RESEARCH TO PRACTICE 2018
27-29 MARCH 2018
BRISBANE, QUEENSLAND

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Thursday, 29 March 2018
9:00am – 10:30am

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Weight Cutting Implications for Competition Outcomes in Mixed Martial Arts Cage Fighting

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Introduction & Aims: Weight cutting is a prolific aspect of MMA (mixed martial arts) competition. This study aimed to identify if weight cutting practices influence competition outcome in MMA. Further, this study attempted to identify if a specific competition outcome was associated with higher magnitudes of weight cutting and whether the amount of weight recovered in the 24-hour period between weigh-in and competition affected these results.
Methods: 75 participants self-reported their body mass (BM) prior to commencing weight-cutting practices. Official weigh-in weights were reported by the regulating body for all competitions. Athletes were then weighed again just prior to competition. Data were analysed according to the following fight outcomes: 1) Win; 2) Loss by technical knockout (TKO) or knockout (KO); 3) Loss by submission; or 4) Loss by judge's decision.
Results: There was a significant main effect for time ($P \leq 0.001$), and significant outcome-by-time interaction when split into win vs lose ($P = 0.04$). Athletes lost a significant amount of BM between baseline and weigh-in ($P \leq 0.001$), and athletes that won their fight cut less BM (8.6%) compared to athletes that lost (10.6%; $P = 0.04$). There were no significant differences between types of loss. Athletes recovered a significant amount of BM between weigh-in and pre-fight ($P \leq 0.001$). There were no significant differences in recovered BM between athletes that won (6.8%) vs lost (7.4%), or type of loss.
Conclusions: This study indicates a significant interaction between fight outcome and BM lost when split into win vs lose. The amount of BM recovered after weigh-in did not alter the outcome of the fight. These results, when considered with those of other studies, suggest a possible threshold whereby weight cutting may be advantageous but only up to a certain point, after which further reductions in BM begin to diminish fighters' performance.

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The effect of exercise duration knowledge on pacing strategies, neuromuscular activity and the central responses to exercise

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Introduction: This study examined the effect of providing versus withholding knowledge of performance variables and time to completion during 30km cycling time trials (TT) on performance and pacing strategies. This study additionally aimed to examine neuromuscular responses and cerebral hemodynamics on exercise regulation.
Methods: 9 well-trained male cyclists (VO_{2max}: 63.6 ± 5.7 $ml \cdot kg^{-1} \cdot min^{-1}$) completed two 30km TT in a randomised order. Each participant completed a condition with real-time performance feedback (KTT), and a condition withholding all performance feedback (UTT). During both conditions, participants were allocated with a wrist-watch to monitor heart rate (HR) responses. Pre-frontal cortex oxygenation (COxy) and deoxygenation (DeOxy) via near-infrared spectrometry (NIRS) and muscular activation (rectus femoris, vastus medialis, vastus lateralis and biceps femoris) via electromyogram (EMG) were recorded throughout each trial. HR, rating of perceived exertion (RPE) and power output (PO) were also recorded.
Results: Time to complete the 30km TT was shorter for the KTT condition ($P=0.01$). During the final 2km, PO and HR were higher in the KTT compared to UTT as evidenced by the presence of an 'end-spurt'. The KTT condition showed higher activation of quadriceps ($P<0.05$), and increased COxy and normalised tissue haemoglobin index (nTHI) during the final 2km ($P<0.05$). No differences in RPE was evident between conditions ($P>0.05$).
Conclusion: Withholding information pertaining to remaining distance during endurance exercise may lead to a reduction in performance due to a more conservative pacing approach. The KTT condition further demonstrated an increase in blood flow and perfusion across the pre-frontal lobe during the final stages of the trial which matched increasing EMG across the active musculature. These data suggest that feedback about exercise endpoint may increase neural activation and thereby adjust motor unit recruitment to regulate exercise output.

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The Pacing Strategies of Track Sprint Cyclists in the Flying 200m Time Trial

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Introduction & Aims: In track cycling, qualification and the allocation of cyclists into the heats for the Sprint event, is determined by a 200m time trial (200TT) with a flying start. There are very small differences in 200m time between competitors (e.g. <1.0 s for the top 50 cyclists) and the pacing strategy they use is an important determining factor of their performance. There are no reports or analysis of the pacing strategy or path ridden by elite cyclists in the 200TT. The aims of this study were to characterise the pacing strategies and paths ridden, by male and female cyclists and to determine if there was an optimal strategy used by successful cyclists.
Methods: Male and female cyclists competing in the 200TT were filmed at a World Championship event and the video recording was analysed to determine their split time every 50m for the 200m before the start and during the 200TT, as well as their position between the inside and outside of the velodrome at three key positions on the velodrome.
Results: Cyclists (males and females) with faster 200TT times, tended to be faster consistently through all 50m intervals and therefore their pacing strategy tended to be the same regardless of their time. However, all cyclists mis-paced their 200TT by completing the untimed 50m interval before the start of the 200TT, in a faster time than the final 50m of the actual 200TT. The path ridden by male cyclists in the crucial acceleration to the start of the 200TT, was related to their performance.
Conclusions: There doesn't appear to be any difference between the pacing strategies of successful and unsuccessful cyclists, however all cyclists might be able to achieve a faster time if they can transfer some of their velocity from the 50m interval before the start, to the last 50m interval. There is clearly an optimal path ridden by successful male cyclists that provides them with an advantage over the less successful cyclists.

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Associations between sleep, muscle soreness and motivation in elite Australian athletes on a multi-species probiotic. Results of a double-blind randomised controlled trial

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Introduction & Aims: Elite athletes are at an increased risk of not getting enough sleep and/or experiencing poor sleep quality. Poor or inadequate sleep has implications for athletic performance and may have negative impacts on cognition, pain perception, memory, immunity and inflammation. This study examined the effects of a probiotic formulation on perceptual markers of sleep quality and quantity. Associations were also investigated between sleep, salivary biomarkers of stress (cortisol, alpha-amylase) and mucosal immunity (secretory(s) IgA), heart rate variability and perceptual markers of muscle soreness, leg heaviness and motivation in elite rugby union athletes.
Methods: A double-blind RCT was conducted over 27 weeks. Elite male Australian Rugby Union athletes were randomly assigned a probiotic (PRB) (n=11) or a placebo (PLA) (n=10) supplement. The probiotic Ultrabiotic 60™ or placebo was taken with food twice daily for 17 weeks and SB Floractiv™ 250mg added twice daily during the athletes' international travel period (10 weeks).
Results: Two-way ANOVA revealed no significant differences between PRO or PLA for sleep quality or quantity over the 27 weeks. For the PRB group, in the first 17 weeks, multiple linear regression (MLR) produced a model ($F(4,49) = 18.84$; $p < 0.000$; $R^2 = .57$) where sleep quality, leg heaviness, motivation and sIgA explained 57% of the variance in overall muscle soreness. During the travel period, MLR produced a model ($F(4,106) = 40.61$; $p < 0.000$; $R^2 = .59$), where sleep quality, leg heaviness, motivation and salivary cortisol explained 59% of the variance in muscle soreness in the PRB group. Sleep quality, motivation and muscle soreness were not associated in any models produced in the PLA group.
Conclusion: The probiotic protocol in this study suggested positive effects on sleep quality and motivation scores that were associated with a reduction in perceived muscle soreness. Further research is required to evaluate these associations.

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Sleep in high performance team sport: the knowledge and practices of coaches and sports science support staff

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Introduction & Aims: Coaches and support staff believe sleep is integral for health and athletic performance. However, no study has assessed the sleep hygiene knowledge of coaches and sports science support staff, or explored the sleep practices staff implement with the athletes they support. Therefore, this study aimed to assess sleep hygiene knowledge and the sleep practices implemented with athletes, and the barriers to more frequent use of these practices within high performance team sport coaches and sports science support staff.
Methods: A sample of 86 Australian coaches and sports science support staff working within high performance team sport (39 supporting males, and 47 females) volunteered to complete a four-part questionnaire, including the Sleep Beliefs Survey (SBS) used to assess sleep hygiene knowledge.
Results: Sleep hygiene knowledge was acceptable (total score 15.3 ± 2.9 [0-20]), however knowledge of sleep-wake cycle behaviours was somewhat poor (4.9 ± 1.6 [0-7]). The majority of coaches and staff monitor sleep (55.8%), while 43.0% implement sleep hygiene strategies with their athletes. Lack of resources and knowledge are the major barriers to implementation of sleep practices. Coaches and staff supporting female athletes (19.1%) also identified 'players not liking it' as a barrier to implementing sleep hygiene practices compared to coaches and staff supporting male athletes (2.6%, $p = 0.017$).
Conclusion: Australian coaches and sports science support staff have acceptable sleep hygiene knowledge, yet most do not implement strategies with the athletic groups they support. Coaches and staff supporting female athletes may experience additional player barriers to implementing sleep hygiene practices. The efficacy of sleep practices implemented by coaches and staff within high performance team sport may be improved by addressing these identified barriers.

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Integrating coach and sport science: a multi-dimensional monitoring system to identify performance change in highly trained swimmers

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Introduction: Despite the prevalence of athlete monitoring systems (AMS) in high performance sport, no research has assessed if they can identify performance change with greater precision than an experienced coach. Therefore, this study compared and combined a coach prediction of athlete performance and a multi-dimensional AMS to identify performance change in highly trained swimmers.
Methods: Nine highly trained swimmers (7 males, 2 females, age: 21.6 ± 2.0 y) recorded daily perceived sleep quality, fatigue (1-5), total quality recovery (6-20), heart rate variability (R-R interval and Ln rMSSD), distance swum (km) and race results over 16-months. Prior to each race an experienced coach (n= 1) was asked to predict their athlete's time (N=88). All values were analysed as a 7-d average and converted to an effect size change from the athlete's previous race. All race results (N= 128) were then classified as a dichotomous outcome (0= No change, 1= performance decrement or improvement (> 0.3 x individual athlete CV)) then analysed using forward stepwise binary logistic regression. The accuracy of these models was assessed using Receiver Operating Characteristic curves (area under the curve (AUC)).
Results: To identify performance decrements (N= 45) a coach prediction was the strongest regression (AUC- 0.91 (95% CI; 0.84-0.98), compared to an AMS model (KM) (AUC- 0.64 (95% CI; 0.54-0.74). For improvements in performance (N= 56) a combined model (coach prediction, R- R interval) (AUC- 0.96 (95% CI; 0.92-0.99), was stronger than a coach prediction (AUC- 0.86 (95% CI; 0.78-0.95)) or AMS model (R-R Interval, KM) (AUC- 0.66 (95% CI; 0.56-0.76).
Discussion: The strong coach prediction compared to other models highlights the limitations of an AMS to improve the precision of identifying performance decrements. However, the combined model of coach prediction and R-R interval highlights the potential of use of an AMS to improve a coaches understanding of their athletes readiness to perform.