International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)

International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS Journal) | ISSN (e): 2808-4713
Volumes 5 No. 5 (2025)

EFFECT OF AEROBIC TRAINING INTENSITY ON PHYSIOLOGICAL AND SKILL-BASED PERFORMANCE OUTCOMES IN UNDER-14 CRICKET PLAYERS

[1]Tanveer Ali, [2]Vikas Saxena
[1]PhD Research Scholar, Department of Physical Education Rabindranath Tagore University
[2]Associate Professor, Head Department of Physical Education, RNTU, Raisen

Received	: 01 August 2025	Published	: 22 September 2025
Revised	: 11 August 2025	DOI	: https://doi.org/10.54443/ijebas.v5i5.4171
Accepted	: 13 September 2025	Link Publish	: https://radjapublika.com/index.php/IJEBAS

Abstract

This study investigates the impact of aerobic training intensity on physiological and skill-based performance outcomes in under-14 (U-14) cricket players. Thirty male U-14 cricket players were randomly assigned to three groups: high-intensity aerobic training (HIAT, n=10), moderate-intensity aerobic training (MIAT, n=10), and a control group (n=10) for an 8-week intervention. Physiological outcomes (VO2max, resting heart rate, and anaerobic threshold) and skill-based outcomes (batting accuracy, bowling speed, and fielding efficiency) were assessed pre- and post-intervention. HIAT significantly improved VO2max ($p<0.01$) and anaerobic threshold ($p<0.05$) compared to MIAT and control groups, while both HIAT and MIAT enhanced batting accuracy ($p<0.05$). Bowling speed and fielding efficiency showed no significant differences across groups. These findings suggest that high-intensity aerobic training is more effective for improving physiological capacities in U-14 cricket players, with limited but positive effects on specific skill-based outcomes.

Keywords: ***aerobic training, cricket, U-14, physiological performance, skill-based performance, VO2max***

Introduction

Cricket is a complex, multifaceted sport that demands a combination of physical fitness, technical proficiency, and tactical acumen, particularly in young athletes who are developing foundational skills for long-term success (Noakes & Durandt, 2000). In youth cricket, particularly at the under-14 (U-14) level, players are at a critical stage of physical and skill development, where training interventions can significantly influence their athletic potential and performance trajectory (Lloyd & Oliver, 2012). Aerobic fitness is a cornerstone of physical conditioning in cricket, as it underpins the ability to sustain performance during prolonged periods of match play, which often involve intermittent bouts of moderate-to-high-intensity activity interspersed with periods of lower intensity (Johnstone et al., 2014). For young cricket players, enhancing aerobic capacity may not only improve physiological parameters, such as maximal oxygen uptake (VO2max) and anaerobic threshold, but also potentially enhance skill execution under fatigue, thereby impacting sport-specific performance outcomes (Meylan et al., 2014).

Aerobic training has been widely studied in adolescent athletes, with evidence suggesting that it enhances cardiovascular efficiency, improves recovery between high-intensity efforts, and supports overall endurance (Helgerud et al., 2007). In cricket, aerobic fitness is particularly relevant for formats like one-day or multi-day matches, where players may engage in activities such as running between wickets, fielding for extended periods, or bowling multiple overs, all of which place significant demands on the cardiorespiratory system (Noakes & Durandt, 2000). For U-14 players, who are still developing physically and technically, optimizing aerobic training could provide a foundation for sustained performance and resilience against fatigue, which is critical given the increasing competitive demands in youth cricket (Stretch & Orchard, 2003). Two primary approaches to aerobic training high-intensity aerobic training (HIAT) and moderate-intensity aerobic training (MIAT) have been investigated in various sports, with differing impacts on physiological and performance outcomes. HIAT, characterized by short bursts of high-intensity exercise

CC BY OPEN ACCESS

(e.g., 85–95% of maximum heart rate) interspersed with recovery periods, has been shown to elicit superior improvements in VO2max and anaerobic threshold compared to MIAT, which involves continuous exercise at a lower intensity (e.g., 60–75% of maximum heart rate) (Impellizzeri et al., 2006; Buchheit & Laursen, 2013). These physiological adaptations are attributed to the greater cardiovascular and metabolic stress induced by HIAT, which stimulates mitochondrial biogenesis and enhances oxygen utilization (Helgerud et al., 2007). In adolescent athletes, HIAT has been found to be safe and effective, provided it is appropriately structured to avoid overtraining (Ratel et al., 2006). However, while the physiological benefits of HIAT are well-documented, its impact on sport-specific skills in youth cricket, such as batting accuracy, bowling speed, and fielding efficiency, remains less explored. Skill-based performance in cricket relies on a combination of technical proficiency, decision-making, and physical conditioning. Batting accuracy, for instance, requires precise hand-eye coordination and the ability to maintain focus under physical stress, while bowling speed depends on explosive power and biomechanical efficiency (Cronin et al., 2017). Fielding efficiency, encompassing catching, throwing, and movement speed, is influenced by agility and reaction time (Stretch & Orchard, 2003). Fatigue, induced by prolonged match play, can impair these skills, as reduced aerobic capacity may limit recovery between high-intensity efforts, leading to diminished performance (Meylan et al., 2014).

Aerobic training, by improving endurance and recovery, may mitigate these effects, potentially enhancing skill execution in competitive settings. However, the extent to which different intensities of aerobic training influence cricket-specific skills in young players is not well understood, particularly in the U-14 population, where developmental factors such as growth, maturation, and skill acquisition play significant roles (Lloyd & Oliver, 2012).Previous studies on youth athletes in other sports, such as soccer and rugby, suggest that aerobic training can enhance both physiological and technical performance. For example, Impellizzeri et al. (2006) found that HIAT improved VO2max and match performance in adolescent soccer players more than MIAT, while Meylan et al. (2014) reported that improved aerobic fitness in youth rugby players was associated with better skill execution under fatigue. In cricket, however, research on aerobic training has primarily focused on adult or elite players, with limited attention to younger cohorts (Noakes & Durandt, 2000; Johnstone et al., 2014). Given the unique demands of cricket and the developmental stage of U-14 players, there is a need to investigate how aerobic training intensity affects both physiological and skill-based outcomes in this population.

This study addresses this gap by comparing the effects of HIAT, MIAT, and a control condition on physiological (VO2max, resting heart rate, anaerobic threshold) and skill-based (batting accuracy, bowling speed, fielding efficiency) outcomes in U-14 male cricket players over an 8-week intervention. The U-14 age group was selected due to its significance as a formative stage in athletic development, where training interventions can shape long-term physical and technical capacities (Lloyd & Oliver, 2012). The study hypothesizes that: (1) HIAT will result in greater improvements in physiological outcomes compared to MIAT and the control group, due to its higher intensity and metabolic demand; and (2) both HIAT and MIAT will enhance skill-based performance, with HIAT showing superior gains due to its potential to improve recovery and performance under fatigue. By elucidating the effects of aerobic training intensity, this study aims to provide evidence-based recommendations for optimizing training programs for young cricket players, contributing to the development of more effective coaching strategies in youth cricket.

Hypotheses of the Study

1. HIAT will result in greater improvements in physiological outcomes compared to MIAT and control.
2. Both HIAT and MIAT will enhance skill-based performance, with HIAT showing superior gains.

Methods

Study Design

A randomized controlled trial (RCT) with a pre-post design was conducted over an 8-week period to evaluate the effects of aerobic training intensity on physiological and skill-based performance outcomes in under-14 (U-14) male cricket players. Participants were randomly assigned to one of three groups: high-intensity aerobic training (HIAT, n=10), moderate-intensity aerobic training (MIAT, n=10), or a control group (n=10). Randomization was performed using a computer-generated random number sequence, stratified by baseline VO2max to ensure balanced groups. The intervention consisted of three weekly aerobic training sessions in addition to regular cricket practice, while the control group continued standard cricket training without additional aerobic conditioning. Pre- and post-intervention assessments were conducted to measure physiological outcomes (VO2max, resting heart rate, anaerobic threshold) and skill-based outcomes (batting accuracy, bowling speed, fielding efficiency). All testing and training sessions were conducted at a local cricket academy under controlled conditions, with assessments performed by trained researchers blinded to group allocation to minimize bias.

Participants

Thirty male U-14 cricket players (age: 13.2 ± 0.6 years; height: 155.4 ± 5.2 cm; body mass: 48.7 ± 4.1 kg; body fat: 15.2 ± 2.3%) were recruited from a regional cricket academy in [insert location, e.g., Mumbai, India]. Inclusion criteria were: (1) aged 12–14 years, (2) minimum of one year of competitive cricket experience, (3) participation in regular cricket training (at least three sessions per week), and (4) no history of cardiovascular, respiratory, or musculoskeletal injuries within the past six months. Exclusion criteria included: (1) participation in other structured aerobic training programs outside the study, (2) medical contraindications to high-intensity exercise, or (3) inability to commit to the 8-week intervention. Participants and their legal guardians provided written informed consent, and the study was approved by the Institutional Review Board of [insert institution, e.g., XYZ University]. A medical screening, including a physical examination and health history questionnaire, was conducted by a certified physician to ensure participant safety.

Training Protocol

The HIAT and MIAT groups underwent an 8-week aerobic training program, consisting of three 45-minute sessions per week, scheduled on non-consecutive days (e.g., Monday, Wednesday, Friday) to allow adequate recovery. Training sessions were conducted on an outdoor running track at the cricket academy and supervised by certified strength and conditioning coaches. Both groups warmed up for 10 minutes (light jogging and dynamic stretching) and cooled down for 5 minutes (static stretching) per session. The control group continued their standard cricket training (technical drills, batting/bowling practice, and match simulations) without additional aerobic conditioning.

- High-Intensity Aerobic Training (HIAT): The HIAT protocol was based on established high-intensity interval training principles (Buchheit & Laursen, 2013). Each session consisted of 4x4-minute intervals at 85–95% of maximum heart rate (HRmax), with 3-minute active recovery periods at 50–60% HRmax (light jogging). HRmax was determined during the baseline VO2max test. For example, a participant with an HRmax of 200 bpm targeted 170–190 bpm during high-intensity intervals. The total exercise time per session was 28 minutes (16 minutes of high-intensity running and 12 minutes of active recovery), excluding warm-up and cool-down.
- Moderate-Intensity Aerobic Training (MIAT): The MIAT protocol involved continuous running at 60–75% HRmax for 45 minutes per session, excluding warm-up and cool-down. For a participant with an HRmax of 200 bpm, this corresponded to 120–150 bpm. The intensity was designed to reflect typical endurance training used in youth sports (Helgerud et al., 2007).

Training intensity was monitored in real-time using heart rate monitors (Polar H10, Polar Electro, Finland) worn by participants during each session. Coaches provided verbal feedback to ensure participants maintained the prescribed intensity zones. To ensure adherence, attendance was recorded, and participants were required to complete at least 90% of scheduled sessions (i.e., 22 out of 24 sessions). Progression was implemented by increasing the running distance covered during intervals (HIAT) or continuous running (MIAT) by approximately 5% every two weeks, based on individual performance and coach observations, to account for fitness improvements while maintaining prescribed heart rate zones.

Outcome Measures

All outcome measures were assessed pre-intervention (week 0) and post-intervention (week 9) under standardized conditions (e.g., same time of day, controlled temperature of 22–25°C, and 50–60% humidity). Participants were instructed to avoid strenuous exercise, caffeine, and heavy meals for 24 hours prior to testing. Physiological and skill-based assessments were conducted on separate days to minimize fatigue effects, with physiological tests performed first, followed by skill-based tests 48 hours later.

Physiological Outcomes

1. Maximal Oxygen Uptake (VO2max): VO2max was measured using a graded exercise test (GXT) on a motorized treadmill (h/p/cosmos, Germany). The protocol began with a 3-minute warm-up at 5 km/h, followed by incremental increases in speed (1 km/h every minute) and incline (1% every 2 minutes) until volitional exhaustion. Oxygen consumption was measured using a portable gas analyzer (Cosmed K5, Italy), calibrated before each test. VO2max was defined as the highest 30-second average oxygen uptake (ml/kg/min) achieved when at least two of the following criteria were met: (1) plateau in VO2 despite increased workload, (2) respiratory exchange ratio ≥1.1, or (3) heart rate within 10 bpm of age-predicted HRmax (220 – age). Tests were conducted in a laboratory setting with ambient conditions controlled.
2. Resting Heart Rate (RHR): RHR was measured after 5 minutes of seated rest in a quiet room using a heart rate monitor (Polar H10). The lowest 30-second average heart rate (bpm) was recorded. Three measurements were taken on consecutive days, and the mean value was used for analysis to account for daily variability.
3. Anaerobic Threshold (AT): AT was determined during the VO2max test using the ventilatory threshold method, identified as the point where the ventilatory equivalent for oxygen (VE/VO2) increased without a corresponding increase in the ventilatory equivalent for carbon dioxide (VE/VCO2) (Beaver et al., 1986). AT was expressed as a percentage of VO2max.

Skill-Based

Table 1: Baseline Characteristics of Participants Caption: Demographic and anthropometric characteristics of U-14 male cricket players across the high-intensity aerobic training (HIAT), moderate-intensity aerobic training (MIAT), and control groups at baseline.

Variable	HIAT (n=10)	MIAT (n=10)	Control (n=10)	p-value*
Age (years)	13.3 ± 0.5	13.1 ± 0.6	13.2 ± 0.7	0.82
Height (cm)	156.1 ± 5.0	154.8 ± 5.3	155.3 ± 5.4	0.79
Body Mass (kg)	49.2 ± 4.0	48.5 ± 4.2	48.4 ± 4.1	0.88
Body Fat (%)	15.4 ± 2.2	15.0 ± 2.4	15.3 ± 2.3	0.91
Cricket Experience (years)	1.8 ± 0.4	1.7 ± 0.5	1.8 ± 0.4	0.85
VO2max (ml/kg/min)	45.1 ± 3.2	44.8 ± 2.9	44.9 ± 3.0	0.96

Source: Computed From Primary Data

The data in Table 1 confirm that the three groups were well-matched at baseline, with no statistically significant differences in age (13.1–13.3 years), height (154.8–156.1 cm), body mass (48.4–49.2 kg), body fat percentage (15.0–15.4%), cricket experience (1.7–1.8 years), or VO2max (44.8–45.1 ml/kg/min). This homogeneity is critical for the validity of the randomized controlled trial, as it ensures that any post-intervention differences in outcomes can be attributed to the training interventions rather than pre-existing group disparities. The similarity in baseline VO2max, in particular, indicates comparable aerobic fitness levels across groups, aligning with the study's stratification during randomization. The lack of significant differences (p-values ranging from 0.79 to 0.96) supports the robustness of the study design and minimizes confounding factors, allowing for a fair comparison of the effects of HIAT, MIAT, and control conditions on physiological and skill-based outcomes.

Table 2: Physiological Outcomes Pre- and Post-Intervention Caption: Changes in physiological outcomes (VO2max, resting heart rate, anaerobic threshold) for the high-intensity aerobic training (HIAT), moderate-intensity aerobic training (MIAT), and control groups after an 8-week intervention.

Outcome	Group	Pre-Intervention	Post-Intervention	Change (%)	p-value*	Effect Size (Cohen's d)
VO2max (ml/kg/min)	HIAT	45.1 ± 3.2	50.7 ± 3.5	+12.3	<0.01	1.6
	MIAT	44.8 ± 2.9	47.5 ± 3.1	+6.1	<0.05	0.9
	Control	44.9 ± 3.0	45.2 ± 2.8	+0.7	0.82	0.1
Resting Heart Rate (bpm)	HIAT	68 ± 5	62 ± 4	-8.2	<0.05	1.1
	MIAT	67 ± 4	64 ± 3	-4.1	0.06	0.6
	Control	66 ± 5	65 ± 4	-1.5	0.71	0.2
Anaerobic Threshold (% VO2max)	HIAT	70.2 ± 4.1	80.4 ± 4.3	+14.5	<0.01	1.4
	MIAT	69.8 ± 3.9	74.8 ± 4.0	+7.2	<0.05	0.7

OPEN ACCESS

	Control	70.0 ± 4.2	70.3 ± 4.0	+0.4	0.89	0.1

Source: Computed From Primary Data

The results in Table 2 demonstrate that the HIAT group experienced the most substantial improvements in all physiological outcomes compared to the MIAT and control groups. For VO2max, the HIAT group showed a significant 12.3% increase (from 45.1 to 50.7 ml/kg/min, p<0.01, d=1.6), compared to a 6.1% increase in the MIAT group (44.8 to 47.5 ml/kg/min, p<0.05, d=0.9) and negligible change in the control group (0.7%, p=0.82). The large effect size for HIAT (d=1.6) suggests a robust improvement in aerobic capacity, likely due to the high metabolic demand of interval training, which aligns with prior research (Helgerud et al., 2007). Similarly, RHR decreased significantly in the HIAT group by 8.2% (68 to 62 bpm, p<0.05, d=1.1), with a non-significant trend in the MIAT group (4.1%, p=0.06) and minimal change in the control group (1.5%, p=0.71), indicating improved cardiovascular efficiency in the HIAT group. For anaerobic threshold, the HIAT group improved by 14.5% (p<0.01, d=1.4), compared to 7.2% in the MIAT group (p<0.05, d=0.7) and no change in the control group (0.4%, p=0.89). These findings suggest that HIAT is more effective than MIAT in enhancing aerobic capacity and cardiovascular adaptations in U-14 cricket players, supporting the hypothesis that higher-intensity training elicits greater physiological benefits (Buchheit & Laursen, 2013). The lack of significant changes in the control group underscores the necessity of structured aerobic training to achieve these outcomes.

Table 3: Skill-Based Outcomes Pre- and Post-Intervention Caption: Changes in skill-based outcomes (batting accuracy, bowling speed, fielding efficiency) for the high-intensity aerobic training (HIAT), moderate-intensity aerobic training (MIAT), and control groups after an 8-week intervention.

Outcome	Group	Pre-Intervention	Post-Intervention	Change (%)	p-value*	Effect Size (Cohen's d)
Batting Accuracy (hits/20)	HIAT	13.4 ± 1.8	15.4 ± 1.6	+15.2	<0.05	1.0
	MIAT	13.2 ± 1.7	14.5 ± 1.5	+10.1	<0.05	0.8
	Control	13.3 ± 1.9	13.5 ± 1.8	+1.5	0.77	0.1
Bowling Speed (km/h)	HIAT	92.1 ± 4.2	93.0 ± 4.0	+1.0	0.44	0.2
	MIAT	91.8 ± 3.9	92.5 ± 3.7	+0.8	0.51	0.2
	Control	92.0 ± 4.1	92.3 ± 4.0	+0.3	0.80	0.1
Fielding Efficiency (s)	HIAT	18.5 ± 1.2	18.2 ± 1.1	-1.6	0.61	0.2
	MIAT	18.4 ± 1.3	18.1 ± 1.2	-1.6	0.59	0.2
	Control	18.6 ± 1.4	18.5 ± 1.3	-0.5	0.88	0.1

Source: Computed From Primary Data

Table 3 reveals that aerobic training had a selective impact on skill-based outcomes, with significant improvements observed only in batting accuracy. The HIAT group improved batting accuracy by 15.2% (from 13.4 to 15.4 hits out of 20, p<0.05, d=1.0), and the MIAT group improved by 10.1% (13.2 to 14.5 hits, p<0.05, d=0.8), while the control group showed minimal change (1.5%, p=0.77). The moderate to large effect sizes for HIAT and MIAT suggest that aerobic training enhances batting performance, possibly by improving recovery and reducing fatigue during technical tasks, as supported by prior studies in youth sports (Meylan et al., 2014). In contrast, no significant group x time interactions were observed for bowling speed (p=0.31) or fielding efficiency (p=0.42). Bowling speed showed minimal changes across all groups (HIAT: +1.0%, MIAT: +0.8%, control: +0.3%), with small effect sizes (d=0.1–0.2), indicating that aerobic training alone does not enhance the explosive power required for bowling (Cronin et al., 2017). Similarly, fielding efficiency improved only marginally (HIAT: -1.6%, MIAT: -1.6%, control: -0.5%), with no significant differences and small effect sizes (d=0.1–0.2), suggesting that aerobic training has limited impact on the coordination and agility demands of fielding. These findings indicate that while aerobic training benefits batting accuracy, likely due to improved endurance and focus under fatigue, it is insufficient to enhance bowling or fielding performance, which may require targeted anaerobic or neuromuscular training.

Results

CC BY OPEN ACCESS

Thirty male U-14 cricket players (age: 13.2 ± 0.6 years) were randomized into high-intensity aerobic training (HIAT, n=10), moderate-intensity aerobic training (MIAT, n=10), and control (n=10) groups, with no significant baseline differences in age, height, body mass, body fat, cricket experience, or VO2max ($p>0.79$ for all, Table 1). After an 8-week intervention, significant group x time interactions were observed for physiological outcomes (Table 2). The HIAT group showed the greatest improvements in VO2max (+12.3%, 45.1 ± 3.2 to 50.7 ± 3.5 ml/kg/min, $p<0.01$, d=1.6), followed by MIAT (+6.1%, 44.8 ± 2.9 to 47.5 ± 3.1 ml/kg/min, $p<0.05$, d=0.9), while the control group showed no change (+0.7%, p=0.82). Resting heart rate decreased significantly in HIAT (-8.2%, 68 ± 5 to 62 ± 4 bpm, $p<0.05$, d=1.1), with a non-significant trend in MIAT (-4.1%, p=0.06) and no change in control (-1.5%, p=0.71). Anaerobic threshold improved significantly in HIAT (+14.5%, $p<0.01$, d=1.4) and MIAT (+7.2%, $p<0.05$, d=0.7), but not in control (+0.4%, p=0.89). For skill-based outcomes (Table 3), batting accuracy improved significantly in HIAT (+15.2%, 13.4 ± 1.8 to 15.4 ± 1.6 hits/20, $p<0.05$, d=1.0) and MIAT (+10.1%, 13.2 ± 1.7 to 14.5 ± 1.5 hits/20, $p<0.05$, d=0.8), but not in control (+1.5%, p=0.77). No significant changes were observed in bowling speed (HIAT: +1.0%, MIAT: +0.8%, control: +0.3%, p=0.31) or fielding efficiency (HIAT: -1.6%, MIAT: -1.6%, control: -0.5%, p=0.42) across groups. These findings indicate that HIAT is more effective than MIAT for enhancing physiological outcomes, particularly VO2max and anaerobic threshold, while both training modalities improve batting accuracy, with no significant impact on bowling speed or fielding efficiency.

Discussion

The results of this 8-week randomized controlled trial demonstrate that high-intensity aerobic training (HIAT) is more effective than moderate-intensity aerobic training (MIAT) and control conditions in improving physiological outcomes in U-14 male cricket players, with significant enhancements in VO2max (+12.3%, $p<0.01$, d=1.6), resting heart rate (-8.2%, $p<0.05$, d=1.1), and anaerobic threshold (+14.5%, $p<0.01$, d=1.4) in the HIAT group compared to MIAT (VO2max: +6.1%, $p<0.05$, d=0.9; anaerobic threshold: +7.2%, $p<0.05$, d=0.7) and control (no significant changes). These findings align with prior research indicating that HIAT elicits greater cardiovascular adaptations in adolescents due to its higher metabolic demand (Helgerud et al., 2007; Buchheit & Laursen, 2013). The superior improvements in VO2max and anaerobic threshold in the HIAT group suggest enhanced aerobic capacity and efficiency, which are critical for sustaining performance during prolonged cricket matches involving repeated high-intensity efforts (Johnstone et al., 2014). Both HIAT and MIAT improved batting accuracy (+15.2% and +10.1%, respectively, $p<0.05$), likely due to improved recovery and reduced fatigue during technical tasks, supporting the hypothesis that aerobic fitness enhances certain skill-based outcomes (Meylan et al., 2014). However, no significant improvements were observed in bowling speed or fielding efficiency across groups ($p>0.31$), indicating that aerobic training alone does not address the explosive power or neuromuscular demands of these skills (Cronin et al., 2017). The absence of baseline differences between groups ($p>0.79$) confirms the study's robust design, ensuring that observed effects are attributable to the interventions. Practical Implications: Coaches should prioritize HIAT in U-14 cricket training to optimize aerobic capacity, which may support sustained performance and batting accuracy, but incorporate specific anaerobic or strength training to enhance bowling and fielding. Limitations: The small sample size (n=30), male-only cohort, and 8-week duration limit generalizability and long-term insights. Future research should explore combined training protocols, include female players, and extend the intervention period to assess sustained effects.

References

- Buchheit, M., & Laursen, P. B. (2013). High-intensity interval training, solutions to the programming puzzle: Part I: Cardiopulmonary emphasis. Sports Medicine, 43(5), 313–338.
- Cronin, J., Lawton, T., Harris, N., Kilding, A., & McMaster, D. T. (2017). A brief review of handgrip strength and sport performance. Journal of Strength and Conditioning Research, 31(11), 3187–3217.
- Helgerud, J., Høydal, K., Wang, E., Karlsen, T., Berg, P., Bjerkaas, M., ... & Hoff, J. (2007). Aerobic high-intensity intervals improve VO2max more than moderate training. Medicine & Science in Sports & Exercise, 39(4), 665–671.
- Impellizzeri, F. M., Marcora, S. M., Castagna, C., Reilly, T., Sassi, A., Iaia, F. M., & Rampinini, E. (2006). Physiological and performance effects of generic versus specific aerobic training in soccer players. International Journal of Sports Medicine, 27(6), 483–492.

- Johnstone, J. A., Ford, P. A., Hughes, G., Watson, T., & Garrett, A. T. (2014). Bioenergetic demands of cricket: A review. Journal of Sports Sciences, 32(10), 911–921.
- Lloyd, R. S., & Oliver, J. L. (2012). The youth physical development model: A new approach to long-term athletic development. Strength and Conditioning Journal, 34(3), 61–72.
- Meylan, C., McMaster, T., Cronin, J., Mohammad, N. I., Rogers, C., & Deklerk, M. (2014). The effect of maturation on physical fitness and skill performance in youth rugby players. Journal of Science and Medicine in Sport, 17(1), 92–97.
- Noakes, T. D., & Durandt, J. J. (2000). Physiological requirements of cricket. Journal of Sports Sciences, 18(12), 919–929.
- Ratel, S., Duche, P., & Williams, C. A. (2006). Muscle fatigue during high-intensity exercise in children. Sports Medicine, 36(12), 1031–1065.
- Stretch, R. A., & Orchard, J. (2003). Cricket injuries: A longitudinal study of the nature of injuries to South African cricketers. British Journal of Sports Medicine, 37(3), 250–253.
- Buchheit, M., & Laursen, P. B. (2013). High-intensity interval training, solutions to the programming puzzle: Part I: Cardiopulmonary emphasis. Sports Medicine, 43(5), 313–338.
- Cronin, J., Lawton, T., Harris, N., Kilding, A., & McMaster, D. T. (2017). A brief review of handgrip strength and sport performance. Journal of Strength and Conditioning Research, 31(11), 3187–3217.
- Helgerud, J., Høydal, K., Wang, E., Karlsen, T., Berg, P., Bjerkaas, M., ... & Hoff, J. (2007). Aerobic high-intensity intervals improve VO2max more than moderate training. Medicine & Science in Sports & Exercise, 39(4), 665–671.
- Johnstone, J. A., Ford, P. A., Hughes, G., Watson, T., & Garrett, A. T. (2014). Bioenergetic demands of cricket: A review. Journal of Sports Sciences, 32(10), 911–921.
- Meylan, C., McMaster, T., Cronin, J., Mohammad, N. I., Rogers, C., & Deklerk, M. (2014). The effect of maturation on physical fitness and skill performance in youth rugby players. Journal of Science and Medicine in Sport, 17(1), 92–97.

CC BY OPEN ACCESS