replaced 2 tactical sessions with a twice weekly course of PT (hurdle and drop jumps). Performances were measured using: a sprint test with 180˚ turns, a 9-3-6-3-9 m sprint with forward and backward running, and a four 5-m sprint test with turns; 2 repeated sprint tests; and running times over 5-, 10-, 20-, 30-, and 40-m distances.

WHAT THEY FOUND:

The PT group showed significant improvements in both sprint times ($p < 0.05$ for 5, 10, and 20 m), and 2 of 3 the RCOD variables (RCOD best, $p < 0.001$; RCOD total, $p < 0.05$). However, there was no significant change in either the agility or RSSA test scores. In conclusion, this study suggests that PT is an effective method for improving various athletic qualities.

Reference:

Hammami, M, Negra, Y, Aouadi, R, Shephard, RJ, and Chelly, MS. Effects of an in-season plyometric training program on repeated change of direction and sprint performance in the junior soccer player. J Strength Cond Res 30(12): 3312– 3320, 2016. [Link]

EDITORS COMMENTS:

"This is yet another study to add to a large, and growing, assortment of studies which concludes the efficacy of PT for improving various athletic qualities in young athletes'.

Whilst this study refers to "agility", the authors should've really called it 'change of direction speed' as there was no reactive component present. To date, I know of 1 study, published early in 2016, which actually did measure true agility and found that PT was capable of improving it—so this is a simple example of why its important to properly analyse a study and not just read the conclusion."

Owen Walker

Nutrition

This month's top research on nutrition.

FEATURE

MILK AND DAIRY PRODUCTS: GOOD OR BAD FOR HUMAN HEALTH? AN ASSESSMENT OF THE TOTALITY OF SCIENTIFIC EVIDENCE

Thorning T, Raben A and Tholstrup T et al. (2016). Food & Nutrition Research, 60(0).

2

VITAMIN C-ENRICHED GELATIN SUPPLEMENTATION BEFORE INTERMITTENT ACTIVITY AUGMENTS COLLAGEN SYNTHESIS

Shaw G, Lee-Barthel A and Ross M et al. (2016) American Journal of Clinical Nutrition.

3

DOES CARBOHYDRATE INTAKE DURING ENDURANCE RUNNING IMPROVE PERFORMANCE? A CRITICAL REVIEW

Wilson P (2016) Journal of Strength and Conditioning Research, 30(12), 3539-3559.

SCIENCE for SPORT

MILK AND DAIRY PRODUCTS: GOOD OR BAD FOR HUMAN HEALTH? AN ASSESSMENT OF THE TOTALITY OF SCIENTIFIC EVIDENCE

OBJECTIVE: To answer the question: will a diet with milk and dairy products provide better or worse health, and increase or decrease risk of major diseases and all-cause mortality than a diet with no or low content of milk and dairy products?

WHAT THEY DID:

Using a total of 114 studies, the researchers conducted a narrative review to assess the scientific evidence from meta-analyses and systematic reviews of observational studies and randomised controlled trials on dairy intake (butter excluded) and risk of obesity, type 2 diabetes, cardiovascular disease, osteoporosis, cancer and all-cause mortality.

MEASUREMENTS:

As this was a narrative review of the literature, measurements are not applicable in this case.

WHAT THEY FOUND:

- Milk and dairy intake is associated with a lower body fat percentage, increased muscle mass, improved bone density, neutral or reduced risk of type 2 diabetes and a reduced risk of cardiovascular disease, particularly strokes.
- Milk and dairy intake was inversely associated with colorectal cancer, bladder cancer, gastric cancer, and breast cancer, and not associated with pancreatic cancer, ovarian cancer, or lung cancer, while the evidence for prostate cancer risk was inconsistent.
- Consumption of milk and dairy products was not associated with all-cause mortality.

WHAT THIS MEANS:

It is very important to look at the totality of the evidence on this topic, as you can find individual studies on both sides of the equation. It's the overall picture the research paints that counts, and in this case, the totality of the research shows that milk and dairy intake may protect against the most prevalent chronic diseases, with very low risk of adverse effects.

This is particularly relevant for athletes as dairy is a high quality protein source for muscle growth, and is associated with a lower body fat percentage.

LIMITATIONS:

As most of the conducted meta-analyses on this topic are on observational data, a clear causal relationship cannot be drawn (i.e. causality cannot be assumed). For example, individuals with a higher intake of milk/dairy may just have a better all-round diet in general, which may be the real reason for the result, and not necessarily because milk/dairy is protective against these diseases.

FUTURE RESEARCH:

Because of the limitations of observational research, more randomised controlled trials on this topic are needed.

Furthermore, more research on the relationship between milk/dairy intake and prostate cancer is needed to clarify the inconsistent findings thus far.

Thorning T, Raben A and Tholstrup T et al. (2016) Milk and dairy products: good or bad for human health? An assessment of the totality of scientific evidence. Food & Nutrition Research, 60(0). [Link]

SCIENCE for SPORT

ARTICLE TITLE

VITAMIN C-ENRICHED GELATIN SUPPLEMENTATION BEFORE INTERMITTENT ACTIVITY AUGMENTS COLLAGEN SYNTHESIS

OBJECTIVE:

To determine whether gelatin and vitamin C supplementation combined could increase collagen synthesis when taken prior to exercise.

WHAT THEY DID:

Eight healthy male subjects received 5 or 15g of vitamin C-enriched gelatin or a placebo control one-hour prior to exercise (6 min rope-skipping) to stimulate collagen synthesis. This was repeated three times per day with >6 hours between exercise bouts, for 3 days, in a randomized, double-blinded, crossover-design.

WHAT THEY FOUND:

The gelatin supplement increased collagen synthesis, and 15g did so even more than 5g.

Reference:

Shaw G, Lee-Barthel A and Ross M et al. (2016) Vitamin C-enriched gelatin supplementation before intermittent activity augments collagen synthesis. American Journal of Clinical Nutrition. [Link]

EDITORS COMMENTS:

"Gelatin is viewed as a low-quality protein in the fitness industry because it is low in essential amino acids which are important for muscle growth. However, gelatin is rich in proline, which may stimulate collagen synthesis.

Collagen synthesis is crucial for strong connective tissue such as tendons and ligaments. With tendinopathy being such a common overuse injury among the athletic population, the findings from this study may lead to advances in both the prevention and management of this common condition."

Tim Rowland

ARTICLE TITLE

DOES CARBOHYDRATE INTAKE DURING ENDURANCE RUNNING IMPROVE PERFORMANCE? A CRITICAL REVIEW

OBJECTIVE:

To systematically review the evidence for carbohydrate ingestion during endurance running, with emphases on performance and gastrointestinal (GI) comfort.

WHAT THEY DID:

The authors searched for studies examining moderate-to-high intensity exercise for >60 minutes (intermittent excluded) and carbohydrate ingestion (mouth rinsing excluded). Since the focus was on performance, only studies including time to exhaustion or self-paced performance trials (e.g. time trials) were included.

WHAT THEY FOUND:

Studies comparing a carbohydrate beverage(s) with water or a placebo found a performance benefit with carbohydrate. These performance benefits are most likely to occur during events >90 minutes. Also, consuming carbohydrate beverages substantially above ad libitum levels likely increases GI discomfort without further improving performance.

Reference:

Wilson P (2016) Does Carbohydrate Intake During Endurance Running Improve Performance? A Critical Review. Journal of Strength and Conditioning Research, 30(12), 3539-3559. [Link]

EDITORS COMMENTS:

"Prior reviews on carbohydrate intake during endurance exercise have focused mainly on cycling. Given how popular running is, and considering that GI issues during exercise are more common in runners than cyclists, this review filled an important gap in the research.

Considering that most participants in the studies reviewed were exercising fasted, it would be good to see more research done under fed conditions which are more likely in a real world setting."

Tim Rowland

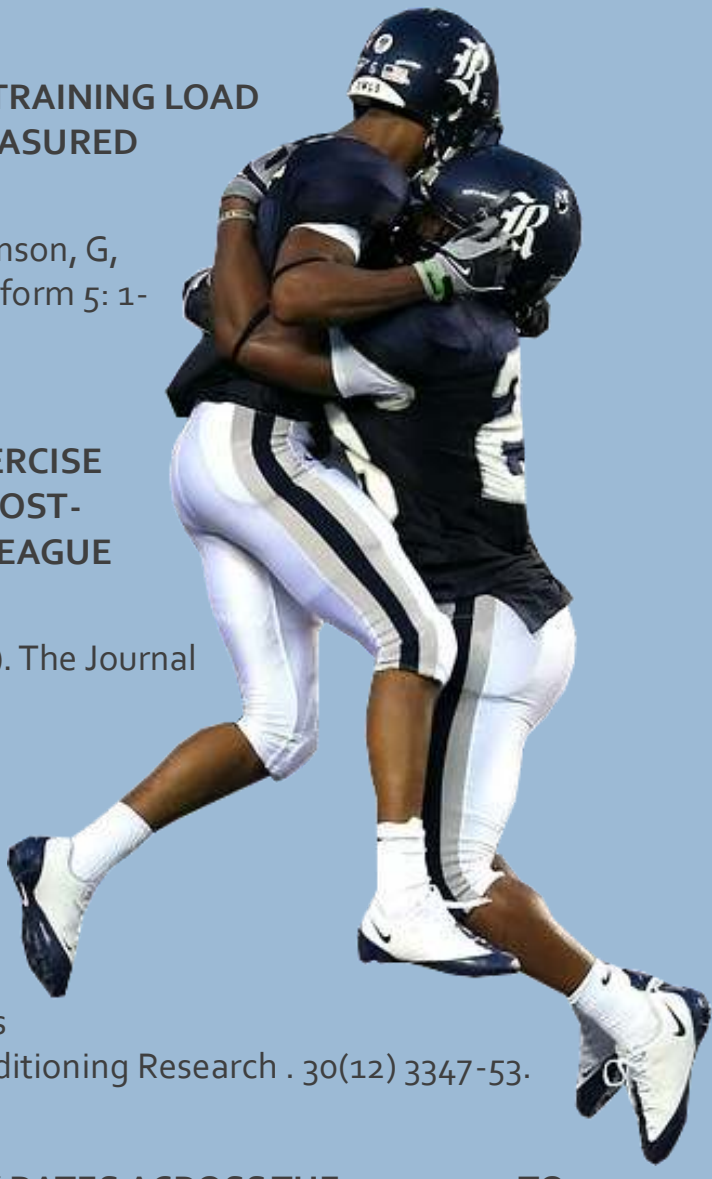
Team Sports

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

FEATURE

STRENGTH AND CONDITIONING FOR THROWING IN CRICKET

Cronin J, Sharp A, Stronach B, Deuchrass R, Bressel E, Shackel DF, McMaster D. Strength & Conditioning Journal, 2016;38(6):1-9.



2

THE INFLUENCE OF CHANGES IN ACUTE TRAINING LOAD ON DAILY SENSITIVITY OF MORNING-MEASURED FATIGUE VARIABLES IN ELITE SOCCER

Thorpe, RT, Strudwick, AJ, Buchheit, M, Atkinson, G, Drust, B, Gregson, W. Int J Sports Physiol Perform 5: 1-23, 2016.

3

COMPLEX TRAINING: THE EFFECT OF EXERCISE SELECTION AND TRAINING STATUS ON POST-ACTIVATION POTENTIATION IN RUGBY LEAGUE PLAYERS

Scott, D. J., Ditroilo, M., & Marshall, P. (2016). The Journal of Strength & Conditioning Research.

4

VALIDITY AND RELIABILITY OF A SUBMAXIMAL INTERMITTENT RUNNING TEST IN ELITE AUSTRALIAN RULES FOOTBALL PLAYERS

Veugelers K, Naughton A, Duncan C, Burgess D and Graham, A.(2016) J. Strength and Conditioning Research . 30(12) 3347-53.

5

INCREASING LOWER EXTREMITY INJURY RATES ACROSS THE 2009-2010 TO 2014-2015 SEASONS OF NATIONAL COLLEGIATE ATHLETIC ASSOCIATION FOOTBALL AN UNINTENDED CONSEQUENCE OF THE "TARGETING" RULE USED TO PREVENT CONCUSSIONS?

Westermann RW, Kerr ZY, Wehr P, and Amendola A. The American Journal of Sports Medicine 44, no. 12 (2016): 3230-3236.

SCIENCE for SPORT

STRENGTH AND CONDITIONING FOR THROWING IN CRICKET

OBJECTIVE: The aim of this study was to outline strength and conditioning practices to improve throwing performance and decrease the likelihood of injury.

WHAT THEY DID:

The authors provided an applied review of the current literature regarding throwing in cricket, highlighting the areas requiring further investigation. In addition, practical examples of appropriate strength exercises and periodization strategies were presented.

PRACTICAL EXAMPLES:

- Shoulder mobility and strength exercises
- Trunk and lower-limb mobility and strength exercises
- Appropriate throwing and strength training periodization.

WHAT THEY DISCUSSED:

A range of strength exercises were presented to assist in the physical preparation of cricket players to enhance performance. Exercises such as 'bent over empty can' and 'dumbbell split jerk' were specifically included, as to target both the mobility required to allow maximal external shoulder rotation, while also providing stability to allow forward acceleration during the throwing motion.

Appropriate throwing and strength periodization (frequency and intensity) were also outlined with examples. This was undertaken with specific reference to avoiding spikes (sudden acute increases in load) which has been associated with a higher prevalence of injury. This is particularly pertinent for cricket players, whom have been shown to undertake up to three times as many throws during training then match-play. Important consideration was also given to trunk and lower-limb strength, as an inability to transfer the forces generated by the lower-limbs through the trunk to the throwing arm and then an ability to dissipate those forces, may led to a decrease in performance and an increased likelihood of injury.

WHAT THIS MEANS:

This applied review provided clear practical examples of appropriate exercises to enhance throwing performance. This was coupled with appropriate periodization for strength exercises and throwing. This information would be beneficial for any sport were throwing is involved (i.e. baseball), and hence is not just limited to cricket. However, the practitioner should also remember to consider the technique of an individual as this can greatly influence performance and injury prevalence.

LIMITATIONS:

This applied review lacked discussion of optimal throwing mechanics, which will obviously play a significant role in determining performance and likelihood of injury. However, this limitation was acknowledged by the authors.

FUTURE RESEARCH:

Discussion of optimal throwing mechanics would have been beneficial, as to complete the picture regarding best practices to enhance performance and prevent injury. Further discussion of exercise variations for possible differences/strengths/weakness in throwing technique would also have proven beneficial to a practitioner.

Cronin J, Sharp A, Stronach B, Deuchrass R, Bressel E, Shackel DF, McMaster D. Strength and Conditioning for Throwing in Cricket. Strength & Conditioning Journal, 2016;38(6):1-9. [Link]

SCIENCE for SPORT

ARTICLE TITLE

THE INFLUENCE OF CHANGES IN ACUTE TRAINING LOAD ON DAILY SENSITIVITY OF MORNING-MEASURED FATIGUE VARIABLES IN ELITE SOCCER PLAYERS

Reference:

Thorpe, RT, Strudwick, AJ, Buchheit, M, Atkinson, G, Drust, B, Gregson, W. The influence of changes in acute training load on daily sensitivity of morning-measured fatigue variables in elite soccer. Int J Sports Physiol Perform 5: 1-23, 2016. [Link]

OBJECTIVE:

The purpose of this study was to determine the sensitivity of a range of potential fatigue measures to monitor daily training load accumulated over the previous two, three and four days of training during a short in-season period.

WHAT THEY DID:

Total high-speed running distance, perceived ratings of wellness (fatigue, muscle soreness, sleep quality), countermovement jump height (CMJ), submaximal heart rate (HRex), post-exercise heart rate recovery (HRR) and heart rate variability (HRV: Ln rMSSD) were analysed during an in-season competitive period (17 days) in ten elite senior soccer-players. General linear models were then used to evaluate the influence of two, three and four days of total high-speed running (HSR) distance accumulation on the fatigue measures.

WHAT THEY FOUND:

The results suggested that perceived ratings of fatigue and HRex were sensitive to fluctuations in acute total HSR distance accumulation. The researchers also reported that the sensitivity of morning-measured fatigue variables to changes in training load is generally not improved when compared with training loads beyond the previous days training – this simply suggests that these measures are perhaps most effective when taken on a daily basis.

EDITORS COMMENTS:

"The current study is another much-needed paper written by a group of vastly experienced and well-respected practitioners who work day in and day out within the applied setting. They conclude that fatigue variables are not sensitive to training loads beyond the previous days training. These findings are in contrast to previous studies which report elevated fatigue markers up to 72-hours post match. It would therefore be interesting to see the current study undertaken over the course of a season as opposed to just 17 days, in order to take into account congested fixture schedules leading to potential chronic fatigue.

Furthermore, it is also worth noting that 'training load' in the current study actually only refers to high speed running distance, and thus the high eccentric demands of decelerating for example are not accounted for."

Liam Mason

ARTICLE TITLE

COMPLEX TRAINING: THE EFFECT OF EXERCISE SELECTION AND TRAINING STATUS ON POST-ACTIVATION POTENTIATION IN RUGBY LEAGUE PLAYERS

Reference:

Scott, D. J., Ditroilo, M., & Marshall, P. (2016). Complex training: The effect of exercise selection and training status on post-activation potentiation in rugby league players. The Journal of Strength & Conditioning Research. [Link]

OBJECTIVE:

To compare the differences in the post-activation potentiation response (PAP) between professional and amateur rugby athletes on the back squat (BS) and hex-bar deadlift (HBD) exercises.

WHAT THEY DID:

10 amateur and 10 professional rugby league players were used in this study, in combination with a control group (n = 10). Participants' were instructed to complete a conditioning activity consisting of 1 set of 3 repetitions of HBD or BS at 93% of 1RM. Peak power output (PP), force at PP, velocity at PP and CMJ height were recorded both before and 2, 4, 6, 8, 10, 12, 14 and 16 minutes after the conditioning activity. Surface EMG of lower body was also collected during jumping.

WHAT THEY FOUND:

The HBD expressed PAP between 2 and 6 minutes, whereas the BS did not express any significant PAP response. However, no differences between amateurs and professionals were observed, and no changes in EMG variables were found. These results suggest that HBD may be a preferable option to elicit PAP in both amateur and professional rugby athletes.

EDITORS COMMENTS:

"While previous research has focused mainly on investigating the BS to elicit PAP, the present study demonstrated that HBD may be a preferable option when compared to the BS for both weaker and stronger athletes.

The results from this study are interesting as they conflict probably the majority of previous research (BS produced no PAP, and stronger athletes experienced no greater PAP response). This is perhaps because the HBD was performed as concentric-only, thus reducing time under tension and fatigue. The strong vs. weak question is potentially due to the fact that the "strong" group weren't actually that strong (BS 1RM = 149kg; 1.77 kg/kg) and the BS 1RM differences between groups were not very evident (~40kg)."

Francisco Tavares

ARTICLE TITLE

VALIDITY AND RELIABILITY OF A SUBMAXIMAL INTERMITTENT RUNNING TEST IN ELITE AUSTRALIAN FOOTBALL PLAYERS

OBJECTIVE:

The objective of this study was to establish the validity and reliability of a submaximal intermittent running (SIR) test in a group of elite Australian Rules Football (ARF) players.

WHAT THEY DID:

Heart rate responses (HR) from both the YOYO IR2 (YOYO) and SIR test were compared over two trials in 38 elite ARF players over multiple time points (2-4 minutes). A linear regression analysis was used to asses the relationship between the HR responses collected at 2, 3 and 4 minutes during the SIR test and YOYO performance (distance covered). Secondly, to identify the day-to-day variability of the SIR test, HR responses from 25 elite ARF players were compared over 3 trials. With results reported as an intraclass correlation coefficient (ICC) and coefficient of variation (CV).

WHAT THEY FOUND:

Large inverse correlations between HR responses during the SIR test and YOYO IR2 total distance at 2-4 minutes were observed. These relationships were similar to the relationship observed by the corresponding HR responses collected during the YOYO. Secondly, strong day-to-day reliability of the SIR test was also observed (CV <5%) at all intra-time points.

Reference:

Veugelers K, Naughton A, Duncan C, Burgess D and Graham, A. (2016) Validity and reliability of a submaximal intermittent running test in elite Australian Rules football players J. Strength and Conditioning Research . 30(12) 3347-53. [Link]

EDITORS COMMENTS:

"Overall, this study aimed to answer a very practical question in high performance environments—that being: "can we track maximal physical performance in submaximal settings?"

Whilst the relationships reported in this study seem promising, longer term repeated measure designs are needed to strengthen the confidence of this measure."

Dean Norris

ARTICLE TITLE

INCREASING LOWER EXTREMITY INJURY RATES ACROSS THE 2009-2010 TO 2014-2015 SEASONS OF NATIONAL COLLEGIATE ATHLETIC ASSOCIATION FOOTBALL: AN UNINTENDED CONSEQUENCE OF THE "TARGETING" RULE USED TO PREVENT CONCUSSIONS?

OBJECTIVE:

This study aimed to assess the change in lower extremity injury rates during the 2009-2010 to 2014-2015 competitive NCAA football seasons.

WHAT THEY DID:

Lower extremity injury and sports related concussion data was collected using the NCAA Injury Surveillance Program (NCAA-ISP) database. 68 NCAA football programs comprised of Division I, II and III teams provided data on 153 seasons to the NCAA-ISP during the investigated period. The authors calculated injury rates per 1000 athlete exposures (AE's).

WHAT THEY FOUND:

2400 lower extremity injuries were reported during the 2009-2010 to 2014-2015 seasons. The primary mechanism of injury was player contact (59.2%) whilst the most common injury sites were the knee (33.6%) and ankle (28.5%). Lower extremity injury rates increased in 2012-2013 to 2014-2015 when compared to 2009-2010 to 2011-2012 (23.55 vs 20.45/1000 AE's respectively). The study concluded that the targeting rule may contribute to increased rates of contact related lower extremity injury.

Reference:

Westermann RW, Kerr ZY, Wehr P, and Amendola A. "Increasing Lower Extremity Injury Rates Across the 2009-2010 to 2014-2015 Seasons of National Collegiate Athletic Association Football An Unintended Consequence of the "Targeting" Rule Used to Prevent Concussions?." The American Journal of Sports Medicine 44, no. 12 (2016): 3230-3236. [Link]

EDITORS COMMENTS:

"A secondary finding in the study was that sports related concussions (SRC's) also increased across the study period. The authors contribute this to better education and identification surrounding SRC's.

Whilst this is a valid statement, I can't help but to think that improved physical characteristics of athletes such as strength and power may also contribute to the increased rate of both contact related lower extremity injuries and SRC's."

Toby Edwards

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

TECHNOLOGY & MONITORING

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YOUTHS

NUTRITION

Tim Rowlands MSc ASCA L2

Tim is the Colts 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.

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.

RUGBY

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.

CRICKET

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.

AUSTRALIAN FOOTBALL

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.

AMERICAN 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.

SCIENCE for SPORT